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Senate Hearings

GOVERNMENT

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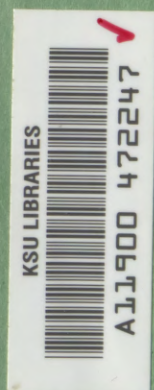
PUBLIC WORKS AND ATOMIC ENERGY COMMISSION APPROPRIATIONS

H.R. 11641

90th CONGRESS, FIRST SESSION

Fiscal Year 1968

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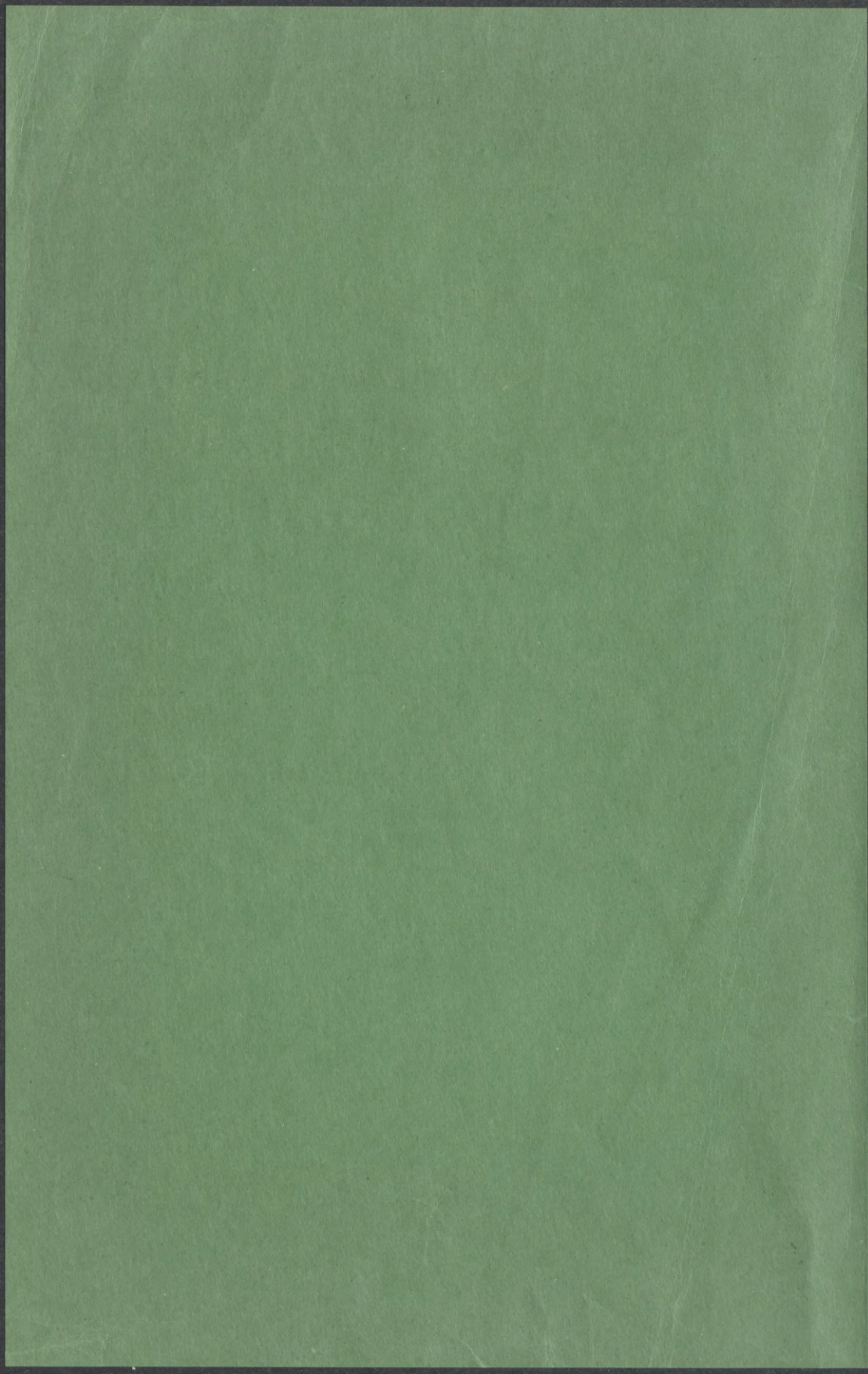


Part 4

TENNESSEE VALLEY AUTHORITY • ATOMIC ENERGY COMMISSION

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION





PUBLIC WORKS AND ATOMIC ENERGY COMMISSION

APPROPRIATIONS FOR FISCAL YEAR 1968

HEARINGS

BEFORE THE

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

UNITED STATES SENATE

NINETIETH CONGRESS

FIRST SESSION

ON

H.R. 11641

MAKING APPROPRIATIONS FOR CERTAIN CIVIL FUNCTIONS ADMINISTERED BY THE DEPARTMENT OF DEFENSE, THE PANAMA CANAL, CERTAIN AGENCIES OF THE DEPARTMENT OF THE INTERIOR, THE ATOMIC ENERGY COMMISSION, THE ATLANTIC-PACIFIC INTEROCEANIC CANAL STUDY COMMISSION, THE DELAWARE RIVER BASIN COMMISSION, INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN, THE TENNESSEE VALLEY AUTHORITY, AND THE WATER RESOURCES COUNCIL, FOR THE FISCAL YEAR ENDING JUNE 30, 1968, AND FOR OTHER PURPOSES

Printed for the use of the Committee on Appropriations



U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 1967

1968 FISCAL YEAR
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**PUBLIC WORKS AND ATOMIC ENERGY COMMISSION
APPROPRIATIONS FOR FISCAL YEAR 1968**

THURSDAY, AUGUST 3, 1967

**U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, D.C.**

The subcommittee met at 10:05 a.m., in room 1318, New Senate Office Building, Hon. Lister Hill (chairman) presiding;
Present: Senators Hill, Bible, Pastore, Anderson, and Hruska.

ATOMIC ENERGY COMMISSION

STATEMENT OF HON. GLENN T. SEABORG, CHAIRMAN; ACCOMPANIED BY WILFRID E. JOHNSON, JAMES T. RAMEY, AND GERALD F. TAPE, COMMISSIONERS; E. J. BLOCH, DEPUTY GENERAL MANAGER; JOHN P. ABBADESSA, CONTROLLER; JOSEPH F. HENNESSEY, GENERAL COUNSEL; JOHN A. ERLEWINE, ASSISTANT GENERAL MANAGER FOR OPERATIONS; GEORGE M. KAVANAGH, ASSISTANT GENERAL MANAGER FOR REACTORS; SPOFFORD G. ENGLISH, ASSISTANT GENERAL MANAGER FOR RESEARCH AND DEVELOPMENT; GEORGE F. QUINN, ASSISTANT GENERAL MANAGER FOR PLANS AND PRODUCTION; PAUL W. McDANIEL, DIRECTOR, DIVISION OF RESEARCH; CHARLES WINTER, DEPUTY DIRECTOR, DIVISION OF MILITARY APPLICATION; DAVID B. ANTHONY, ASSISTANT DIRECTOR, DIVISION OF MILITARY APPLICATION; JOHN A. DERRY, DIRECTOR, DIVISION OF CONSTRUCTION; VICTOR CORSO, ASSISTANT CONTROLLER FOR BUDGETS; AND ROBERT H. BAUER, DEPUTY ASSISTANT CONTROLLER FOR BUDGETS

BUDGET REQUEST AND HOUSE ALLOWANCE

Senator HILL. The subcommittee will kindly come to order.

The budget estimates for the Atomic Energy Commission total \$2,646,100,000, consisting of \$2,169,900,000 for "Operating expenses" and \$476,200,000 for "Plant and capital equipment." The House allowed a total of \$2,492,733,000, an increase of \$202 million above the fiscal year 1967 appropriations, and a reduction of \$153,367,000 below the fiscal year 1968 estimates.

APPEALS

The Commission requests restoration of \$2,302,000 for "Operating expenses" and \$1,900,000 for "Plant and capital equipment," a total

of \$4,202,000. Dr. Seaborg's letter and the justifications will appear in the record at this point.

(The letter and justifications follow:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., July 28, 1967.

HON. CARL HAYDEN,
Chairman, Committee on Appropriations,
United States Senate.

DEAR SENATOR HAYDEN: The House of Representatives on July 25, 1967 passed H.R. 11641, "A bill making appropriations for certain civil functions administered by the Department of Defense, the Panama Canal, certain agencies of the Department of the Interior, the Atomic Energy Commission, . . . for the fiscal year ending June 30, 1968, and for other purposes."

As passed by the House, the bill makes certain reductions in the appropriations requested for the atomic energy program. We have made a careful review of the areas affected by the House bill and propose amendments thereto for consideration by your committee.

Enclosed are fifteen copies of the amendments proposed by the Atomic Energy Commission to H.R. 11641, together with the reasons therefor.

Cordially,

GLENN T. SEABORG, *Chairman.*

Enclosures: Proposed Amendments to the Public Works and Atomic Energy Commission Appropriation Bill, 1968.

PROPOSED AMENDMENTS TO THE PUBLIC WORKS AND ATOMIC ENERGY COMMISSION
APPROPRIATION BILL, 1968, ATOMIC ENERGY COMMISSION (H.R. 11641)

(As Passed by the House of Representatives)

Estimate submitted to the House:

Operating Expenses-----	\$2, 169, 900, 000
Plant and Capital Equipment-----	476, 200, 000
Total -----	<u>2, 646, 100, 000</u>

Bill as passed by the House:

Operating Expenses-----	2, 125, 000, 000
Plant and Capital Equipment-----	367, 733, 000
Total -----	<u>2, 492, 733, 000</u>

Change by House:

Operating Expenses-----	-44, 900, 000
Plant and Capital Equipment-----	-108, 467, 000
Total -----	<u>-153, 367, 000</u>

PROPOSED AMENDMENTS TO BILL

(1) Page 23, line 24, strike out "\$2,125,000,000" and insert in lieu thereof "\$2,127,302,000."

(2) Page 25, line 10, strike out "\$367,733,000" and insert in lieu thereof "\$369,633,000."

HOUSE REPORT No. 505

Operating expenses

Appropriation, 1967-----	\$1, 923, 000, 000
Budget estimate, 1968 (as amended)-----	2, 169, 900, 000
Recommended, 1968-----	2, 125, 000, 000
Comparison:	
Appropriation, 1967-----	+202, 000, 000
Budget estimate, 1968-----	-44, 900, 000

Of the net increase of \$202,000,000 allowed over fiscal year 1967, \$135,161,000 represents the new appropriations required to finance activities funded during

fiscal year 1967 with carryover unobligated balances from fiscal year 1966. In addition, an increase of \$17,869,000 is required in direct appropriations to offset a reduction in estimated program revenues in fiscal year 1968. Major program increases include: \$37,000,000 for the Weapons program; \$39,738,000 for the Reactor Development program; \$18,210,000 for the Physical Research program; and \$7,380,000 for civilian applications of nuclear explosives.

Funds under this heading are distributed as shown in the following table:

Program	Appropriation, 1967	Budget estimate, 1968	Recommended in bill	Change from budget estimate
Raw materials.....	\$162,515,000	\$129,594,000	\$129,094,000	-\$500,000
Special nuclear materials.....	353,728,000	346,420,000	345,920,000	-500,000
Weapons:				
Production, storage, and surveillance.....	244,300,000	236,800,000	236,800,000	-----
Research and development.....	215,150,000	222,100,000	222,100,000	-----
Testing atomic weapons.....	198,480,000	236,100,000	236,100,000	-----
Special test detection activities.....	5,570,000	5,500,000	5,500,000	-----
Total weapons.....	663,500,000	700,500,000	700,500,000	-----
Reactor development:				
Civilian power reactors.....	106,480,000	122,820,000	121,250,000	-1,570,000
Cooperative power reactor demonstration.....	17,116,000	28,783,000	28,783,000	-----
Euratom.....	2,000,000	2,500,000	2,500,000	-----
Merchant ship reactors.....	100,000	100,000	100,000	-----
Army power reactors.....	700,000	900,000	-----	-900,000
Naval propulsion reactors.....	94,900,000	106,700,000	106,700,000	-----
Space propulsion systems.....	77,575,000	90,400,000	83,000,000	-7,400,000
Space electric power development.....	61,497,000	60,740,000	60,990,000	+250,000
Terrestrial electric power development.....	5,595,000	8,125,000	7,500,000	-625,000
General reactor technology.....	50,100,000	51,000,000	50,100,000	-900,000
Advanced systems research and development.....	14,850,000	11,035,000	8,535,000	-2,500,000
Nuclear safety.....	32,015,000	35,000,000	35,000,000	-----
Operational services.....	4,792,000	3,000,000	3,000,000	-----
Total reactor development.....	467,720,000	521,103,000	507,458,000	-13,645,000
Physical research:				
High energy physics.....	108,073,000	116,500,000	118,000,000	+1,500,000
Medium energy physics.....	11,000,000	11,100,000	11,100,000	-----
Low energy physics.....	28,336,000	29,400,000	29,400,000	-----
Mathematics and computer research.....	6,107,000	6,200,000	6,200,000	-----
Chemistry research.....	52,864,000	55,000,000	55,000,000	-----
Metallurgy and materials research.....	26,284,000	27,600,000	27,600,000	-----
Controlled thermonuclear research.....	22,626,000	26,200,000	26,200,000	-----
Total physical research.....	255,290,000	272,000,000	273,500,000	+1,500,000
Biology and medicine:				
Biology and medicine.....	86,000,000	90,450,000	90,450,000	-----
Training, education and information.....	16,158,000	17,855,000	16,355,000	-1,500,000
Isotopes development.....	7,838,000	8,375,000	7,838,000	-537,000
Civilian application of nuclear explosives (Plow-share).....	13,335,000	21,865,000	20,715,000	-1,150,000
Communities.....	10,137,000	7,223,000	6,871,000	-352,000
Program direction and administration.....	88,676,000	94,000,000	93,200,000	-800,000
Security investigations.....	6,443,000	6,731,000	6,731,000	-----
Cost of work for others.....	17,200,000	13,224,000	13,224,000	-----
Total program costs.....	2,148,540,000	2,229,340,000	2,211,856,000	-17,484,000
Change in selected resources.....	8,756,000	12,818,000	7,518,000	-5,300,000
Gross obligations.....	2,157,296,000	2,242,158,000	2,219,374,000	-22,784,000
Revenues applied.....	-77,186,000	-59,317,000	-59,317,000	-----
Net obligations.....	2,080,110,000	2,182,841,000	2,160,057,000	-22,784,000
Unobligated balance, start of year.....	-170,218,000	-12,941,000	-35,057,000	-22,116,000
Unobligated balance, end of year.....	12,941,000	-----	-----	-----
Transfer to General Services Administration.....	167,000	-----	-----	-----
Appropriation.....	1,923,000,000	2,169,900,000	2,125,000,000	-44,900,000

Raw Materials.—The decrease of \$500,000 in the budget estimate is in accordance with the reduction made in the authorization bill. The Committee recommends that \$395,000 of the reduction be applied to the item for "resource investigations." The discovery and development of new uranium reserves should be the responsibility of the U.S. Geological Survey and appropriate provisions for this purpose should be reflected in its future budget proposals.

The amount allowed for resource investigations, \$355,000, includes an increase of \$100,000 to be allocated to colleges and universities in uranium producing areas for special study of the uranium supply problem.

Special Nuclear Materials.—The reduction of \$500,000 recommended by the Committee is based on a history of cost underruns for the program during the past several years.

Weapons.—Because of the critical budgetary situation, the Committee has not approved the additional unbudgeted amount of \$15,000,000 contained in the authorization bill. The Committee believes that the budgeted amount of \$700,500,000 for operating expenses of the weapons program, an increase of \$37,000,000, and the \$110,500,000 for new weapons production facilities included under the Plant and Capital Equipment appropriation should make adequate provision for essential additional requirements in fiscal year 1968.

Reactor development program.—The Committee has recommended a total of \$507,458,000 for the reactor development program, a decrease of \$13,645,000 in the budget estimate, including a net reduction of \$1,750,000 made in the authorization bill.

Civilian power reactors.—The reduction of \$1,570,000 made in the civilian power reactors program includes: (1) a decrease of \$370,000 for the Bonus superheat reactor. The \$2,000,000 allowed should be adequate pending review of the current problems being encountered; (2) a decrease of \$600,000 in the request for the Heavy water organic cooled reactor. The Atomic Energy Commission has terminated this program and the allowance of \$2,700,000 should be adequate to continue any essential research and development required to maintain the option to exploit this type of reactor in the future; and (3) a reduction of \$600,000 in the High-temperature gas reactors advanced development program. The allowance of \$7,300,000, the same as the current year, should be adequate for advance work on larger reactors in view of the concentrated effort being made under the cooperative program.

Army power reactors.—The Committee has deleted the \$900,000 budgeted for this item. Essential research and development work should be financed out of general research and development funds. The Committee agrees with the Joint Committee on Atomic Energy which noted that there was an apparent lack of interest in and requirements for the development of reactors for military application and recommended consideration be given to consolidating the program with the terrestrial electric power development program.

Space propulsion systems (Rover).—The Committee recommends a total reduction of \$9,700,000, including \$2,300,000 under the related selected resources item, in the budget request for operating expenses for the nuclear rocket program including initiation of the NERVA engine development program. The original budget request for the program, \$60.4 million, provided only for the continuation of the NERVA technology program. A budget amendment, submitted in House Document No. 62, provided for an additional \$40,000,000 for initiation of the NERVA engine development program leading to flight testing in the 1975-76 period. The Committee carefully reviewed the request to determine if it was not advisable, in light of the critical budgetary situation, to continue only the technology program and defer to subsequent fiscal years the initiation of the engine development. However, as tests to date indicate that there would be significant performance advantages for advanced space missions utilizing a nuclear rocket engine and deferment of the program would result in costly elimination of a large portion of the unique government-industry nuclear rocket capability which has been developed, the Committee has recommended continuation of the development program but at a reduced level. The total of \$90.7 million approved for operating expenses, together with \$4,000,000 for construction and capital equipment, is based on the minimum funds required to maintain and effectively utilize the current manpower engaged in the program.

Space electric power development.—The net increase of \$250,000 allowed is in accordance with the authorization bill which provides for a reduction of \$1,400,000 in the SNAP-8 reactor program; a decrease of \$1,350,000 in the power conversion development program; and an increase of \$3,000,000, for the thermionics effort, including \$2,000,000 transferred from Advanced systems research and development.

Terrestrial electric power development.—The Committee has allowed \$7,500,000, an increase of \$1,905,000 over the 1967 level, and a decrease of \$625,000 in the budget estimate. The allowance should be adequate if full exploitation is made of the technology and experience gained in the space nuclear systems program involving similar technology.

General reactor technology.—The Committee has allowed \$50,100,000, the same as 1967, and a decrease of \$900,000 in the budget estimate. The allowance should be adequate to continue essential work considering the increase of \$1,100,000 made in the level of this program in fiscal year 1967.

Advanced systems research and development.—The reduction of \$2,500,000 imposed in this program reflects the transfer of \$2,000,000 to the Space nuclear systems division as provided for in the authorization bill and deletion of a new item of \$500,000 for plant engineering concepts. It is believed that the Atomic Energy Commission should be able to absorb this latter requirement within the \$8,535,000 allowed.

Physical research—High energy physics.—The Committee has approved an increase of \$1,500,000 in the budget request, as provided for in the authorization bill, to provide for more efficient utilization of the capacity of the Stanford linear accelerator. These additional funds, together with \$1,500,000 to be re-programmed within funds available for the physical research program, will provide for a 15 shift per week basis in lieu of the ten shift basis provided for in the budget estimate.

Training, education, and information.—The reduction of \$1,500,000 in the estimate is in accordance with the action taken in the authorization bill. The Committee reduction includes deletion of the \$100,000 requested for design of internal exhibits for the New York Hall of Science pending firming up of building plans. It is also expected that a proportionate share of the reduction will be applied to the increase of \$190,000 proposed for the operation of the Puerto Rico Nuclear Center.

Isotopes development.—The Committee has allowed \$7,838,000, the same as the current level, and a reduction of \$537,000 in the budget estimate. Because of budgeted reductions totaling \$550,000 in radiation processing applications development and radiation preservation of foods, sufficient funds should be available to expand the development of radioisotope production and materials and thermal applications in fiscal year 1968.

Civilian application of nuclear explosives.—The Committee has allowed a total of \$20,715,000, an increase of \$7,380,000 in the 1967 appropriations, and a reduction of \$1,150,000 in the estimate. The Committee reduction has been applied to the item for scientific experiments. Continuation of the current level of funding \$350,000, should be adequate for this purpose as essential requirements can be met by maximum exploitation of other scheduled experiments for scientific value.

Community program.—The reduction of \$352,000 made in the request for this program includes a general reduction of \$200,000 made in the authorization bill and an additional reduction of \$152,000 made by the Committee to delete the total of \$352,000 budgeted to establish a separate fire department for the Los Alamos Community. It is believed that the Atomic Energy Commission should continue to maintain the present fire department, serving both the community and the technical area, pending further review and study.

Program direction and Administration.—The Committee has allowed a total of \$93,200,000, an increase of \$4,524,000 in the 1967 amount, and a decrease of \$800,000 in the estimate. The Committee believes that the increase granted, primarily required for additional contractual services and supplies, including automatic data processing, and mandatory salary costs and benefits, should be adequate to provide for the most essential needs of the Commission during fiscal year 1968.

Changes in selected resources.—The reduction in this item, \$5,300,000, is based on the reductions recommended by the Committee in the above programs, including \$2,300,000 for the Rover program.

Unobligated balances.—The additional general reduction recommended of \$22,116,000, is based on the estimated carryover fund situation at the end of the fiscal year 1967, including \$13,664,000 reflected in the authorization bill.

Plant and capital equipment

Appropriation, 1967.....	\$276,030,000
Budget estimate, 1968.....	476,200,000
Recommended, 1968.....	367,733,000
Comparison:	
Appropriation, 1967.....	+91,703,000
Budget estimate, 1968.....	—108,467,000

The reduction in this item includes the following made in the authorization bill: deletion of \$4,000,000, budgeted for the Omnitron accelerator, Lawrence Radiation Laboratory, California; a decrease of \$2,667,000 in the budget request of \$10,000,000 for planning of the 200 Bevatron Accelerator, Illinois; and deletion of \$1,000,000 budgeted for construction planning, and design due to the availability of carryover balances.

In reference to the funds allowed for the 200 Bev accelerator at Weston, Illinois, the Committee has not approved the revised request of the Atomic Energy Commission to utilize the funds for certain procurement and assembly of components as well as the original proposed architect-engineer work. Because of the current critical budgetary situation, the Committee recommends the 1968 funds be restricted to architect-engineer work and has restored the phrase "A.E. only" in connection with the project allowance as indicated in the table below.

In addition to the above, the Committee has made the following additional reductions in the 1968 request:

(1) Deletion of the \$1,400,000 proposed for the addition to the biomedical building, Rio Piedras, Puerto Rico. The Committee believes that in light of the present budgetary situation considerations of the addition should be deferred to a later date.

(2) A reduction of \$59,000,000 in the request for the Fast flux test facility and a reduction of \$39,900,000 in the request for the Meson physics facility, Los Alamos Scientific Laboratory, New Mexico, to convert the financing to an annual appropriation basis in lieu of the full funding proposed in the budget estimates. Because of the large construction costs involved in these two projects, the Committee feels it is desirable to provide at this time only the funds needed for obligation in fiscal year 1968 to permit an opportunity for Committee review annually of construction costs and progress, similar to the annual financing procedure followed in connection with other agencies covered by the bill.

(3) Deletion of the \$500,000 proposed for the acquisition of another small accelerator for use by a university. As the Committee has funded such small accelerators annually in recent years, it is believed an additional such purchase can readily be deferred at this time.

A breakdown of the plant and capital equipment program allowed is shown on the following table:

Project	Construction project	Allocation
68-1-a	Hot laboratory, New Brunswick, N.J.	\$1,000,000
68-1-b	Replacement waste storage tanks, Richland, Wash.	2,500,000
68-2-a	New weapons production capabilities, various locations.	100,500,000
68-2-b	Weapons production, development and test installations.	10,000,000
68-3-a	Research and development test plants, Project Rover, Los Alamos Scientific Laboratory, N. Mex., and Nevada Test Site, Nev.	2,000,000
68-3-b	Isotopic space systems facility, Sandia Base, N. Mex.	2,250,000
68-3-c	Modifications to reactors.	1,000,000
68-4-a	Accelerator and reactor additions and modifications, Brookhaven National Laboratory, N.Y.	1,095,000
68-4-b	Accelerator improvements, zero gradient synchrotron, Argonne National Laboratory, Ill.	1,900,000
68-4-c	Accelerator improvements, Lawrence Radiation Laboratory, Berkeley, Calif.	1,740,000
68-4-d	Accelerator improvements, Cambridge and Princeton accelerators.	400,000
68-4-e	Accelerator improvements, Stanford Linear Accelerator Center, Calif.	865,000
68-4-f	200 Bev accelerator, Du Page and Kane Counties, near Chicago, Ill., (A.E. only)	7,333,000
68-4-g	Laboratory and energy storage facility, Los Alamos Scientific Laboratory, N. Mex.	8,500,000
68-6	General plant projects.	39,175,000
67-3-a	Fast flux test facility.	21,000,000
66-5-h	Meson physics facility, Los Alamos Scientific Laboratory, N. Mex.	10,400,000
	Subtotal construction projects.	211,658,000
	Capital equipment not related to construction.	156,075,000
	Total appropriations.	367,733,000

AMENDMENT (1) : INCREASE OF \$2,302,000 IN THE APPROPRIATION FOR OPERATING EXPENSES

The Commission requests restoration of \$2,302,000 of the reduction made by the House of Representatives. The following table summarizes the reductions made by the House and the amount requested for restoration.

SUMMARY OF OPERATING EXPENSES

	AEC request	House change	Restoration requested
Raw materials.....	\$129,594,000	—\$500,000	(1)
Special nuclear materials.....	346,420,000	—500,000	
Weapons.....	700,500,000		
Reactor development.....	521,103,000	—13,645,000	\$1,600,000
Physical research.....	272,000,000	+1,500,000	
Biology and medicine.....	90,450,000		
Training, education and information.....	17,855,000	—1,500,000	
Isotopes development.....	8,375,000	—537,000	
Civilian applications of nuclear explosives.....	21,865,000	—1,150,000	
Communities.....	7,223,000	—352,000	152,000
Program direction and administration.....	94,000,000	—800,000	
Security investigations.....	6,731,000		
Cost of work for others.....	13,224,000		
Change in selected resources.....	12,818,000	—5,300,000	550,000
Revenues and reimbursements from non-Federal sources.....	—59,317,000		
Unobligated balance brought forward.....	—12,941,000	—22,116,000	
Total.....	2,169,900,000	—44,900,000	2,302,000

¹ While no funds are requested for restoration, the Commission is appealing the restrictions placed on the use of funds for this program as set forth in the House Report No. 505 on the Public Works and Atomic Energy Appropriation Bill, 1968, (H.R. 11641).

The reasons for the requested restoration are given below :

RAW MATERIALS—RESOURCE INVESTIGATIONS

The Commission is appealing (1) the recommended distribution of the reduction and (2) the restrictive language relating to the expenditure of funds, contained in the House Appropriations Committee report.

Of the \$500,000 reduction in operating costs, the Commission proposes that \$150,000 instead of the House amount of \$395,000, be applied to the item of resource investigation. The Commission would apply the balance of the \$500,000 House reduction to domestic U₃O₈ procurement and related costs.

The Commission also appeals the statement in the House report that within the amount allowed for resource investigations \$100,000 should be "allocated to colleges and universities in uranium producing areas for special study of the uranium supply problem." In this connection, while we intend to contract with institutions in the uranium producing areas, we would also like the opportunity to place contracts with other well qualified institutions regardless of geographic location.

We will work closely with the U.S. Geological Survey with the objective of increasing their efforts on topographic and geologic mapping in uranium areas and related activities in their program. However to supplement this work, the Commission after application to our \$750,000 request of the \$150,000 reduction mentioned above, intends to use the remaining \$600,000 for R&D contracts with educational and other nonprofit institutions, private research companies, and other government agencies to improve our knowledge of uranium occurrence and to develop new exploration concepts and instrumentation which will complement the private industry exploration effort.

REACTOR DEVELOPMENT PROGRAM—ARMY POWER REACTORS

It is requested that \$700,000 of the House reduction of \$900,000 against the Army Power Reactors category be restored. The requested restoration is required to support the Portable Medium Power Reactors effort. All of the power reactor effort is committed to the direct technical support, including prototype hardware presently being fabricated, of operating military land-based reactors. Currently operating military plants include the PM-1 at Sundance, Wyoming, the PM-3A at McMurdo Sound, Antarctica, the SM-1A at Fort Greely, Alaska, and the SM-1 and MH-1A barge at Fort Belvoir, Virginia. Included in the Portable Medium Power Reactors effort are (1) the design, development, fabrication and testing of an improved control rod actuator control console and power supplies which are presently being procured under a fixed price contract, (2) completion of an improved radioactive waste disposal system, (3) the design and procurement of improved reactor control rods, and (4) the procurement presently underway of a prototype uranium oxide replacement core. The military organizations

are actively supporting and are committed to continued operation of these plants while the AEC is committed to a minimal type of technical support.

We are accepting the recommendation in the House Appropriations report and the JCAE report to consolidate this program with the Terrestrial Electric Power Development Program.

REACTOR DEVELOPMENT PROGRAM—GENERAL REACTOR TECHNOLOGY

The Commission requests restoration of \$900,000 for this category. Thorough technical appraisals of the Commission's high priority efforts on fast breeders and other advanced reactor development programs have identified a number of technological areas in urgent need of substantially increased basic technology support. The General Reactor Technology program has been reoriented to serve these needs and has thereby become the major foundation of technology for these priority programs.

During the past two years many significant internal program adjustments have been made; many efforts have been cancelled and have been replaced with higher priority activities in response to the identified needs. Notwithstanding these cancellations and terminations, the requested FY 1968 General Reactor Technology budget (\$51 million) barely keeps pace with priority program needs and in fact will necessitate further curtailment of efforts at national laboratories due to the increased costs of goods and services we are experiencing.

In fact, if General Reactor Technology is held to the FY 1967 level as proposed by the House, closeout of major program activities must be taken in light of increased demands for irradiation services, principally supporting the LMFBR program, of about \$1.6 million more than had been expected at the time the FY 1968 budget request was prepared. Absorption of these costs alone within the \$51 million requested for General Reactor Technology in FY 1968 will result in reductions below the FY 1967 levels for several of our major activities.

During the past two years, and after considerable scrutiny, the Joint Committee on Atomic Energy has given support to the Commission's position that a strong and vital General Reactor Technology program is essential to the success of overall program goals. Specifically, "The Committee concurs with the Commission's view that a strong base program in metallurgy, engineering chemistry and physics is essential in order to provide the technological information necessary for the exercise of sound engineering judgments relative to the design and conduct of specific reactor projects. This program remains of vital importance as the AEC steps up its efforts in fast breeder reactor development."

In order to avoid loss of needed efforts within this program it is requested that the \$900,000 reduction in the General Reactor Technology program be restored.

COMMUNITY PROGRAM

It is requested that \$152,000 of the \$352,000 reduction made by the House be restored. It is the opinion of the Commission and in keeping with the intent of the community disposal legislation that the community be a separate entity and provide its own municipal services. The requested restoration is needed in order that the fire department at Los Alamos, instead of being operated by Government employees can be separated into two portions—the first to be operated by the community for its protection and the second to be operated by the contractor as a technical area fire department.

It would be the Commission's intention, subject to county government acceptance, to transfer to the county the existing Community portion of the fire department prior to expiration on September 28, 1967 of the authority to transfer municipal functions under the Atomic Energy Community Act. This fire department would then become a part of the municipal installation. The Commission would however, reserve the right to use the property and would operate the fire department until such time as Los Alamos County could fully staff and be in the position to assume operations.

CHANGES IN SELECTED RESOURCES

The House reduced this category by \$5,300,000. Of this amount restoration of \$550,000, representing the obligational authority necessary to finance the con-

tractors involved in the program restorations discussed above, is requested as follows:

	In thousands
Reactor development:	
Army reactors.....	\$250
General reactor technology.....	300
Total Selected Resources.....	550

AMENDMENT (2) : INCREASE OF \$1,900,000 IN THE APPROPRIATION FOR PLANT AND CAPITAL EQUIPMENT

The Commission requests restoration of the \$1,900,000 reduction made by the House Appropriations Committee. The following table summarizes the reductions made by the House Appropriations Committee and the requested restoration.

SUMMARY OF PLANT AND CAPITAL EQUIPMENT

	AEC request	House change	Restoration requested
Omnitron accelerator, Lawrence Radiation Laboratory, Berkeley Calif. (AE only).....	\$4,000,000	—\$4,000,000	-----
200 Bev. accelerator, Du Page and Kane Counties, near Chicago, Ill. (AE only).....	10,000,000	—2,667,000	(1)
Addition to biomedical building Rio Piedras, P.R.....	1,400,000	—1,400,000	\$1,400,000
Construction planning and design.....	1,000,000	—1,000,000	-----
67-3-a. Fast flux test facility.....	80,000,000	—59,000,000	-----
66-5-h. Meson physics facility, Los Alamos Scientific Laboratory, N. Mex.	50,300,000	—39,900,000	-----
All other construction projects.....	172,925,000	-----	-----
Capital equipment not related to construction.....	156,575,000	—500,000	500,000
Total.....	476,200,000	108,467,000	1,900,000

¹ While no funds are requested for restoration, the Commission is appealing the restrictions placed on the use of funds for this project as set forth in H. Rept. 505 on the Public Works and Atomic Energy Appropriation Bill, 1968 (H.R. 11641).

The reasons for the requested restoration are given below:

200 Bev Accelerator

The Commission is appealing the restrictive language in the House report relating to the use of funds for the 200 Bev Accelerator. In support of its request to amend the FY 1968 authorization for the 200 Bev Accelerator (Item 68-4-f), to include procurement and assembly of certain components required for initial portions of the injector system, the Commission cited the economic and other advantages which would accrue. The ability to proceed in FY 1968 with these components would permit the use of the Brookhaven AGS Conversion Injector design for the 200 Bev Accelerator and would afford us the following economies of joint procurement:

(1) A significant economic benefit results from procuring components of the injector jointly and concurrently with the Brookhaven National Laboratory (BNL) since fabrication of two identical units simultaneously results in a reduced unit cost for these items due in part to the reduced number of jigs and fixtures required in manufacture of the hardware. This will result in reduced cost for both the BNL and 200 Bev injectors. The resulting savings on the total cost (\$16 million) of both injectors is estimated at \$500,000.

(2) Furthermore, the National Accelerator Laboratory (NAL) would be able to save overhead procurement costs since the BNL purchasing staff would do the joint procurements. This savings will accrue throughout the entire 3 year period during which linac procurement and fabrication would take place. The total savings resulting from this factor is estimated to be about \$200,000.

(3) Finally, a year's delay in initiating procurement would result in a year's delay of the entire injector system since no significant compression of the injector procurement and assembly schedule can be achieved. The cost of the entire injection system (\$8 million) would therefore be increased due to escalation. Assuming an escalation of 5% the saving from immediate procurement would be about \$400,000.

In summary, the combined effect of price savings on components, savings in overhead resulting from joint procurement with BNL, and escalation related to acceleration of the procurement schedule are, therefore, estimated to be approximately \$1.0 million.

By going the joint procurement route and using the BNL linac design, there are also other advantages which would accrue to the 200 Bev effort. NAL would require less staff during procurement and fabrication stages of the project by working jointly with BNL; e.g., it would not be necessary for both BNL and NAL to have technical overseers at vendors' plants. Furthermore, less additional R&D effort will be required by the NAL for the injection system if they are working concurrently with BNL rather than working independently.

The schedule for procurement and assembly of the linac encompasses a three-year period followed by a period for debugging and tune-up of about two years. While this may appear to be a long time span for debugging and tune-up it must be emphasized that the intensity and quality of the output beam from the main ring is strongly dependent on the quality of the beam delivered by the injection system developed through preacceleration and acceleration in the linac. Having a greater time interval available to develop and shake-down operation of the linac will result in an improved injection system and ensure early productive operation of the entire accelerator.

Addition to Biomedical Building, Rio Piedras, Puerto Rico

Restoration of the \$1,400,000 for the addition to biomedical building at the Rio Piedras site of PRNC is requested. This addition is required in order to provide adequate working facilities for personnel engaged in training and education and in programmatic research activities. The present facility is so seriously overcrowded that it is beyond reasonable safety limits even though many of the staff have overflowed into space made available on a temporary basis by the University of Puerto Rico. In fact present space allocation per person in this facility is about one half of that normally required for an operation of this type.

The activities being pursued at this facility are important not only to U.S. objectives in Latin America but also the Commission's specific objectives. The education and training programs are oriented toward graduate training and research in medical, biomedical, radiochemistry, and radioisotope utilization areas. The programmatic research includes such areas as terrestrial ecology, control of schistosomiasis using nuclear methods, radiation and photochemistry, and solid state physics. An addition to the existing biomedical facility will not only relieve the seriously overcrowded condition but will permit greater exploitation of the full potential of these programs. Realizing this, the Commission assigned highest priority to the need for the addition to the PRNC biomedical facility in determining the construction items it would request Congress to approve in FY 1968.

Since submission of our FY 1968 request, the meeting of the leaders of the American Republics has been held at Punta del Este. During this meeting serious discussions were held on the expansion of Latin American scientific and technological capabilities and on hemispheric nuclear cooperation. As a result of recent visits to several Latin American countries, the Commission is convinced that the Puerto Rico Nuclear Center can and should play an important role in carrying out the programs to which President Johnson spoke at Punta del Este. The addition to the biomedical facility is important to this effort.

We are at an important crossroads in the development of the Puerto Rico Nuclear Center. In one direction is a viable education and training program of importance to national goals and objectives in Latin America coupled with a scientifically sound research program of importance to the Commission's overall program. In the other direction is mediocrity due to loss of senior scientific staff and low morale brought about by lack of proper facilities.

Low Energy Physics—University Accelerator

The Commission requests restoration of \$500,000 in Equipment funds for a Low Energy Accelerator.

The funds in the FY 1968 budget for a small accelerator were requested to initiate a new program at an emerging university or to meet the increasing needs for upgrading one of the AEC accelerator facilities at a university.

A research program centered around a small accelerator requires a modest operating budget and is ideally suited for strengthening academic capabilities in the physical sciences. Research conducted on such a machine can yield valuable information required by the AEC while at the same time increasing the quality of the academic staff and graduate students.

There are presently two main requirements for using a small accelerator for upgrading a university facility. One is to use a small cyclotron as an injector for

a large modern-day tandem Van de Graaff thus providing an accelerator combination which can provide an energy region for investigation which may be a factor of two higher than obtainable by a tandem Van de Graaff alone. The second requirement is brought about by investigations requiring more and more use of short-lived radioactive isotopes in the performance of their work. This requirement can in many cases be accomplished by the use of a small fixed energy, high intensity cyclotron.

Universities where a need for a small accelerator have been brought to the attention of the AEC, and which require funds of \$500,000 or less, but have not submitted formal proposals are as follows:

1. A 4 MeV de Graaff at the University of South Carolina.
2. Cyclotron injector at the University of Wisconsin.
3. Cyclotron injector at the University of Minnesota.
4. Cyclotron injector at Yale University.
5. Cyclotron for the production of short-lived radioactive isotopes at the University of California at Berkeley.

Since no formal proposals have been received from the above-mentioned universities no priority assignments can be made at this time.

BUDGET AMENDMENTS

(Excerpts from H. Doc. 62, 90th Cong., first sess., follow:)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND THE ATOMIC ENERGY COMMISSION APPROPRIATIONS, 1968

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., February 25, 1967.

The PRESIDENT,
The White House.

SIR: I have the honor to submit herewith for your consideration amendments to the request for appropriations transmitted in the budget for the fiscal year 1968 in the amounts of \$50,000,000 for the National Aeronautics and Space Administration and \$99,800,000 for the Atomic Energy Commission, as follows:

Budget appendix page	Heading	Requests pending	Proposed amendments	Revised requests
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION				
873	Research and development.....	\$4,324,500,000	\$27,500,000	\$4,352,000,000
876	Construction of facilities.....	54,200,000	22,500,000	76,700,000
ATOMIC ENERGY COMMISSION				
835	Operating expenses.....	2,144,800,000	40,000,000	2,184,800,000
838	Plant and capital equipment.....	348,200,000	59,800,000	408,000,000

The above budget amendments are for three projects which were still under consideration at the time the 1968 budget message was transmitted. Because provision was made in the 1968 budget for the possibility of proceeding with these projects, appropriations of the above amounts will not increase the overall budget totals.

The projects are as follows:

A nuclear powered rocket engine which will substantially increase our capabilities in space exploration. This engine will be developed jointly by the National Aeronautics and Space Administration and the Atomic Energy Commission under the Rover program. The 1968 budget amendments required for the National Aeronautics and Space Administration are \$27,500,000 for "Research and development" and \$22,500,000 for "Construction of facilities." The amendments required for the Atomic Energy Commission are \$40,000,000 for "Operating expenses" and \$1,000,000 for "Plant and capital equipment."

A meson physics facility for basic physical and biomedical research. This facility will be constructed by the Atomic Energy Commission at Los Alamos, N. Mex. An amount of \$4,700,000 has previously been appropriated for design. The 1968 budget amendment required is \$50,300,000 for "Plant and capital equipment."

The "Scyllac" facility for further investigation into controlled thermonuclear fusion as a potential source of electricity. This facility will be constructed by the Atomic Energy Commission at the Los Alamos Scientific Laboratory. The 1968 budget amendment required is \$8,500,000 for "Plant and capital equipment."

Authorizing legislation for these additional items will be proposed to the Congress by the National Aeronautics and Space Administration and the Atomic Energy Commission.

I recommend that the foregoing amendments to the budget for the fiscal year 1968 be transmitted to the Congress.

Respectfully yours,

CHARLES L. SCHULTZE,
Director of the Bureau of the Budget.

(Excerpts from H. Doc. 80, 90 Cong., first sess., follow:)

DECREASING BUDGET REQUEST FOR ATOMIC ENERGY COMMISSION

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., March 9, 1967.

The PRESIDENT,
The White House.

SIR: I have the honor to submit herewith for your consideration an amendment to the request for appropriations transmitted in the budget for the fiscal year 1968 involving a decrease in the amount of \$14,900,000 for the Atomic Energy Commission, as follows:

Budget appendix page	Heading	Requests pending	Proposed amendments	Revised requests
835 (as amended).	Operating expenses.....	\$2,184,800,000	-\$14,900,000	\$2,169,900,000

This amendment to the budget is made possible by an Atomic Energy Commission decision to phase out one of the three major projects for advanced nuclear power reactor development which the Atomic Energy Commission is pursuing in addition to its main-line effort to develop the so-called "fast breeder" power reactor. The Atomic Energy Commission will terminate the current development work on the heavy-water-moderated, organic-cooled reactor (HWO CR) concept for civilian power but will continue a research and development program on heavy water reactor technology.

The decision of the Atomic Energy Commission to cancel the HWO CR development program and to realine its heavy water reactor research and development program was made after an extensive study of the technical and economic characteristics of the HWO CR concept within the framework of heavy water technology generally.

A corresponding amendment to the Atomic Energy Commission's pending authorizing bill for the fiscal year 1968 will be proposed to the Congress by the Atomic Energy Commission.

I recommend that the foregoing amendment to the budget for the fiscal year 1968 be transmitted to the Congress.

Respectfully yours,

CHARLES L. SCHULTZE,
Director of the Bureau of the Budget.

(Excerpts from H. Doc. 111, 90th Cong., first sess., follow :)

ATOMIC ENERGY COMMISSION APPROPRIATION AMENDMENT FOR 1968

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., April 21, 1967.The PRESIDENT,
The White House.

SIR: I have the honor to submit herewith for your consideration an amendment to the request for appropriations transmitted in the budget for the fiscal year 1968 in the amount of \$68,200,000 for the Atomic Energy Commission, as follows:

ATOMIC ENERGY COMMISSION

Budget appendix page	Heading	Request pending	Proposed amendments	Revised request
838 (as amended).	Plant and capital equipment.....	\$408, 000, 000	\$68, 200, 000	\$476, 200, 000

This proposed amendment together with \$32,300,000 included in the 1968 budget estimate currently pending before the Congress will cover the cost of facilities necessary to provide modernized capabilities required for the production of nuclear weapons systems.

This amendment is in addition to the amendment included in House Document No. 62 transmitted to the Congress on February 28, 1967.

The amount requested herein when added to the amounts previously requested will not increase the totals proposed in the 1968 budget.

A corresponding amendment to the Atomic Energy Commission's pending authorizing bill for the fiscal year 1968 will be proposed to the Congress by the Atomic Energy Commission.

I recommend that the foregoing amendment to the budget for the fiscal year 1968 be transmitted to the Congress.

Respectfully yours,

CHARLES L. SCHULTZE,
Director of the Bureau of the Budget.

OPERATING EXPENSES, ATOMIC ENERGY COMMISSION

PROGRAM AND FINANCING

[In thousands of dollars]

	1968 request pending	1968 proposed amendment	1968 revised request
Program by activities:			
1. Reactor development.....	522, 303	-11, 200	511, 103
Items not changed.....	1, 704, 819	-----	1, 704, 819
Total program costs, funded.....	2, 227, 122	-11, 200	2, 215, 922
Change in selected resources.....	16, 518	-3, 700	12, 818
Total obligations.....	2, 243, 640	-14, 900	2, 228, 740

FINANCING AND EXPENDITURES

[In thousands of dollars]

	1968 request pending	1968 proposed amendment	1968 revised request
10 Total obligations (from program schedule)-----	2,243,640	-14,900	2,228,740
Financing:			
Receipts and reimbursements from:			
13 Trust fund accounts (-)-----	-3,334		-3,334
14 Non-Federal sources (-)-----	-55,506		-55,506
New obligational authority-----	2,184,800	-14,900	2,169,900
Relation of obligations to expenditures:			
10 Total obligations-----	2,243,640	-14,900	2,228,740
70 Receipts and other offsets (items 11-17)-----	-58,840		-58,840
71 Obligations affecting expenditures-----	2,184,800	-14,900	2,169,900
72 Obligated balance, start of year-----	1,036,041		1,036,041
74 Obligated balance, end of year (-)-----	-1,170,841	3,700	-1,167,141
90 Expenditures-----	2,050,000	-11,200	2,038,800

PROGRAM AND FINANCING

[In thousands of dollars]

	1968 request pending	1968 proposed amendment	1968 revised request
Program by activities:			
1. Reactor development-----	492,303	30,000	522,303
Items not changed-----	1,704,819		1,704,819
Total program costs, funded-----	2,197,122	30,000	2,227,122
Change in selected resources-----	6,518	10,000	16,518
Total obligations-----	2,203,640	40,000	2,243,640

FINANCING AND EXPENDITURES

[In thousands of dollars]

	1968 request pending	1968 proposed amendment	1968 revised request
10 Total obligations (from program schedule)-----	2,203,640	40,000	2,243,640
Financing:			
Receipts and reimbursements from:			
13 Trust fund accounts (-)-----	-3,334		-3,334
14 Non-Federal sources (-)-----	-55,506		-55,506
40 New obligational authority-----	2,144,800	40,000	2,184,800
Relation of obligations to expenditures:			
10 Total obligations-----	2,203,640	40,000	2,243,640
70 Receipts and other offsets (items 11-17)-----	-58,840		-58,840
71 Obligations affecting expenditures-----	2,144,800	40,000	2,184,800
72 Obligated balance, start of year-----	1,036,041		1,036,041
74 Obligated balance, end of year (-)-----	-1,160,841	-10,000	-1,170,841
90 Expenditures-----	2,020,000	30,000	2,050,000

PLANT AND CAPITAL EQUIPMENT, ATOMIC ENERGY COMMISSION

PROGRAM AND FINANCING

[In thousands of dollars]

	1968 request pending	1968 proposed amendment	1968 revised request
Program by activities:			
1. Reactor development-----	133,400	1,000	134,400
2. Physical research-----	62,300	58,800	121,100
Items not changed-----	152,500		152,500
Total obligations-----	348,200	59,800	408,000

FINANCING AND EXPENDITURES

[In thousands of dollars]

	1968 request pending	1968 proposed amendment	1968 revised request
10 Total obligations (from program schedule).....	348,200	59,800	408,000
Financing:			
Receipts and reimbursements from:			
40 New obligational authority.....	348,200	59,800	408,000
Relation of obligations to expenditures:			
71 Obligations affecting expenditures.....	348,200	59,800	408,000
72 Obligated balance, start of year.....	479,916	-----	479,916
74 Obligated balance, end of year (—).....	—518,116	—54,045	—572,161
90 Expenditures.....	310,000	5,755	315,755

PREPARED STATEMENT

Senator HILL. We are happy to have you gentlemen here with us this morning. Dr. Seaborg, are you going to open the presentation?

Dr. SEABORG. I am going to open up with a prepared statement. (The statement follows:)

Mr. Chairman and members of the Committee, the members and staff of the Atomic Energy Commission are pleased to appear before your Committee to discuss the AEC's program and budget estimates for fiscal year 1968.

The AEC request for appropriations for fiscal year 1968 totals \$2,646.1 million of which \$2,169.9 million is for operating expenses and \$476.2 million for plant and capital equipment. The requested appropriation is \$447.1 million more than the amount appropriated for fiscal year 1967.

Authorizing legislation approved July 26th would provide for 1968 appropriations of \$2,641.7 million, or \$4.4 million less than the amount requested.

The appropriation bill as passed by the House of Representatives on July 25 provides total appropriations of \$2,492.7 million including \$2,125.0 million for operating expenses and \$367.7 million for plant and capital equipment. This represents a reduction of \$153.4 million from our appropriation request—\$44.9 million for operating expenses and \$108.5 million for plant and capital equipment.

By letter of July 28th to Senator Hayden we submitted proposed amendments to the appropriation bill which would restore \$4,202,000 of the House reduction—\$2,302,000 for operating expenses and \$1,900,000 for plant and capital equipment. Before discussing the basis for this proposed restoration, I would like to talk briefly about each of our major programs.

RAW MATERIALS

The raw materials program budget request of \$129.6 million for operating expenses provides for the procurement of 8,000 tons of uranium concentrates. This is the lowest quantity to be procured since 1955. This estimate reflects a decrease of \$32.9 million and \$76.6 million from the fiscal year 1967 and fiscal year 1966 estimates, respectively. The concentrates to be procured are all from domestic sources. The estimate also includes an amount of \$750,000 for a resource investigation program. These funds are required for research and development contracts with educational and other nonprofit institutions, private research companies, and other government agencies to improve our knowledge of uranium occurrence and to develop new exploration concepts and instrumentation which will supplement the private industry exploration effort. We believe it to be important to place increasing emphasis on these activities in order to help assure an adequate and economical supply of uranium in the future.

SPECIAL NUCLEAR MATERIALS

The fiscal year 1968 budget request for operating expenses for the special nuclear materials program is \$346.4 million, a reduction of \$7.3 million from the fiscal year 1967 estimate. This reflects estimated costs to operate the Commission's

production complex for the production of special nuclear materials for military and civilian programs. The estimate also includes funds for the purchase of plutonium produced in private power reactors and for chemical processing of spent reactor fuels in commercial facilities. Production process development, which continues to make important contributions to the military and civilian applications of atomic energy, is maintained at about the fiscal year 1967 level.

The 1968 estimate reflects the shutdown of a fourth production reactor at Richland and a reduction in electric power usage at the Commission's diffusion plants which will result in a power level of 2,820 MW by June 30, 1968. Also, this estimate is based on the consolidation of feed materials production operations in the Fernald Plant near Cincinnati. As a result of this consolidation, the Weldon Spring feed material plant near St. Louis was closed down in fiscal year 1967 and AEC has notified the General Services Administration of its intention to declare the plant excess to its needs.

WEAPONS

The estimated operating costs for the weapons program in fiscal year 1968 are \$700.5 million. This provides for production of nuclear weapons to meet the Presidentially approved stockpile requirements, the conduct of an aggressive research and development program, the conduct of the underground testing program, maintenance of an atmospheric test readiness capability, and cooperation with the Department of Defense in special test detection activities. The planned program is one which will enable us to continue to meet our responsibilities for the four safeguards related to the limited nuclear test ban treaty.

The fiscal year 1968 estimate represents an increase of \$37.0 million over the estimate for fiscal year 1967, which is a net change consisting of increases of \$44.1 million for development of supplemental test sites and \$7.0 million for research and development activities, offset by decreases in production and in other testing estimates. The total request for development of supplemental test sites is \$66.1 million. These new sites combined with the test facilities of the Nevada Test Site will provide for a more flexible and suitable testing program in the future.

The weapons program request under plant and capital equipment totals \$180.3 million. This includes \$125.5 million for construction projects and \$54.8 million for capital equipment. The amount requested for construction includes \$100.5 million required to provide new facilities for the production of weapons of new and different designs. This project covers plant expansions and modifications of several of our production plants. The capital equipment estimate of \$54.8 million covers requirements for the laboratories, testing and production complex.

REACTOR DEVELOPMENT

The reactor development program operating costs for fiscal year 1968 are estimated at \$521.1 million which is an increase of \$53.4 million compared to fiscal year 1967. This funding supports activities related to the development of safe and reliable nuclear reactors and isotopic power sources for a variety of applications. These involve:—development of economical central station electric power plants;—development of nuclear power plant for desalting sea water and other process application;—development of nuclear propulsion systems for Naval vessels and space vehicles;—development of compact power sources for space and terrestrial application;—conduct of broadly based research of new and advanced reactor technology;—and investigation of advanced reactor systems.

More than half of the \$53.4 million increase in operating costs is related to work being conducted on central station power reactors. The high priority liquid metal fast breeder reactor program (LMFBR) accounts for a \$20.1 million increase principally to bring qualified industrial contractors into the development program and to increase the supporting research for the facilities such as Experimental Breeder Reactor II (ERB II), Fast Flux Test Facility (FFTF), and Zero Power Plutonium Reactor (ZPPR). Related to this work, our fiscal year 1968 construction budget includes \$80.0 million for full funding of the FFTF which is of great importance to the LMFBR development. Design funds of \$7.5 million were authorized for the FFTF in fiscal year 1967. The other increases related to central station power reactors are required principally for the higher level of costs anticipated for the previously appropriated Public Service Company of Colorado and General Atomic Cooperative arrangement to build a 330 MWe advanced high-temperature gas-cooled reactor and the initiation of the new cooperative project being undertaken with the Department of Interior and the Metropolitan Water District of Southern California to construct a combined nuclear power and desalting plant. Also there is underway a small supplement

to the engineering study for a nuclear desalting plant under the U.S.-Israel joint project. In view of recent developments it is possible that additional engineering studies on large international nuclear desalting plants, whether on a regional basis or with the government of Israel, may be necessary.

The remainder of the reactor development program's operating increase is attributed primarily to the development effort on the reactor propulsion plant for the two-reactor aircraft carrier which was authorized in the fiscal year 1967 Naval Shipbuilding program, and to the initiation of a program to develop a flight qualified nuclear-powered rocket engine (project ROVER) by the mid-1970's. In addition, the Nuclear Safety activities are being further strengthened in fiscal year 1968 as the effort on in-plant testing and development of standards, codes, and specifications is increased.

There have been some reactor development program activities which have been curtailed or terminated based upon the Commission's assessment of program priorities and the lower relative potential of these activities. We have terminated our work on the experimental beryllium oxide reactor project (EBOR), the heavy water organic cooled reactor concept (HWO CR), and the sodium reactor experiment (SRE).

PHYSICAL RESEARCH

Basic research in the physical sciences is supported through the physical research program. Investigations are conducted in the fields of high energy physics, medium energy physics, low energy physics, mathematics and computers, chemistry, metallurgy and materials, and controlled thermonuclear research. The information gained by research in these areas is fundamental to future technological and engineering advances. Our fiscal year 1968 request for operating costs is \$272.0 million, which is an increase of \$16.7 million, or about 6.5% over the fiscal year 1967 estimate.

About half of this proposed increase is for the high energy physics program, of which over two-thirds is required to support the Stanford Linear Accelerator which enters its first full year of operation in fiscal year 1968. The remaining high energy physics increase is principally required for continued use of presently operating accelerators (Alternating Gradient Synchrotron, Zero Gradient Synchrotron, Princeton-Pennsylvania Accelerator, Cambridge Electron Accelerator, and Bevatron). Funds are also included to strengthen university user group activities and for continued research and development on advanced accelerator concepts with emphasis on the 200 BEV accelerator. The budget originally included \$10 million under the plant and capital equipment appropriation to initiate design and engineering activities for the 200 BEV accelerator and to initiate procurement and assembly of components required for initial portions of the injector for the machine.

The medium energy physics research cost estimates are essentially the same as fiscal year 1967. Funding of \$50.3 million is requested under the plant and capital equipment budget for construction of a meson physics facility at Los Alamos.

For the controlled thermonuclear program we are requesting \$26.2 million in operating funds which is an increase of \$3.6 million over fiscal year 1967. The request represents a 10.5% increase in research operations plus \$1.2 million for the fabrication of major new devices. The proposed increase will provide for an intensification of experimental and theoretical effort and will allow the fabrication of new experimental devices to be initiated. Under the plant and capital equipment budget \$8.5 million is requested for a laboratory and energy storage facility at Los Alamos. This facility will provide housing and support capability for the Scyllac, a major new controlled thermonuclear research device.

Smaller increases in low energy physics, mathematics, chemistry, and metallurgy and materials comprise the balance of the operating program request.

BIOLOGY AND MEDICINE

The budget for the biology and medicine program provides for research on the short and long-term consequences of the interaction of radiation with biological systems, overcoming the attendant hazards of radiation, and development of the useful potentialities of radiation in the life sciences.

The proposed operating budget of \$90.4 million is \$4.4 million more than the fiscal year 1967 level. The areas of somatic effects of radiation, genetics, radiological physics, molecular and cellular level studies, and cancer research will be strengthened by new or increased support in fiscal year 1968. However, these increases are partially offset by reductions in the high altitude sampling portion of the atmospheric radioactivity and fallout program, and the nuclear energy weapons effects program.

The proposed capital equipment budget for this program is \$6.0 million, a decrease of about 10 percent from the fiscal year 1967 level. No major construction projects are included, but \$1.0 million is proposed for general plant projects.

TRAINING, EDUCATION AND INFORMATION

Our operating budget for training, education and information activities, the primary purposes of which are to increase the number of trained people in the nuclear field and to communicate information related to nuclear science and technology, totals \$17.9 million for fiscal year 1968.

The training and education activities provide for: the operation of specialized courses; fellowships and traineeships in nuclear energy fields; assistance to schools, faculty and students which include nuclear training equipment grants, faculty training institutes and cooperative programs between universities and AEC laboratories; operation of the Puerto Rico Nuclear Center; and special assistance to the states for training in radiation control.

The information activities provide for the communication and dissemination of information about nuclear science and technology to American and foreign scientists, engineers, students and teachers, and the general public. These activities are designed to increase the effectiveness of research and development and to promote industrial use of innovations resulting from AEC-sponsored work, as well as to raise the level of scientific knowledge of our citizens and to encourage their interest and confidence in the peaceful uses of nuclear energy. Demonstrations are also made to other nations of this country's achievements and its willingness to share them, and to encourage the sale of U.S. nuclear equipment.

The estimated plant and capital equipment obligations for fiscal year 1968 of \$2,444,000 include \$1,850,000 for construction projects at the Puerto Rico Nuclear Center and \$594,000 for capital equipment. The funds for construction provide \$1,400,000 for an addition to the biomedical building at Rio Piedras and \$450,000 for general plant projects at the Center.

ISOTOPES DEVELOPMENT

The isotopes development program provides for the development and demonstration of radioisotope and radiation technology and applications, and the development of technology for production, separation, purification and encapsulation of radioisotopes. The proposed operating budget is \$8.4 million, an increase of \$500,000 over fiscal year 1967.

Particular emphasis will be given in fiscal year 1968 to work on production and materials development technology for isotopes—plutonium 238, thulium 171, and promethium 147—which are candidates as power sources for implantable circulatory support systems. The development of an isotopic source of medical grade quality with very low background radiation is a prerequisite to the use of isotopes in this application. This effort is being coordinated with the National Heart Institute which has over-all responsibility for development of cardiac assist devices.

Development of radioisotope and radiation applications will also continue in the production of chemicals and other materials, preservation of foods, environmental control, and isotopic measuring and detection systems.

The proposed capital equipment budget in support of the isotopes development program is estimated at \$1.4 million which is a slight reduction from fiscal year 1967. The budget contains no new construction projects for this program.

PLOWSHARE

To continue the development of our civilian applications of nuclear explosives program, which is also known as Plowshare, we are proposing an operating budget of \$21.9 million. The fiscal year 1967 operating costs are estimated at \$13.3 million.

The major portion of the \$21.9 million requested is planned to support the development of nuclear excavation technology. Briefly, in fiscal year 1968 we are planning the execution of project Cabriolet and the subsequent execution of project Buggy-I, a nuclear row charge experiment.

In reviewing the work we proposed in scientific experiments with nuclear explosives, estimated at \$1.5 million, the House Appropriations Committee recommended we continue into 1968 at our fiscal year 1967 level of \$350,000. I would like to point out that our fiscal year 1967 level was not the level originally planned but resulted from a reprogramming of Plowshare funds to meet an even more urgent need. I wish, therefore, to express regret at the reduction recommended by the House Appropriations Committee and to indicate that the level allowed permits us only to sustain this activity and to make very little progress. However,

we have reluctantly accepted the House's recommendation, and propose with the money left in the category for fiscal year 1968 to pursue as vigorously as possible laboratory studies and preparations for field investigations into the formation of new heavier isotopes and possibly new elements. We will also investigate the use of the nuclear explosion as a source of neutrons to make measurements not possible in the laboratory. We do plan to seek an increase in the \$350,000 level in the next fiscal year as such a level does not permit significant progress in this field. In addition, during fiscal year 1968 we shall keep this area under review and if needed seek your agreement to increase the funding for these studies, by selective reprogramming. In summary, the Commission continues to believe these scientific applications for nuclear explosions are important and contribute to the Commission's mission and should be pursued vigorously.

I am pleased to report that the work on project Gasbuggy, estimated at \$1.5 million in fiscal year 1968, is on schedule, and that barring unforeseen circumstances, we plan to detonate the nuclear explosive for this first joint government industry experiment this fall. The explosion will occur some 4,200 feet underground in the San Juan Basin of New Mexico, located 55 air miles east of Farmington. We have negotiated a contract with the El Paso Natural Gas Company that provides for about a 60-40 government-industry cost ratio in the \$4.7 million cost for this project.

Capital equipment obligations to support the total Plowshare program are estimated at \$350,000, which is \$155,000 less than the fiscal year 1967 estimate.

COMMUNITY

The fiscal year 1968 estimate of \$7.2 million for the community program provides \$2.6 million for assistance payments to the former AEC communities of Oak Ridge and Richland and \$4.6 million for assistance payments and operating costs at the Los Alamos Community.

The fiscal year 1968 estimate of \$2.6 million for assistance payments at Oak Ridge and Richland reflects an increase of \$200,000 over the fiscal year 1967 estimate. Legal authorization for making assistance payments to Oak Ridge and Richland expires in fiscal year 1969. Proposed legislation which would authorize continued assistance, as may be necessary, has been developed for submission during this session of Congress.

The fiscal year 1968 estimate of \$4.6 million for the Los Alamos community is a reduction of \$3.1 million from the fiscal year 1967 estimate. This reduction reflects continued progress toward the termination of government ownership of the town, including termination of assistance to the County in the establishment of local government, sale of a large part of the real estate and transfer of the utilities and most of the municipal functions to the County. In connection with this cost reduction, our revenues from community operation (included in the Revenues portion of our budget) decrease from \$3.6 million in fiscal year 1967 to \$600,000 as a result of the disposal of the community facilities.

PROGRAM DIRECTION AND ADMINISTRATION

Included under this program are the salaries, travel and other costs of the Federal employees at the Washington Headquarters and the field offices engaged in the executive direction, general management and technical supervision of the atomic energy program. Operating costs under this program are estimated at \$94 million.

Provision has been made in the budget for a staffing complement at the end of fiscal year 1968 of 5,853, an increase of 225 over the 5,628 employees planned at the end of fiscal year 1967. The additional positions are required to augment both the technical and administrative staff in the management of the Commission's operation and regulatory programs due primarily to the growth and complexity of the developmental efforts and the increase in licensing activity.

Plant and capital equipment obligations are estimated at \$1,331,000. Of this amount, \$1,131,000 is for capital equipment and \$200,000 is for modifications and alterations to the existing facilities at Headquarters.

BUDGET REDUCTIONS AND REQUESTED RESTORATIONS

At the opening of this statement I referred to the reductions, amounting to \$153.4 million, made by the House. We have carefully assessed the program impact of these reductions to determine those items for which we should seek restoration of funds. As this Committee knows, over the years the Atomic Energy Commission has always been selective in its requests to this Committee for restoration of House reductions. We are particularly cognizant of the budgetary pressures on the Congress this year and, for that reason, we are

proposing restoration of only a small fraction of the amount reduced by the House. We would like to note, however, that we still consider the programmatic activities involved in the reductions we are not appealing to be exceedingly worthwhile.

The House reduced our operating expenses appropriation request by \$44.9 million. About half of this amount reflects a revised estimate of unused funds which could be carried over from fiscal year 1967 to meet our fiscal year 1968 fund needs. The balance of the reduction was against Commission programs. We are proposing restoration of \$2,302,000 of this reduction. The Commission's requested appropriation for plant and capital equipment was reduced by \$108.5 million. Of this amount, \$98.9 million related to obligations which were not scheduled to take place until after 1968. Of the balance of the reduction, amounting to \$9.6 million, we are requesting restoration of \$1,900,000 for two items.

The basis and composition of the \$4,202,000 we are appealing is set forth in the material transmitted to the Committee in support of our proposed amendments to the appropriation bill as enacted by the House. At this point I would like to summarize briefly for the Committee the items in our appeal.

Our first item of appeal does not require additional appropriations over the House allowance, but stems rather from the restrictions on the use of the funds provided for the Raw Materials program. The House allocated the major portion of the half million dollar reduction in this program against the Commission's uranium resources investigation activities and limited an additional \$100,000 allowed over the fiscal year 1967 level for research contracts we proposed to let with universities under our resources investigation activities to universities in uranium producing areas. In view of the uranium demand outlook as a result of the growth in civilian nuclear power, we believe we must pursue a vigorous resources investigation program. We would propose therefore to reduce the resources investigation program by a maximum of \$150,000 and apply the balance of the House reduction to other activities within the Raw Materials program. While we expect to let research contracts with universities in uranium producing areas, we believe we should also have the opportunity to avail ourselves of the competence in this field of universities which may be located outside of the uranium producing areas. We would appreciate it, therefore, if the report of the Committee could indicate that the Commission would have this latitude in its resources investigation program.

The House reduced the estimate for the Reactor Development program by \$13,645,000. Of this amount, we are seeking restoration of \$1,600,000 of which \$700,000 would be for the army reactor program and \$900,000 for general reactor technology research and development. The restoration for the army reactor program is necessary to accommodate, in fiscal year 1968, program commitments we presently have in support of existing portable military reactors. The amount for the general reactor technology program is required to minimize the adverse effects of cost increases we have experienced since the budget was developed and to prevent a further dilution of effort in basic technology supporting our specific developmental programs such as advanced converters and breeder reactors.

We are also proposing restoration of \$152,000 in the Commission's Community program. This amount would permit a separate fire department for the Los Alamos community which is in the process of assuming the responsibilities of self government. Having a separate fire department for the community would be consistent with the established policy of self government for the community of Los Alamos.

The final restoration requested under the operating expenses appropriation amounts to \$550,000 and represents the selected resources necessary to finance the contractors involved in the items appealed for the Reactor Development program.

The first item of appeal under the plant and capital equipment appropriation also does not require additional appropriations, but stems rather from the limitation on the use of funds included in the House bill for the 200 Bev accelerator. The legislation authorizing this project permits the Commission to initiate procurement of equipment as well as initiate design of this facility. The House report limits the use of the \$7,333,000 authorized and included in the House appropriation bill for this project to design only. Since considerable savings can accrue to the Government if the Commission is permitted to proceed with procurement of equipment in concert with the procurement of similar equipment at Brookhaven, for which funds have already been authorized and appropriated, we are requesting that the limitation to design only imposed by the House action be removed.

The \$1,900,000 fund restoration we are requesting in the plant and capital equipment appropriation is for Project 68-5-a, an addition to the biomedical building at Rio Piedras, Puerto Rico in the amount of \$1,400,000; and for the

procurement of a low energy physics accelerator in the amount of \$500,000. The addition to the biomedical building is sorely needed to alleviate an acute overcrowded condition at the Puerto Rico Nuclear Center. The low energy physics accelerator will make a valuable contribution to the greater dispersion of competency and excellence in the performance of physics research.

That concludes my prepared statement, Mr. Chairman. I will be pleased to answer any questions you may have on our programs.

HEAT ENERGY IN URANIUM

Senator HILL. Let me ask you a question. I went down to dedicate a nuclear reactor at Auburn University—that is our land-grant university—and I heard a statement that about that much uranium, about the size of a golf ball, contained about as much power as about 5 million tons of coal; is that right?

Dr. SEABORG. A piece of uranium about 1-inch cube, fissionable material, contains as much heat energy as 1,500 tons of coal.

Senator HILL. 1,500 tons of coal.

You must remember this: I come from a coal-producing State. [Laughter.]

Dr. SEABORG. I think we can assure you there is going to be an increasing need for coal in the coming decades because of the tremendous increase in the need for electric power in our country.

AIR POLLUTION

Senator HILL. I have the thought—am I right or am I wrong, Doctor—that you would not get as much air pollution with your nuclear power as you do with your coal?

Dr. SEABORG. Yes, you do not. There are no combustion products—

Senator HILL. One of our problems now is this air pollution.

Dr. SEABORG. That is right. Nuclear power will contribute to the solution of the air pollution problem, not only directly through the fact that in the large plants which produce electricity there are no combustion products to contribute to air pollution but also possibly through the introduction of electric automobiles and trains in the future, which might have their electricity furnished either indirectly through batteries in the case of automobiles, or through electrification in the case of trains from the nuclear-produced electrical sources.

Senator HILL. Every morning I come up Constitution Avenue, which is crowded with automobiles, all of which are giving off pollution in varying degrees.

Dr. SEABORG. They contribute a lot to the air pollution.

Senator HILL. As I say, we are just 50 years behind in working on air pollution.

Dr. SEABORG. It would have been a lot different if automobiles had been developed with the air pollution problem in mind.

Senator HILL. All right, Doctor, you may proceed, sir.

BUDGET REQUEST

Dr. SEABORG. Mr. Chairman and members of the committee, the members and staff of the Atomic Energy Commission are pleased to appear before your committee to discuss the AEC's program and budget estimates for fiscal year 1968.

The AEC request for appropriations for fiscal year 1968 totals \$2,646.1 million of which \$2,169.9 million is for operating expenses and \$476.2 million for plant and capital equipment. The requested appropriation is \$447.1 million more than the amount appropriated for fiscal year 1967.

AUTHORIZING LEGISLATION

Authorizing legislation approved July 26 would provide for 1968 appropriations of \$2,641.7 million, or \$4.4 million less than the amount requested.

HOUSE ALLOWANCE

The appropriation bill as passed by the House of Representatives on July 25 provides total appropriations of \$2,492.7 million, including \$2,125 million for operating expenses and \$367.7 million for plant and capital equipment.

Senator HILL. They made a sizable reduction.

Dr. SEABORG. Yes; \$44.9 million in operating expenses and a total of \$108.5 million for plant and capital equipment. We are going to appeal, at the last part of my statement, a small cut.

Senator HILL. You are making an appeal for restoration.

Dr. SEABORG. Appeal for restoration about \$4 million of this.

This represents a reduction of \$153.4 million from our appropriation request—\$44.9 million for operating expenses and \$108.5 million for plant and capital equipment.

APPEAL LETTER

By letter of July 28 to Senator Hayden we submitted proposed amendments to the appropriation bill which would restore \$4,202,000 of the House reduction—\$2,302,000 for operating expenses and \$1,900,000 for plant and capital equipment. Before discussing the basis for this proposed restoration, I would like to talk briefly about each of our major programs.

RAW MATERIALS

The raw materials program budget request of \$129.6 million for operating expenses provides for the procurement of 8,000 tons of uranium concentrates. This is the lowest quantity to be procured since 1955. This estimate reflects a decrease of \$32.9 million and \$76.6 million from the fiscal year 1967 and fiscal year 1966 estimates, respectively. The concentrates to be procured are all from domestic sources. The estimate also includes an amount of \$750,000 for a resource investigation program. These funds are required for research and development contracts with educational and other nonprofit institutions, private research companies, and other Government agencies to improve our knowledge of uranium occurrence and to develop new exploration concepts and instrumentation which will complement the private industry exploration effort. We believe it to be important to place increasing emphasis on these activities in order to help assure an adequate and economical supply of uranium in the future.

SPECIAL NUCLEAR MATERIALS

The fiscal year 1968 budget request for operating expenses for the special nuclear materials program is \$346.4 million—a reduction of \$7.3 million from the fiscal year 1967 estimate. This reflects estimated costs to operate the Commission's production complex for the production of special nuclear materials for military and civilian programs. The estimate also includes funds for the purchase of plutonium

produced in private power reactors and for chemical processing of spent reactor fuels in commercial facilities. Production process development, which continues to make important contributions to the military and civilian applications of atomic energy, is maintained at about the fiscal year 1967 level.

The 1968 estimate reflects the shutdown of a fourth production reactor at Richland and a reduction in electric power usage at the Commission's diffusion plants which will result in a power level of 2,820 megawatts by June 30, 1968. Also, this estimate is based on the consolidation of feed materials production operations in the Fernald plant near Cincinnati. As a result of this consolidation, the Weldon Spring feed material plant near St. Louis was closed down in fiscal year 1967 and AEC has notified the General Services Administration of its intention to declare the plant excess to its needs.

Senator HILL. You no longer need the plant?

Dr. SEABORG. No, not that plant; we can carry on those functions by combining them with other plants.

WEAPONS

The estimated operating costs for the weapons program in fiscal year 1968 are \$700.5 million. This provides for production of nuclear weapons to meet the Presidentially approved stockpile requirements, the conduct of an aggressive research and development program, the conduct of the underground testing program, maintenance of an atmospheric test readiness capability, and cooperation with the Department of Defense in special test detection activities. The planned program is one which will enable us to continue to meet our responsibilities for the four safeguards related to the limited nuclear test ban treaty.

1968 FUNDING INCREASE

DEVELOPMENT OF TEST SITES AND RESEARCH AND DEVELOPMENT

The fiscal year 1968 estimate represents an increase of \$37 million over the estimate for fiscal year 1967, which is a net change consisting of increases of \$44.1 million for development of supplemental test sites and \$7 million for research and development activities, offset by decreases in production and in other testing estimates. The total request for development of supplemental test sites is \$66.1 million. These new sites combined with the test facilities of the Nevada Test Site will provide for a more flexible and suitable testing program in the future.

CAPITAL EQUIPMENT

The weapons program request under plant and capital equipment totals \$180.3 million. This includes \$125.5 million for construction projects and \$54.8 million for capital equipment. The amount requested for construction includes \$100.5 million required to provide new facilities for the production of weapons of new and different designs.

This project covers plant expansions and modifications of several of our production plants. The capital equipment estimate of \$54.8 million covers requirements for the laboratories, testing, and production complex.

Senator BIBLE. Mr. Chairman, at that point might I ask a question on weapon testing?

AUTHORIZATION INCREASE

If my memory is right and my research is correct, I believe the Joint Committee when it was considering authorizing appropriations for the AEC added \$15 million to the weapons program, and the House Appropriations Committee did not recommend adding this additional \$15 million. I believe that is a correct statement of facts, Dr. Seaborg. I am wondering what would be the effect of not receiving the \$15 million added by the Joint Committee on Atomic Energy in the authorizing legislation.

NEVADA TEST SITE AND LABORATORY OPERATIONS

Dr. SEABORG. Well, you will recall that in response to questioning by the Joint Committee during the weapons program hearings the laboratory directors indicated that it would take about \$21 million additional to accomplish the weapons and laboratory programs at the desired levels, as they saw it.

As a result of this, the Joint Committee, as you indicated, added \$15 million, not the entire \$21 million, but \$15 million corresponding to a \$10 million increase for the Nevada Test Site and \$5 million for the operations of the laboratories.

NONPROVISION IN BUDGET FOR CONTINGENCIES

At the time of the fiscal year 1968 budget submission, which now is approximately 7 months ago, it was estimated that [deleted] tests could be carried out with the amount in the submitted budget; the final number would be dependent upon the complexity of the tests that were actually carried out.

No contingency was provided to cover additional tests necessary because of any deficiencies that might be discovered as part of the fiscal year 1967 test program. [Deleted.]

ADVANCED DEVELOPMENT AND FUNDAMENTAL RESEARCH

With a reduction [deleted] there is now no provision for advanced technology tests. The large number of phase 3 requirements placed on the laboratories under present funding and personnel ceilings has resulted in the dilution of effort in areas of advanced development and fundamental research.

The augmented budget would permit a program of tests which would include [deleted] advanced technology or contingency for committed programs.

Senator BIBLE. Dr. Seaborg, what you are then saying, in part at least, is that you would be unable to have [deleted] tests which you had planned, you will only have [deleted] of them, so that you are [deleted] short if the present funding stands; is that a correct statement?

Dr. SEABORG. That is, we wouldn't be able to carry out the [deleted] tests required [deleted] in the program, and the [deleted] tests that would be required to provide for the development of advanced technology. So it would be [deleted] tests.

CENTRAL NEVADA TEST SITE

Senator BIBLE. It would be [deleted] tests, then, as the total.

The testing that you are about to enter into in central Nevada, does it have any relationship to this particular additional authorized

amount of \$15 million? Is that tied into this at all? You are just starting a community up there and you have some type of very deep underground testing.

Dr. TAPE. Senator, may I amplify the chairman's statement and address the point about central Nevada? The central Nevada location is what we call a supplemental test site to the primary test site outside of Las Vegas. With reference to the additional \$15 million, the program the chairman has addressed will all be carried out at the main test site. With respect to future testing, some of our very high priority work on weapons developments that result from the particular program that will go forward within the tests we are now talking about, may be carried out in the central Nevada test site.

I would like to point out here that these are all estimates. As the chairman said, 7 months ago we said [deleted] this is because we didn't know exactly the precise composition of the tests some 7 or 8 months down the line and as we get closer to the actual detonation we know more about the particular tests that have to be carried out. Therefore, as was said, at this time for this budget we have additional information and we know what we can or cannot do and this \$15 million will, indeed, permit us to do the things which show up.

DEPARTMENT OF DEFENSE PRIORITIES

Furthermore, we have experience in the past year and a half and have moved toward a much firmer weaponization program. What we mean by this is instead of working on as many concepts for the future—the Department of Defense has actually indicated their needs to go into particular weapons. When those requirements are placed upon us these become the priority requirements and we have before us right now something like [deleted] such systems which have to go into weaponization. As a result, these come first; and if the weapons program does not have the resources to carry out the advanced development then it must slip.

We had hoped in this current year we would be able to do something about advanced development, but with our present analysis it appears that unless the \$15 million is approved, then we won't have a chance to do that at all. So that is why we have indicated a need. Of course, I think you would understand it is the advanced development on which the systems of the future are built.

Senator BIBLE. I think I understand that, and if I understand you correctly, then, the requirement of DOD, if anything, was increased from the time of the original major budgetary submission.

Dr. TAPE. The requirements of the DOD with respect to weaponization have increased in the past year or so and we have been taking these on immediately but at the expense of some of the advanced development work.

PROGRAM INTENSIFICATION SUBSEQUENT TO BUDGET FORMULATION

Senator BIBLE. But apparently you had a good case at the time of presentation before the Joint Committee before it was authorized and if it was true then it is even truer now; is that a correct statement?

Dr. TAPE. It is still true now.

Senator BIBLE. It is true and, if anything, it might be intensified?

Dr. TAPE. [Deleted.]

Senator BIBLE. That is what I understood from what you said.

Thank you very much, and thank you, Dr. Seaborg.

Senator HILL. The truth is, the budget was made up nearly a year ago.

Dr. TAPE. That is correct.

Senator HILL. That is it. You made your budget a year ago and we are confronted with these more recent developments; is that right, Senator?

Senator BIBLE. That is my understanding.

Senator HILL. Is that right, Doctor?

Dr. SEABORG. That is right. Seven or eight months ago the final—

Senator HILL. It was sent up here in January and had to be made up some time before it was sent up here. Of course, you not only had atomic energy but these other items, too, so these things were considered many months ago.

Senator BIBLE. That is true, thank you, Mr. Chairman.

Pardon the interruption.

REACTOR DEVELOPMENT

Dr. SEABORG. I will go on to reactor development then.

The reactor development program operating costs for fiscal year 1968 are estimated at \$521.1 million which is an increase of \$53.4 million compared to fiscal year 1967.

This funding supports activities related to the development of safe and reliable nuclear reactors and isotopic power sources for a variety of applications. These involve development of economical central station electric powerplants, development of nuclear powerplants for desalting sea water and other process application, development of nuclear propulsion systems for naval vessels and space vehicles, development of compact power sources for space and terrestrial application, conduct broadly based research of new and advanced reactor technology, and investigation of advanced reactor systems.

CENTRAL STATION POWER REACTORS

More than half of the \$53.4 million increase in operating costs is related to work being conducted on central station power reactors. The high-priority liquid metal fast breeder reactor program (LMFBR) accounts for a \$20.1 million increase principally to bring qualified industrial contractors into the development program and to increase the supporting research for the facilities such as experimental breeder reactor II (EBR II), fast flux facility (FFTF), and zero power plutonium reactor (ZPPR). Related to this work, our fiscal year 1968 construction budget includes \$80 million for full funding of the FFTF which is of great importance to the LMFBR development. Design funds of \$7.5 million were authorized for the FFTF in fiscal year 1967.

The other increases related to central station power reactors are required principally for the higher level of costs anticipated for the previously appropriated Public Service Co. of Colorado and General Atomic Cooperative arrangement to build a 330-megawatt-electrical, advanced high-temperature, gas-cooled reactor and the initiation of the new cooperative project being undertaken with the Department of the Interior and the Metropolitan Water District of Southern California to construct a combine nuclear power and desalting plant.

UNITED STATES-ISRAEL PROJECT: NUCLEAR DESALTING PLANT STUDY

Also there is underway a small supplement to the engineering study for a nuclear desalting plant under the United States-Israel joint project.

Senator HILL. The Arabs haven't objected to that project yet, have they?

Dr. SEABORG. No; it is not yet underway. But suggestions have been made, as you know, Senator Hill, that a dual-purpose water desalting and nuclear powerplant might do a great deal to alleviate one of the basic causes of the situation in the Middle East; namely, the controversial—

Senator HILL. I had the thought in mind when I asked the question—

Dr. SEABORG. Yes. So this problem is one that we have in mind and studies are continuing.

Mr. RAMEY. This has been the idea, you know, of Frank DiLuzio, the Assistant Secretary of the Interior, among others who has been championing this idea for several years, and I think we are all happy that there is a lot of interest in it now as shown in the press.

Senator HILL. They recognize the importance of it.

Dr. SEABORG. Yes.

In view of recent developments it is possible that additional engineering studies on large international nuclear desalting plants, whether on a regional basis or with the Government of Israel, may be necessary.

This is what we are saying.

The remainder of the reactor development program's operating increase is attributed primarily to the development effort on the reactor propulsion plant for the two-reactor aircraft carrier which was authorized in the fiscal year 1967 naval shipbuilding program, and to the initiation of a program to develop a flight-qualified nuclear-powered rocket engine (Project Rover) by the mid-1970's. In addition, the nuclear safety activities are being further strengthened in fiscal year 1968 as the effort on in-plant testing and development of standards, codes, and specifications is increased.

There have been some reactor development program activities which have been curtailed or terminated based upon the Commission's assessment of program priorities and the lower relative potential of these activities. We have terminated our work on the experimental beryllium oxide reactor project (EBOR), the heavy water organic cooled reactor concept (HWOCR), and the sodium reactor experiment (SRE).

PHYSICAL RESEARCH

Basic research in the physical sciences is supported through the physical research program. Investigations are conducted in the fields of high-energy physics, medium-energy physics, low-energy physics, mathematics and computers, chemistry, metallurgy and materials, and controlled thermonuclear research. The information gained by research in these areas is fundamental to future technological and engineering advances. Our fiscal year 1968 request for operating costs is \$272 million, which is an increase of \$16.7 million, or about 6.5 percent over the fiscal year 1967 estimate.

PROGRAM INCREASES

About half of this proposed increase is for the high-energy physics program, of which over two-thirds is required to support the Stanford Linear Accelerator which enters its first full year of operation in fiscal year 1968. The remaining high-energy physics increase is principally required for continued use of presently operating accelerators (Alternating Gradient Synchrotron, Zero Gradient Synchrotron, Princeton-Pennsylvania Accelerator, Cambridge Electron Accelerator, and Bevatron). Funds are also included to strengthen university user group activities and for continued research and development on advanced accelerator concepts with emphasis on the 200-Bev accelerator. The budget originally included \$10 million under the plant and capital equipment appropriation to initiate design and engineering activities for the 200-Bev accelerator and to initiate procurement and assembly of components required for initial portions of the injector for the machine.

MEDIUM ENERGY PHYSICS RESEARCH

The medium energy physics research cost estimates are essentially the same as fiscal year 1967. Funding of \$50.3 million is requested under the plant and capital equipment budget for construction of a meson physics facility at Los Alamos.

For the controlled thermonuclear program we are requesting \$26.2 million in operating funds which is an increase of \$3.6 million over fiscal year 1967. The request represents a 10.5-percent increase in research operations plus \$1.2 million for the fabrication of major new devices. The proposed increase will provide for an intensification of experimental and theoretical effort and will allow the fabrication of new experimental devices to be initiated. Under the plant and capital equipment budget \$8.5 million is requested for a laboratory and energy storage facility at Los Alamos. This facility will provide housing and support capability for the Scyllac, a major new controlled thermonuclear research device.

LOW-ENERGY PHYSICS

Smaller increases in low-energy physics, mathematics, chemistry, and metallurgy and materials comprise the balance of the operating program request.

BIOLOGY AND MEDICINE

The budget for the biology and medicine program provides for research on the short- and long-term consequences of the interaction of radiation with biological systems, overcoming the attendant hazards of radiation, and development of the useful potentialities of radiation in the life sciences.

PROGRAM OPERATING BUDGET

The proposed operating budget of \$90.4 million is \$4.4 million more than the fiscal year 1967 level. The areas of somatic effects of radiation, radiation genetics, radiological physics, molecular and cellular level studies, and cancer research will be strengthened by new or increased support in fiscal year 1968. However, these increases are partially offset by reductions in the high-altitude sampling portion of the atmospheric radioactivity and fallout program, and the nuclear energy weapons effects program.

The proposed capital equipment budget for this program is \$6 million, a decrease of about 10 percent from the fiscal year 1967 level.

No major construction projects are included, but \$1 million is proposed for general plant projects.

TRAINING, EDUCATION, AND INFORMATION

Our operating budget for training, education, and information activities, the primary purposes of which are to increase the number of trained people in the nuclear field and to communicate information related to nuclear science and technology, totals \$17.9 million for fiscal year 1968.

The training and education activities provide for the operation of specialized courses; fellowships and traineeships in nuclear energy fields; assistance to schools, faculty, and students which include nuclear training equipment grants, faculty training institutes, and cooperative program between universities and AEC laboratories; operation of the Puerto Rico Nuclear Center; and special assistance to the States for training in radiation control.

The information activities provide for the communication and dissemination of information about nuclear science and technology to American and foreign scientists, engineers, students and teachers, and the general public. These activities are designed to increase the effectiveness of research and development and to promote industrial use of innovations resulting from AEC-sponsored work, as well as to raise the level of scientific knowledge of our citizens and to encourage their interest and confidence in the peaceful uses of nuclear energy. Demonstrations are also made to other nations of this country's achievements and its willingness to share them, and to encourage the sale of U.S. nuclear equipment.

The estimated plant and capital equipment obligations for fiscal year 1968 of \$2,444,000 include \$1,850,000 for construction projects at the Puerto Rico Nuclear Center and \$594,000 for capital equipment. The funds for construction provide \$1,400,000 for an addition to the biomedical building at Rio Piedras and \$450,000 for general plant projects at the center.

ISOTOPES DEVELOPMENT

The isotopes development program provides for the development and demonstration of radioisotope and radiation technology and applications, and the development of technology for production, separation, purification, and encapsulation of radioisotopes. The proposed operating budget is \$8.4 million, an increase of \$500,000 over fiscal year 1967.

Particular emphasis will be given in fiscal year 1968 to work on production and materials development technology for isotopes—plutonium 238, thulium 171, and promethium 147—which are candidates as power sources for implantable circulatory support systems. The development of an isotopic source of medical grade quality with very low background radiation is a prerequisite to the use of isotopes in this application. This effort is being coordinated with the National Heart Institute which has overall responsibility for development of cardiac assist devices.

Development of radioisotope and radiation applications will also continue in the production—

PACEMAKER

Senator HILL. Speaking about the Heart Institute, Doctor, I understand we have what is called a pacemaker.

Dr. SEABORG. Yes; we do, there is a battery operated pacemaker.

Senator HILL. The trouble with that is you have to operate on a fellow every year to take that battery out and put another battery in.

Dr. SEABORG. Yes.

NUCLEAR ISOTOPIC BATTERY

Senator HILL. How close are we to an atomic battery, or whatever you might call it, that will last for 10 years.

Dr. SEABORG. It would be a nuclear isotopic battery that would replace the regular battery.

Senator HILL. You wouldn't have to replace that more than once in about 10 years?

Dr. SEABORG. You wouldn't have to replace it as often, and perhaps it would last as long as 5 or 10 years. We are well along—

Senator HILL. How close are we to that?

Dr. SEABORG. We are well along in that development. We have a number of contractors working on the development of this isotopic power source.

CIRCULATORY SUPPORT SYSTEM

The circulatory support system I am referring to is a step beyond the pacemaker device. This is a power source that would furnish the energy required for what sometimes has been referred to as an artificial heart. It is not as far along, but the possibility of successful development of such a cardiac assist device, or even a totally artificial heart, is within the realm of reason. Heart surgeons are of the opinion that it is possible. As I have indicated, the National Heart Institute has overall responsibility for the development of the device, and the Atomic Energy Commission is cooperating with them in developing an isotopic power source of energy.

Senator HILL. For this artificial heart?

Dr. SEABORG. For this artificial heart, yes.

Senator HILL. You think you are making some progress?

Dr. SEABORG. Yes, we do believe that we are making some progress.

Senator BIBLE. You have been the leader in that, Mr. Chairman.

Now that you are tying the Atomic Energy Commission in with your other activity, you will conquer us. [Laughter.]

Senator HILL. I want to get one for my friend Senator Hruska here.

Senator HRUSKA. I will need it any day. [Laughter.]

Dr. SEABORG. As I mentioned, on other occasions we have relied on plutonium 238. That might be the isotope, and I mentioned two others, to furnish the energy for such a device for several decades so this might be sufficiently long to serve the purpose.

Senator HILL. Would that suit you all right? [Laughter.]

All right, Doctor.

RADIOISOTOPE AND RADIATION APPLICATIONS

Dr. SEABORG. Development of radioisotope and radiation applications will also continue in the production of chemicals and other materials, preservation of foods, environmental control, and isotopic measuring and detection systems.

BUDGET REQUEST

The proposed capital equipment budget in support of the isotopes development program is estimated at \$1.4 million, which is a slight reduction from fiscal year 1967. The budget contains no new construction projects for this program.

Senator HILL. Did you ask for a new construction project?

Dr. SEABORG. No, we did not.

PLOWSHARE

To continue the development of our civilian applications of nuclear explosives program, which is also known as Plowshare, we are proposing an operating budget of \$21.9 million. The fiscal year 1967 operating costs are estimated at \$13.3 million.

The major portion of the \$21.9 million requested is planned to support the development of nuclear excavation technology. Briefly, in fiscal year 1968 we are planning the execution of Project Cabriolet and the subsequent execution of Project Buggy-I, a nuclear row charge experiment.

SCIENTIFIC RESEARCH APPLICATIONS

In reviewing the work we proposed in scientific experiments with nuclear explosives, estimated at \$1.5 million, the House Appropriations Committee recommended we continue into 1968 at our fiscal year 1967 level of \$350,000. I would like to point out that our fiscal year 1967 level was not the level originally planned but resulted from a reprogramming of Plowshare funds to meet an even more urgent need. I wish, therefore, to express regret at the reduction recommended by the House Appropriations Committee and to indicate that the level allowed permits us only to sustain this activity and to make very little progress. However, we have reluctantly accepted the House's recommendation, and propose with the money left in the category for fiscal year 1968 to pursue as vigorously as possible laboratory studies and preparations for field investigations into the formation of new, heavier isotopes and possibly new elements.

Senator HILL. What about the budget?

Dr. SEABORG. What we are requesting is not an increase in funds but rather a flexibility in reprogramming so that we could meet this requirement.

Senator HILL. I see.

Dr. SEABORG. As the year goes along.

Senator HILL. As you go along?

Dr. SEABORG. Yes.

We will also investigate the use of the nuclear explosion as a source of neutrons to make measurements not possible in the laboratory. We do plan to seek an increase in the \$350,000 level in the next fiscal year as such a level does not permit significant progress in this field. In addition, during fiscal year 1968 we shall keep this area under review and if needed seek your agreement to increase the funding for these studies, as I indicated, by selective reprogramming. In summary, the Commission continues to believe these scientific applications for nuclear explosions are important and contribute to the Commission's mission and should be pursued vigorously.

PROJECT GASBUGGY

I am pleased to report that the work on Project Gasbuggy, estimated at \$1.5 million in fiscal year 1968, is on schedule, and that, barring unforeseen circumstances, we plan to detonate the nuclear explosive for this first joint Government-industry experiment this fall. The explosion will occur some 4,200 feet underground in the San Juan Basin of New Mexico, at a location some 55 air miles east of Farmington. We have negotiated a contract with the El Paso Natural Gas Co. that provides for about a 60-40 Government-industry cost ratio in the \$4.7 million cost for this project.

Capital equipment obligations to support the total Plowshare program are estimated at \$350,000, which is \$155,000 less than the fiscal year 1967 estimate.

Senator HILL. That is your estimate?

Dr. SEABORG. That is our estimate.

RECENT UNDERGROUND WEAPON TEST VENTING

Senator BIBLE. Might I ask a question at that point, Mr. Chairman?

Senator HILL. Yes.

Senator BIBLE. Much of this underground testing is done at Yucca Flats and, Doctor, during the last several months, I don't know what the name of the project was, a test went through the surface, and it received considerable publicity locally. As a matter of curiosity, I am wondering what type of a reaction you got from the other signatories to the test ban treaty. What project was that? I have forgotten.

Dr. SEABORG. This was one of our regular—

Senator BIBLE. That was the big crater.

Dr. SEABORG. This was one of our regular underground weapons tests.

Senator BIBLE. It probably doesn't make any difference.

Dr. TAPE. We have had no Plowshare cratering experiments in the past year or so. I expect the event you referred to would be one of the weapons tests.

Senator BIBLE. It was a weapons test of some kind.

Dr. TAPE. In which we had a small venting.

Senator BIBLE. You had a venting?

Dr. TAPE. In the process of the subsidence and settling there may have been a crack or fissure, through which some material did come to the surface. As you know, we follow this testing very carefully and monitor our tests onsite. The majority of these ventings are so small we can't find the activity off of the test site. Occasionally there is a little more activity, and then we follow this either by aircraft or ground sensor stations. In the last venting that occurred, as I recall, we had some airborne activity that we were able to pick up some distance from the test site and then we lost it.

Now, we do make statements to the press so that they know this sort of thing is happening.

Senator BIBLE. It was made public?

Dr. TAPE. And we let them know what has happened. There is no health hazard involved in this, for the levels are extremely low. We do find that on occasion we are queried as to whether or not there may have been a violation of the limited test ban treaty.

Dr. SEABORG. But there have been no instances yet where there was a violation, or even came very close to being a violation because

radioactive debris has to be present outside of the boundaries of the country to be a violation.

FALLOUT FROM EARLIER ATMOSPHERIC TESTS

Senator BIBLE. Have you satisfied the people who live in the eastern Nevada area and into the Utah area where you did have very marked fallout in your earlier experiments, as to the fact that it wasn't going to render them sterile or their hair didn't fall out more rapidly or cause some real physical damage?

Dr. SEABORG. No, there has been no—

Senator BIBLE. We used to receive periodic complaints about that, and you know that as well as I do.

Mr. RAMEY. I believe those were atmospheric tests.

Senator BIBLE. I realize that. I know those were atmospheric tests. But I am wondering what has been the followthrough, to check on these people who said they were losing their hair. Do they 5 years later have some other physical impairment that is due to fallout?

THYROID STUDIES

Dr. TAPE. Senator, I know of no cases of the kind you are talking about which have resulted from that at all. A few years ago there was a rather extensive survey by the Public Health people in this area and in another area of the country and the most sensitive symptom that they looked for is an effect on the thyroid from radiiodine and this was looked at and, as I say, this is the most sensitive effect to look for and they did not find any malignant growths of the thyroid. The U.S. Public Health Service did find some cases of thyroiditis—an inflammation of the thyroid—but as they stated, there has been a general increase in thyroiditis in several widely separated areas in the country and abroad. They also stated that to date there is no relationship established between thyroiditis and exposure to radiation.

These are being followed up. Some of these went to hospitals for actual biopsy examination, and surgical examination and so on. Many of the cases that were suspected were found to be from causes other than fallout.

We are still looking at the few cases that might have some correlation, but to date no relationship has been established between thyroiditis and exposure to radiation.

Senator BIBLE. Thank you.

Dr. SEABORG. Of course, there hasn't been any problem since we have conducted our testing underground.

Senator BIBLE. I wasn't suggesting that. My question was primarily beamed at the atmospheric testing.

Dr. SEABORG. Sure.

FALLOUT

EASTERN NEVADA AND UTAH

Senator BIBLE. At some of the earlier problems you had on intense fallout in eastern Nevada and intense fallout around Salt Lake City, and I was wondering if 3 or 4 or 5 years after that particular fallout you had followed the patient or the case through carefully enough to see whether there was an adverse effect to the person who had complained that they had been harmed by the fallout. That was my question.

Mr. RAMEY. Our Livermore Laboratory had followed that pretty closely, hadn't they, Glenn, with the Public Health Service?

Dr. SEABORG. Yes.

Senator BIBLE. You are satisfied that as of today the fallout created in the atmospheric testing in Nevada with the prevailing winds generally coming from the west to the east, the fallout in eastern Nevada and Utah had no adverse physical harmful effect to human beings. Is that the conclusion you have drawn?

Mr. RAMEY. Yes, sir, except they are studying these few thyroid cases as Dr. Tape mentioned.

Senator BIBLE. They haven't had enough time on the thyroid cases to know whether they were adversely affected or not adversely affected by fallout?

MARSHALLESE

Dr. TAPE. The strongest implications we have are for the Marshallese where it was extensive, and that is a case we have followed year by year since the event and we are looking very closely at it and here, again, is the place where they have cases of thyroid difficulties.

SURVEILLANCE

Now, those people actually showed radiation burns at the time of the event.

Senator BIBLE. Do you monitor continuously?

Dr. TAPE. We watch them completely because as you can appreciate many of these effects that we are talking about are long-term effects.

Senator BIBLE. I understand.

Dr. TAPE. So it does require long-term surveillance for the people involved.

Senator BIBLE. Thank you very much.

Thank you very much, Mr. Chairman.

COMMUNITY

Dr. SEABORG. I will go on to the community, then.

The fiscal year 1968 estimate of \$7.2 million for the community program provides \$2.6 million for assistance payments to the former AEC communities of Oak Ridge and Richland and \$4.6 million for assistance payments and operating costs at the Los Alamos community.

The fiscal year 1968 estimate of \$2.6 million for assistance payments at Oak Ridge and Richland reflects an increase of \$200,000 over the fiscal year 1967 estimate. Legal authorization for making assistance payments to Oak Ridge and Richland expires in fiscal year 1969. Proposed legislation which would authorize continued assistance, as may be necessary, has been developed for submission during this session of Congress.

The fiscal year 1968 estimate of \$4.6 million for the Los Alamos community is a reduction of \$3.1 million from the fiscal year 1967 estimate. This reduction reflects continued progress toward the termination of government ownership of the town, including the termination of assistance to the county in the establishment of local government, sale of a large part of the real estate and transfer of the utilities and most of the municipal functions to the county. In connection with this cost reduction, our revenues from community operation (included in the revenues portion of our budget) decrease from \$3.6 million in fiscal year 1967 to \$1.1 million as a result of the disposal of the community facilities.

PROGRAM DIRECTION AND ADMINISTRATION

Included under this program are the salaries, travel and other costs of the Federal employees at the Washington headquarters and the field offices engaged in the executive direction, general management, and technical supervision of the atomic energy program. Operating costs under this program are estimated at \$94 million.

Provision has been made in the budget for a staffing complement at the end of fiscal year 1968 of 5,853, an increase of 225 over the 5,628 employees planned at the end of fiscal year 1967. The additional positions are required to augment both the technical and administrative staff in the management of the Commission's operation and regulatory programs due primarily to the growth and complexity of the developmental efforts and the increase in licensing activity.

Plant and capital equipment obligations are estimated at \$1,331,000. Of this amount, \$1,131,000 is for capital equipment and \$200,000 is for modifications and alterations to the existing facilities at headquarters.

Now, I would like to go on to the question of the budget reductions and requested restorations.

BUDGET REDUCTIONS AND REQUESTED RESTORATIONS

At the opening of this statement I referred to the reductions amounting to \$153.4 million made by the House. We have carefully assessed the program impact of these reductions to determine those items for which we should seek restoration of funds. As this committee knows, over the years the Atomic Energy Commission has always been selective in its requests to this committee for restoration of House reductions. We are particularly cognizant of the budgetary pressures on the Congress this year and, for that reason, we are proposing restoration of only a small fraction of the amount reduced by the House. We would like to note, however, that we still consider the programmatic activities involved in the reductions we are not appealing to be exceedingly worth while.

The House reduced our operating expenses appropriation request by \$44.9 million. About half of this amount reflects a revised estimate of unused funds which could be carried over from fiscal year 1967 to meet our fiscal year 1968 fund needs. The balance of the reduction was against Commission programs. We are proposing restoration of \$2,302,000 of this reduction. The Commission's requested appropriation for plant and capital equipment was reduced by \$108.5 million. Of this amount, \$98.9 million related to obligations which were not scheduled to take place until after 1968. Of the balance of the reduction, amounting to \$9.6 million, we are requesting restoration of \$1,900,000 for two items.

The basis and composition of the \$4,202,000 we are appealing is set forth in the material transmitted to the committee in support of our proposed amendments to the appropriation bill as enacted by the House. At this point I would like to summarize briefly for the committee the items in our appeal.

RAW MATERIALS PROGRAM FUNDS RESTRICTION

Our first item of appeal does not require additional appropriations over the House allowance, but stems rather from the restrictions on the use of the funds provided for the raw materials program. The House allocated the major portion of the half million dollar reduction in this program against the Commission's uranium resource

investigation activities, and limited an additional \$100,000 allowed over the fiscal year 1967 level for research contracts we proposed to let with universities under our resource investigation activities, to universities in uranium producing areas. In view of the uranium demand outlook as a result of the growth in civilian nuclear power, we believe we must pursue a vigorous resource investigation program. We would propose, therefore, to reduce the resource investigation program by a maximum of \$150,000 and apply the balance of the House reduction to other activities within the raw materials program. While we expect to let research contracts with universities in uranium producing areas, we believe we should also have the opportunity to avail ourselves of the competence in this field of universities which may be located outside of the uranium producing areas. We would appreciate it, therefore, if the report of this committee could indicate that the Commission would have this latitude in its resource investigation program.

REACTOR DEVELOPMENT PROGRAM

The House reduced the estimate for the reactor development program by \$13,645,000. Of this amount, we are seeking restoration of \$1,600,000 of which \$700,000 would be for the Army reactor program and \$900,000 for general reactor technology research and development. The restoration for the Army reactor program is necessary to accommodate, in fiscal year 1968, program commitments we presently have in support of existing portable military reactors. The amount for the general reactor technology program is required to minimize the adverse effects of cost increases we have experienced since the budget was developed and to prevent a further dilution of effort in basic technology supporting our specific developmental programs such as advanced converters and breeder reactors.

COMMUNITY PROGRAM

We are also proposing restoration of \$152,000 in the Commission's community program. This amount would permit a separate fire department for the Los Alamos community which is in the process of assuming the responsibilities of self-government. Having a separate fire department for the community would be consistent with the established policy of self-government for the community of Los Alamos.

SELECTED RESOURCES

The final restoration requested under the operating expenses appropriation amounts to \$550,000 and represents the selected resources necessary to finance the contractors involved in the items appealed for the reactor development program.

PLANT AND CAPITAL EQUIPMENT

The first item of appeal under the "Plant and capital equipment" appropriation also does not require additional appropriations, but stems rather from the limitation on the use of funds included in the House bill for the 200-Bev accelerator. The legislation authorizing this project permits the Commission to initiate procurement of equipment as well as initiate design of this facility. The House report limits the use of the \$7,333,000 authorized and included in the House appropriation bill for this project to design only. Since considerable savings can accrue to the Government if the Commission is permitted to

proceed with procurement of equipment in concert with the procurement of similar equipment at Brookhaven, for which funds have already been authorized and appropriated, we are requesting that the limitation to design only imposed by the House action be removed.

The \$1,900,000 fund restoration we are requesting in the plant and capital equipment appropriation is for Project 68-5-a, an addition to the biomedical building at Rio Piedras, P.R., in the amount of \$1,400,000; and for the procurement of a low energy physics accelerator in the amount of \$500,000. The addition to the biomedical building is sorely needed to alleviate an acute overcrowded condition at the Puerto Rico Nuclear Center. The low energy physics accelerator will make a valuable contribution to the greater dispersion of competency and excellence in the performance of physics research.

That concludes my prepared statement.

TOTAL RESTORATION REQUEST

Senator HILL. Let me ask you a question. The House cut you some \$108,467,000. What is the total amount of your request for restoration?

Dr. SEABORG. \$4,202,000.

Mr. ABBADESSA. Mr. Chairman, the \$108.5 million reduction was against the plant and equipment request; the total House reduction, including operating expenses, was \$153.4 million, and our requested appeal is \$4,202,000.

LANGUAGE CHANGES

Senator HILL. Together with that limitation on the 200-Bev accelerator?

Mr. ABBADESSA. There are two language appeals, Mr. Chairman. There is language on the 200-Bev to allow us to do the advanced procurement; also in the raw materials program, we would like to have the language changed so that, instead of applying the \$395,000 reduction against resource investigations which the chairman referred to, we would prefer to apply \$150,000, and take the balance against the rest of the program. We are not appealing the money.

Senator HILL. You are not appealing the money?

Senator PASTORE. Will you yield to me?

200-BEV ACCELERATOR

LINAC INJECTOR—PROCUREMENT

What do you mean, advanced procurement of what?

Dr. TAPE. The 200-Bev accelerator as it is now being designed and refined would utilize the same type of injector which is being designed and procured for the Brookhaven AGS modification program.

As Dr. Seaborg says the Brookhaven program is authorized, it is underway, the design is proceeding and procurement of those components for the injector will be starting in a short period.

The situation then is that that particular injector would lend itself eventually to the machine which Dr. Wilson is designing in Chicago, and the savings then that would be permitted will be savings both in time because he is using the same design and same procurement, and savings in money because he would be buying duplicates of these particular items and you realize much of this is custom built, if you will, because of its nature.

Senator PASTORE. What difference does time make? Is time of the essence? It is going to take 7 or 8 years to build this 200 Bev.

HIGH ENERGY PHYSICS PROGRAM

Dr. TAPE. Senator Pastore, the program goes back for some years, as we know. The high energy physics program has been reviewed by a number of committees and panels of the Government. It was in 1963 that the Ramsey panel which was a joint panel of the General Advisory Committee of the AEC and the President's Science Advisory Committee issued its report stating that a higher energy accelerator than existed in the country's facilities was of prime importance. It was the single-most urgent facility needed to explore high energy physics.

HIGHER ENERGIES IMPORTANT

We have known for many years that energy of the particles is crucial to the research program. We have at Brookhaven the 30-Bev accelerator. There is in Europe a 30-Bev accelerator, Mr. Chairman, the same kind as at Brookhaven. The Russians are completing an accelerator, hopefully, in this year of about 70 Bev, more than twice the energy which we have currently operating.

So in order to move forward with the program in high energy physics, it has been recognized that higher energies are important.

As I said, this has been recognized and urged upon the Nation as early as 1963.

The national policy paper which we have used as a guide, reviewed the program again in 1965 and underlined this same need.

We are now in 1967 and wish to move forward to satisfy this particular urgent requirement.

TWO-PHASED JOB

Senator PASTORE. The thing that bothers me is why all these concessions have to be made to the Bureau of the Budget. I realize what you are saying, Doctor, because I have no strong feeling against the accelerator. Not as much as I have against some of the background that led to this authorization. My position is rather well known, it doesn't make any difference now, Congress has acted although the vote was even closer than the House, which was 140 to 7.

The fact still remains that all these studies led to a very ultrahigh energy machine, which would have cost in the neighborhood of \$400 million, and because of the money element when you went before the Bureau of the Budget they reduced it to a machine that would cost about \$240 million. This places us in a position whereby this has to be a two-phased job. When we talk about a two-phased job, we are talking about procurement in order to save money, and yet we are getting into a two-phased job which means more expenses. It is like building your house in two sections, you build one wing one time and another wing another time, when you know if you build a whole house at the same time it is going to cost you less.

But, after all, that is a consideration of the Budget, they made that decision, and you gentlemen at AEC bought it. It was bought.

LINAC INJECTOR—RELATION TO FINAL ACCELERATOR

Now, the thing that is bothering me on this procurement; has this procurement got to do with the small job or the big job, or doesn't it make any difference?

Dr. TAPE. It doesn't make any difference, Senator.

Senator PASTORE. No? Can you explain to me why.

Dr. TAPE. The injector we would procure can be used for either the lower intensity machine or the higher intensity machine, and would provide us with the capability then of going to either intensity. It would also be applicable for higher energies. As you recall from the hearings before the Joint Committee, we discussed the option on energy in terms of whether we might not at this stage include in the initial design an option to go to higher energy, perhaps 300 Bev or somewhat higher energy in the Bev.

The injector is the beginning of the entire accelerator cycle and so what we are looking for here is the opportunity to inject into the machine particles at an energy which would be useful for either machine, and at an intensity which would be useful for either machine. Added costs could result from higher energies, more extensive experimental areas, and so on, in the machine. So we are trying to do precisely what was developed at the hearings before the Joint Committee.

We want to look at this in terms of what are these several options that can be achieved, and I think you will recall in the subcommittee report there were a number of options which we were asked to look at and these are being looked at by Dr. Wilson at Chicago and also by the Commission.

Senator PASTORE. Let me get this straight. What you are actually saying is this: If before the authorization for the machine itself is made, even though we do allow you to go beyond the architecture and the engineering to get into procurement, what you propose to procure, if it finally ends up that we are going to have the \$400 million job, that your money, the money you are spending in procurement will serve that machine as well as any other decision?

Dr. TAPE. Serve either machine equally.

Senator PASTORE. Now, another question, may I?

Senator HILL. Go ahead, surely.

FUNDS ADDED BY JOINT COMMITTEE FOR MODIFICATION OF WEAPONRY

Senator PASTORE. On this matter of the \$15 million that the Joint Committee added for modification of our weaponry, which was asked by the laboratories, why is no request being made to restore that when the Joint Committee thought it was of prime importance and had priority? Why isn't that being asked to be restored? Is that to put the cat on our back, or don't you think it is necessary? What do you propose to do?

EFFECTS OF NOT GETTING FUNDS

Dr. SEABORG. The question was put to us a little earlier by Senator Bible as to what would be the effect of not receiving the \$15 million added, and I responded to that at that time, as did Commissioner Tape.

Senator PASTORE. Do you mind if I hear it?

Dr. SEABORG. Not at all.

As you have indicated in response to questioning by the Joint Committee during the authorization hearing, our laboratory directors indicated that it would take about \$21 million additional to accomplish the weapons test and laboratory programs at the desired level and as a result of that the Joint Committee added not \$21 million but

\$15 million, \$10 million to be applied toward the Nevada test site and \$5 million for work at the laboratories.

Now, at the time of the fiscal year 1968 budget submission which was some 7 or 8 months ago, it was estimated that there would be some, between [deleted] weapons tests required. The final number dependent upon the complexity of the tests that were actually carried out.

Since that time we can make a better estimate of this, and we now estimate that [deleted] tests actually would be [deleted] tests.

However, no contingency was provided to cover additional tests [deleted] since the time of the submission of the fiscal year 1968 budget.

We now find that additional tests will be required.

With the reduction in tests there is thus also no provision for advanced technology tests. The larger number of phase 3 requirements placed on the laboratories under the present funding and personnel ceilings have resulted in the dilution of effort in the areas of advanced technology, and there would be [deleted] tests required in this area of advanced technology.

So that in order to meet the requirements as they now exist, this would correspond to a total of [deleted] tests.

Senator PASTORE. Have you the money for it?

Dr. SEABORG. That would be possible with the additional \$15 million.

REPORT OF JOINT COMMITTEE

Senator PASTORE. Are you familiar with the report that was issued by the Joint Committee yesterday?

Dr. SEABORG. I certainly am.

Senator PASTORE. Do you agree with it?

Dr. SEABORG. Well, I think that I agree with it, yes. I don't know whether I would estimate exactly the same dates as the committee did, but—

Senator PASTORE. Well, give a year or two one way or the other. We are talking about history here.

Dr. SEABORG. Yes.

Senator PASTORE. Whether it is 1972 or 1980, it is a peril, isn't it?

Dr. SEABORG. Oh, yes.

Senator PASTORE. And these tests we are talking about are not going to give us any answers tomorrow. It is a question that has to go back to the laboratory and has to be worked out, and that is going to take months and years.

Dr. SEABORG. That is right.

CONCERN OVER RED CHINA

Senator PASTORE. The thing that bothers me here is, we are at a crucial point, we have a new consideration in this year of 1967, we have another nuclear power we have to worry about. Up to now we have only been worrying about Russia. The President went so far as to say he was going to try to reach an agreement with Mr. Kosygin, to see if we could do something about not involving us in this tremendous expenditure of an antiballistic missile. That is now dropped out. But, after all, that had no consideration, no inclusion, no involvement with this new development. Of course, that is coming

along on the part of Red China and all of us know that Red China in 3 years has accomplished a lot more than the French have in 7 years. Their accomplishment is quite spectacular and exotic and that is agreed to by our experts.

CONCERN OVER PRIORITIES

Now, in view of that, I, for the life of me, cannot see why we are becoming so contrite, we are becoming so restrictive when it comes to developing and protecting our weaponry, and here we are, we are ready to spend \$400 million for a billion electron volts that has nothing at all to do with national security. Those are the priorities that disturb me. The committee, in its own judgment suggested \$15 million, and it is being played down by the Atomic Energy Commission and it has to do with the percentage of our own weaponry in view of this new threat. I can't see it. I can't see it, unless, of course, the Bureau of the Budget has taken hold of the Atomic Energy Commission and anything they decide you people agree with.

That is a speech I came here to make and I have made it.

EFFECT OF PROVIDING ADDITIONAL \$15 MILLION

Let me ask you this question: If we put the \$15 million in this bill for the added testing, will it be wasted money?

Dr. SEABORG. Certainly not.

Senator PASTORE. Will it put us in a better position as against this threat of Red China?

Dr. SEABORG. Yes; it would. And, as I started to say, that when this budget was made up we, of course, hadn't known about and couldn't possibly have known about the test of June 17 of Red China where they tested.

Senator PASTORE. Precisely.

Dr. SEABORG. The thermonuclear weapon in the megaton range.

Senator PASTORE. Precisely.

Senator HILL. Can I ask a question there?

TOTAL PROGRAM

How will this put us in a better position so far as the threat of Red China is concerned?

Dr. SEABORG. Well, it will enable us to develop [deleted] and enable us to get on faster with the advanced technology and advanced weapons that are so important in meeting the threat.

Dr. TAPE. Senator, I realize you put your finger on Red China, but you must realize the program is a total program. [Deleted.] So it is quite true, as Senator Pastore said, the report of the Joint Committee has put a real focus on the Red China situation, but it is a problem broader than that.

Senator PASTORE. How angry will it make you if we restore the \$15 million?

Mr. RAMEY. Not at all.

Senator PASTORE. How happy will it make you?

Mr. JOHNSON. Let me say one more thing about it.

[Deleted] tests of more advanced concepts are necessary to back up the basic work that is going forward on presently conceived weapons.

WEAPONS IN PLANNING AND DEVELOPMENT STAGE

Senator HILL. Presently what, Doctor?

Mr. JOHNSON. Presently conceived weapons, that are in the planning and development stage now.

Senator BIBLE. You did say earlier, Doctor, if I remember your testimony correctly, [deleted].

Dr. TAPE. That is correct.

Senator BIBLE. Isn't that true?

Dr. TAPE. [Deleted.]

Senator BIBLE. Right.

Dr. TAPE. [Deleted.]

Senator BIBLE. I thought that is the way I understood your testimony.

LINAC INJECTOR—ESTIMATED FISCAL YEAR 1968 OBLIGATIONS

Senator HRUSKA. Dr. Tape, referring again to the appeal from the restricted language in the House bill on the 200-Bev accelerator, what portion of the moneys appropriated would be used for procurement of components of the injector if that language request is granted?

Dr. TAPE. This would occur over a period of time, Senator. The earliest element of that would be going on order within the next few months, I would say, and over the coming year there would be procurement that would probably have to go on order that would run up to the order of \$3 million—sorry, \$1.9 million.

Senator HRUSKA. \$1.9 million?

Dr. TAPE. Yes.

Senator HRUSKA. And so the difference between that and the amount that has been appropriated would still be left for the AE work?

Dr. TAPE. \$7.3 million minus \$1.9 million would be available for the AE work starting both on the machine and building designs on supporting facilities.

LINAC INJECTOR—ESTIMATED SAVINGS

Senator HRUSKA. Just by way of review, you detail about three items of savings that would come about by this process of ordering simultaneously with the Brookhaven order for these components, these parts.

Dr. TAPE. That is right.

Senator HRUSKA. Now, the first of those elements has to do with the simultaneous fabrication of the two identical units at a reduced unit cost, and what does that amount to?

Dr. TAPE. We estimate that would be about a half million dollars.

Senator HRUSKA. Then you have a savings in the overhead procurement because joint procurements always, by reason of joint oversight, and joint supervision and inspection, they result in savings. How much would that be?

Dr. TAPE. We estimate that would be about \$200,000.

ESCALATION OF COSTS

Senator HRUSKA. Then the third element was the escalation of costs which can be anticipated within the interim, which would follow if this language were not taken out at this time. What would that come to?

Dr. TAPE. Since the entire injection system is about an \$8 million procurement, we estimated about 5 percent on that or about \$400,000. Senator HRUSKA. So that would be a total of about \$1.1 million.

Dr. TAPE. And we have rounded this off to a million dollars, in rounded figures.

Senator HRUSKA. A million dollars. If we rounded off further, we would be on the basis of an expenditure for these particular parts of about \$2 million, we would be saving \$1 million which is 50 percent of their cost. Isn't that correct?

EXPLANATION OF SAVINGS

Dr. TAPE. I would have to back up for a moment. The \$1 million saved would be in the procurement and final delivery of the entire system. The parts going on order at this stage would be only \$2 million. The \$1 million savings estimate reaches into a whole procurement pattern which would extend over the \$8 million procurement.

Senator HRUSKA. But these three items which you gave me are based upon the expenditure of \$2 million, aren't they, \$1.9 million?

Dr. TAPE. In this coming fiscal year.

Senator HRUSKA. Yes; in this coming fiscal year.

Dr. TAPE. What I am assuming is the follow-on items would follow in the final authorization of 1969.

Senator HRUSKA. Yes.

Dr. TAPE. And the savings would have to be in the total project not just the \$2 million I am talking about this year.

Do I make myself clear?

They don't accumulate. The total savings would not accumulate on the first year's procurement but it would accumulate because you have started the entire procurement 1 year earlier. You see, the total injector is a 3-year procurement.

Senator HRUSKA. I see, so you would have to spread that over the total cost?

Dr. TAPE. So the total savings would be over the entire period.

Senator HRUSKA. But at any rate, the savings would be substantial.

Dr. TAPE. You achieve it because you are able to start in parallel with Brookhaven.

Senator HRUSKA. But the savings would be substantial, would they not?

Dr. TAPE. Substantial.

RESTRICTION IN HOUSE REPORT

Senator PASTORE. Would the Senator yield at that point for just one moment?

This restriction is written in the House report, is it not?

Dr. TAPE. That is in the House report.

Senator PASTORE. It is not part of the bill itself?

Mr. ABBADESSA. The House has changed the project title to include AE only.

Senator PASTORE. In the bill itself?

Mr. ABBADESSA. Not in the bill itself, in the report.

Senator PASTORE. What I am considering here, you see, the House report is not part of the conference. What if this committee agreed

with you on just how we would handle this; the House has written it in the report, not in the bill.

EFFECT OF LANGUAGE IN SENATE REPORT

Mr. ABBADESSA. I am not a parliamentarian, Senator Pastore, but it is my understanding if the Senate in its report would put language in it which would allow us to proceed with procurement; this would be a factor for consideration in conference.

Senator PASTORE. The Senate report would not be in conference. We can write anything we want in the report. You are not going to have a contest on a report.

Senator HRUSKA. If the Senator will yield, on previous occasions we have encountered on committees I have served, of putting in language diametrically opposite to the language contained in the report of the other body and the result is a stalemate. So perhaps the bid for an amendment on the restrictive language would result in the adoption of that procedure and, if so, it is a horse apiece and they are just about of equal strength and speed.

LANGUAGE IN BILL SUBJECT TO POINT OF ORDER

Senator PASTORE. If we wrote language in this it would be subject to a point of order.

Senator HRUSKA. In the bill. But there is no restriction in the bill.

Senator PASTORE. Not in the bill, but of course they would violate the edicts in the House if they dared to do it unless we had some understanding. Well, we can discuss this in conference when we get there and the chances are it will be on a moral rather than on a legal basis.

REQUEST FOR MEMORANDUM

I think what you should do on this is to give a little memorandum as to the specifics on it.

Dr. TAPE. We will do that.

Senator PASTORE. Maybe in the conference report—

Senator HRUSKA. On the procedure.

Senator HILL. Will you give us that?

Dr. TAPE. Yes.

(The memorandum follows:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., August 4, 1967.

HON. LISTER HILL,
Chairman, AEC-TVA Subcommittee,
Committee on Appropriations,
U.S. Senate.

DEAR SENATOR HILL: During the course of your Committee's recent hearing on the Atomic Energy Commission's FY 1968 appropriation, we appealed restrictions imposed by language in the House Appropriations Committee report on the Public Works and Atomic Energy Commission Appropriation bill with respect to use of funds for the Commission's Raw Materials program and for design, engineering and initial procurement for the 200 Bev accelerator. You will recall that Senator Pastore indicated that no legislative amendments were involved in these appeals. Therefore, he requested a memorandum from the Commission which would set forth its views regarding the handling of this request in the Senate report and in conference with the House.

If your Committee wishes to act favorably on our appeals, we would suggest that your report on the bill incorporate language that would reflect such action.

Language for each item could be similar to that quoted below. If the Senate approves the bill in a manner consonant with your report, the differences in guidance contained in the House and Senate reports would, we assume, be discussed in conference, with the expectation that the views expressed in the Senate report could be incorporated in the conference report. Should the conference report be silent we would assume that our use of the appropriated funds would not be subject to the limitations contained in the House report, since both Houses of the Congress would have failed to reach an agreement upon those limitations. Naturally, it would be preferable from our standpoint not to be required to interpret in this manner, and we would hope that the conference report could be explicit.

There follows the language referred to above:

"Raw Materials Program.—The Committee recommends a reduction of \$150,000 in lieu of \$395,000 in the resources investigation activity of this program. Also, in the interest of taking full advantage of scientific competence, the Committee recommends that the Commission should be allowed to place research contracts with universities without regard to geographic location.

"200 Bev Accelerator.—The Committee recommends that the Atomic Energy Commission be allowed to initiate procurement and assembly of the linac injector for the 200 Bev accelerator as well as perform architect-engineer work on the overall facility. The Committee was persuaded by the testimony received that as much as \$1,000,000, and perhaps more, may be saved if such procurement and assembly is initiated in FY 1968."

The foregoing, we believe, is responsive to Senator Pastore's request. We would be pleased to discuss this further if you so desire.

Sincerely yours,

E. J. BLOCH, *Acting General Manager.*

RESTRICTIVE LANGUAGE ON RAW MATERIALS

Mr. RAMEY. Mr. Chairman, on the other restrictive language on the raw material picture again there isn't so much money involved, but actually the Commission, as a result of this remarkable increase in atomic power requirements is having to restudy the whole uranium raw material picture. I believe, and I think the Commission agrees, it is very important we have the flexibility to utilize universities and other experts in various parts of the country to look at other parts of the country, and utilize the Geological Survey and others in our proceeding with this increased raw material program.

Senator HILL. Any further questions?

Senator BIBLE. No; I am satisfied.

PUERTO RICO NUCLEAR CENTER

Senator PASTORE. Did they discuss the Puerto Rico project?

Dr. SEABORG. I mentioned that we are appealing the deletion of the addition to the biomedical building at Puerto Rico Nuclear Center.

Senator PASTORE. Will you give us a capsule description of how serious the situation is?

Dr. SEABORG. The Puerto Rico Nuclear Center is in dire need of additional space. I visited there, along with the other Commissioners in February of last year, and they are just overflowing in their use of the space. They are almost literally carrying on experiments in the hallways and using the hallways and the ends of corridors for offices.

We found there that their work is first rate. They are particularly strong in the medical aspects of nuclear energy, and they are carrying on first-class research work.

We believe that they can go—that the Puerto Rico Nuclear Center can be—further used as an international center which a number of

Latin American countries could utilize, and particularly in view of the Punta del Este Conference of the Latin American and American Presidents in which they pointed out the advantages of regional developments in nuclear energy in the Americas, we feel that the Puerto Rico Nuclear Center can play an important role.

UTILIZATION OF CENTER BY LATIN AMERICAN COUNTRIES

Senator PASTORE. Can we have in the record, if these figures are available, the numbers of countries of Latin America that have utilized this center and to what extent.

Dr. SEABORG. Yes. We can furnish that.

Senator PASTORE. We would like to have that in the record. In other words, this not only serves the people of Puerto Rico—

Dr. SEABORG. Oh, no.

Senator PASTORE (continuing). This serves practically all of Latin America, and that was the reason for it.

(The information follows:)

PARTICIPATION OF LATIN AMERICAN STUDENTS AT PRNC

During the period FY 1958 through FY 1967 students from Latin America participated in the education and training program at the Puerto Rico Nuclear Center which included graduate course work, thesis research, seminars, and special training projects.

Student totals by country for the ten year period are provided in the following tabulation:

Country:	10-year student totals
1. Argentina -----	16
2. Boliva -----	8
3. Brazil -----	1
4. Chile -----	14
5. Colombia -----	44
6. Costa Rica -----	5
7. Cuba ¹ -----	9
8. Dominican Republic -----	21
9. Ecuador -----	10
10. El Salvador -----	8
11. Guatemala -----	4
12. Haiti -----	1
13. Mexico -----	16
14. Nicaragua -----	3
15. Panama -----	2
16. Paraguay -----	6
17. Peru -----	13
18. Uruguay -----	7
19. Venezuela -----	18
Total -----	206

¹ Cuban refugees residing in Puerto Rico.

SISTER LABORATORY ARRANGEMENT

Dr. SEABORG. That is right, and in fact we have a sister laboratory arrangement between the Nuclear Energy Center in Colombia, and the Puerto Rico Nuclear Center. But more important than that, we are trying to enhance and increase the use of this Puerto Rico Nuclear Center, by the Latin American countries.

NEED FOR REQUESTED FUNDS

Senator PASTORE. Do we need all of that \$1.4 million now?

Dr. SEABORG. I think so. I think we have cut that down as low as we can in order to accomplish our objective here.

Senator PASTORE. What kind of construction will this be?

Dr. ENGLISH. This will be reinforced concrete and masonry construction. Construction in Puerto Rico has to be built well to withstand the possibility of storms. It would be an economical type of construction.

Senator PASTORE. Nothing luxurious or exotic?

Dr. ENGLISH. No, no, quite simple.

Senator PASTORE. Very practical.

Dr. SEABORG. Actually, what I would hope is that some members of this committee and the members of the Joint Committee would visit the Puerto Rico Nuclear Center and see first hand the fine work that is going on there. I think it is——

Senator PASTORE. I understand two members of the committee and a staff member were down there and they confirm what you have just said. No question about that.

Dr. SEABORG. I think it is not just appreciated.

(Discussion off the record.)

LETTER FROM RESIDENT COMMISSIONER

Senator HILL. I have here a letter from the Resident Commissioner in Puerto Rico which confirms your testimony, and I think it should be put in the record at this point.

(The letter follows:)

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C. August 1, 1967.

Hon. LISTER HILL,

Chairman, Atomic Energy Commission—TVA Subcommittee of the Subcommittee on Public Works, U.S. Senate, Washington, D.C.

DEAR SENATOR HILL: I take the liberty of writing to request your help with regard to appropriations to fill an urgent and critical need in Puerto Rico. Specifically, I refer to the item of \$1.4 million for an addition to the biomedical building at the Rio Piedras site of the Puerto Rico Nuclear Center (PRNC). This item was requested by the Atomic Energy Commission, recommended by the Joint Committee on Atomic Energy in their report on the authorization bill, and approved by the House of Representatives in H.R. 10918, to authorize appropriations for the Atomic Energy Commission.

As you know, it was deleted by the House Committee on Appropriations in their consideration of H.R. 11641.

The House Appropriations Committee, in their Report 505 did not deny the need for the biomedical building addition but merely felt that it should be deferred to a later date.

If you or a member of your staff will study the justification of this need, which I am including as item #9 of the construction project data sheet attached, I am sure that you cannot help but come to the conclusion that the addition to the biomedical building at the Rio Piedras site of the Puerto Rico Nuclear Center is needed now, as soon as construction can be completed. I am also enclosing, to help you come to a conclusion on this matter, a letter dated July 28, 1967, from Henry J. Gomberg, Director of the Puerto Rico Nuclear Center, operated by the University of Puerto Rico for the U.S. Atomic Energy Commission.

Mr. Gomberg's letter is brief but to the point, and I think the justification that he presents for the need for this new facility cannot be denied.

I know that you will give this matter your considered attention and I should appreciate it if you would include in the official record of your hearings on this legislation this letter to you. Mr. Gomberg's letter to me, and the justification of needs presented as Item #9 of the construction project data sheet.

Thanking you for your cooperation, I am,

Sincerely,

SANTIAGO POLANCO-ABREU.

[Enclosures]

PUERTO RICO NUCLEAR CENTER,

Mayaguez, P.R., July 28, 1967.

Representative SANTIAGO POLANCO ABREU,
House of Representatives,
Cannon Building,
Washington, D.C.

DEAR REPRESENTATIVE POLANCO: As suggested by Mr. Alexander Palau, I am writing to explain the situation at the Puerto Rico Nuclear Center, and the critical need for expansion of our Río Piedras facilities.

By way of background, the Puerto Rico Nuclear Center was created to help the United States fulfill its leadership role in development of peace time nuclear energy. The principal need in Latin America in this area was and is education and training in the application of nuclear energy techniques to develop improved medical service, agriculture and technology. The Center was established in Puerto Rico as the ideal meeting ground between advanced science and technology as practiced in the United States and the developing countries of Latin America.

As a mode of operation adapted to conditions in Puerto Rico, the Nuclear Center established two major bases. One of these is located in Mayaguez so as to interact closely with the College of Engineering and Mechanic Arts in the study of problems of engineering, agriculture, and marine biology, along with related basic sciences. The other is in Río Piedras as part of the "Centro Médico" and is designed to provide essential support to radiation and isotope utilization in medicine. It is our installation at "Centro Médico", known as the Bio-Medical Building, with which we are now concerned.

In support of our original proposal to the U. S. Atomic Energy Commission for an expansion of the Bio-Medical building, we prepared a statement which is part of "Schedule 44" of the FY-1968 Budget Proposal made by the University of Puerto Rico for the Nuclear Center. The statement on "Justification of Need" is attached and provides ample data on the severe crowding which has existed for some time and the deleterious effect it has had on operations.

In addition, our justification for this new facility is based not only on the desire to be able to carry out our program under conditions which will make for good efficiency and productivity, but also the need to reduce the existing hazards which have reached serious proportions.

As early as 1964, the crowded conditions were noted and criticized by a team of inspectors from the Oak Ridge Operations Office of the United States Atomic Energy Commission. In their report "Health Protection Review of the Puerto Rico Nuclear Center", May 1964, the following statements appear.

I. INTRODUCTION AND SUMMARY

... "PRNC health protection programs were observed to be adequate, however, the implementation of such programs at the Río Piedras facility appears increasingly difficult due to the overcrowded conditions." ...

III. OBSERVATIONS

... "C. The condition of the Río Piedras facility is observed to be extremely crowded. In one instance, safety equipment (a safety shower and eye wash) was blocked from use by an experimental apparatus. Halls were being used for storage. Storage areas were crowded and contained unmarked radioactive material. These instances illustrate the difficulty of maintaining correct health protection attitudes in inadequate facilities. A temporary laboratory annex is in preparation but will only begin to relieve the existing situation." ...

The report was prepared by Howard V. Heacker and William T. Thornton, both Health Physicists of the US AEC from Oak Ridge, Tennessee.

It would not be appropriate at this time to enter into a defense of the PRNC program as a whole. The PRNC program has been evaluated many times in recent years and there is documentation on record testifying to the high quality of the program and the need it fulfills.

We feel that the requested addition to the Bio-Medical Building is necessary if we are to sustain the program quality and meet the demonstrated need for this work in Puerto Rico and in Latin America.

Respectfully yours,

HENRY J. GOMBERG, *Director.*

CONSTRUCTION PROJECT DATA SHEET

9. JUSTIFICATION OF NEED

The research and training activities carried out at the PRNC Biomedical Building at Río Piedras are primarily oriented toward the biomedical sciences but also include activities in radioisotope technology; radiation, photo, radiochemistry, and organic chemistry; and solid state physics. The PRNC Bio-medical Building is located on the site of the Puerto Rico Medical Center of the Department of Health, Commonwealth of Puerto Rico. The research and training activities in the Biomedical Building expanded to the point where, by FY 1962, the building was seriously overcrowded and temporary space in other available buildings had to be used on an increasing basis to take care of the further expansion during FY 1962 through FY 1967. The proposed Addition to the Biomedical Building is required to provide normal working space for the personnel now housed in the overcrowded Biomedical Building and in temporary non-PRNC facilities.

When the present Biomedical Building was planned in the summer of 1957 it was proposed for construction in approximately two equal phases with the second phase (the currently proposed Addition) scheduled to be placed under construction in FY 1963. Two-phase construction was premised on the need for PRNC to demonstrate its potential for growth on the basis of both programmatic need and quality of work for increased support by the AEC. The schedule was premised on the assumption that this potential would be capable of positive determination during FY 1962 (first five years) and that authorization of the second phase in FY 1963 would provide additional facilities by the beginning of FY 1963 when it was estimated the space in the present building would be overcrowded and be the limiting factor on further development of the research and training programs.

The present building was occupied at the end of FY 1961 and the gross area of 18,900 sq. ft. (net functional area of 12,900 sq. ft.) became overcrowded before the end of FY 1962 when 86 staff members were housed in the Biomedical Building. During FY 1963, further increases in staff were necessary, and by the end of FY 1963 the occupancy of the Biomedical Building had to be increased to 97 and an overflow of 22 staff members had to be housed in five scattered locations, totaling 5,550 net sq. ft., primarily in University buildings. In addition, space had to be provided in the present building for approximately 13 full-time long-term students who required the same personnel space. The overcrowded conditions in the present building are clearly indicated by the average net working area per occupant of 117 sq. ft. per person as against an average in excess of 200 net sq. ft. per person in other comparable facilities of the AEC and US research installations. Formal courses are also presented in the existing building but these are periodic and the students are concentrated for most of their time in group work.

The proposed Biomedical Building Addition will provide additional net working area totaling 15,400 sq. ft. The net working area provided by the existing and proposed building addition will total 28,900 net sq. ft. The enlarged building plus the animal house will house all 120 of the personnel on the staff in FY 1968. The full-time long-term students requiring the same type of space will be increased upon occupancy of the enlarged building from 13 to about 38. The average space per full-time occupant of the enlarged building will on this basis become about 186 net sq. ft. per person. This average is on the low side of the averages for buildings of this type. This is further indicated by comparison to the AEC design criteria of 150 net sq. ft. per planned occupant for an administration or office type building.

The accelerated growth of the PRNC training and research activities at the Río Piedras site (Biomedical Building) over that contemplated in 1957 resulted from studies made during FY 1961 which indicated the following:

1. The immediate and most pressing needs of Latin American countries for training and graduate study are in the fields of—

- (a) Uses of radioisotopes in medicine, industry and agriculture.
- (b) Radiotherapy for cancer treatment.
- (c) Clinical uses of radioisotopes in medical diagnosis and treatment.
- (d) Radiobiology related to the medical sciences.

2. The need for training at the graduate level was far greater than the need for purely technical training.

3. Graduate level training (including residency and post-graduate type training) can only be satisfactorily presented when provided in conjunction with a well organized and high quality research program covering the areas in which training is to be provided.

Most of the current and anticipated greatest needs of Latin America for training fall within the activities carried out primarily at the Biomedical Building. The interest and demands of Latin American countries for training in the fields of reactor operation, nuclear science and technology, agricultural biosciences, health physics, and marine biology as conducted at the PRNC site at Mayaguez is continuing to increase each year but not as rapidly as for fields covered at Río Piedras.

In addition to the build-up in demand for training at Río Piedras (all of which can not be satisfied due to space limitation), the establishment of a strong related research program was initiated in FY 1963 under separate support provided by the AEC Divisions of Research and Biology and Medicine. This research program shows exceedingly good promise of providing the active research work required to support graduate level training.

The combination of the need to offer increased opportunities for graduate level training in the biomedical sciences and the need to expand the biomedical and radioisotope research studies in support of the graduate level training has resulted in an operation which is so cramped for space that neither the training or research activities can presently be fully productive and responsive to the needs of Latin America. It is estimated that the demand for long term training assignments (residencies, graduate students, research participants, etc.) will increase from 15 in FY 1965 to 38 in FY 1968-70 period and that the maximum number of trainees at any one time in short term formal courses will double from 50 in FY 1963 to 100 in the FY 1968-70 period. None of these increased demands for training can be handled until the new Addition is constructed.

The FY 1968 operating budget levels and total manpower level for the training and research work planned for the present Biomedical Building and associated temporary facilities are as follows:

CONSTRUCTION PROJECT DATA SHEET

Item of effort	Fiscal year 1968	
	Operating budget	Total man-years
1. Radioisotope applications training and research.....	\$120,000	11.5
2. Radiotherapy and cancer training and research.....	170,000	19.25
3. Clinical applications training and research.....	162,900	23.0
4. Medical sciences and radiobiology training and research.....	100,000	14.0
5. Radioecology of a tropical rain forest.....	184,000	15.75
6. Radiation preservation of tropical foods.....	15,000	1.0
7. Agricultural biosciences training and research.....	33,000	3.0
8. Study of schistosoma mansoni.....	82,600	6.0
9. Study of radiation damage in organic crystals.....	87,900	5.55
10. Shop and other technical services at Río Piedras.....	61,000	11.0
11. Administrative and Services Personnel.....	110,000	13.0
Total at Río Piedras in fiscal year 1968.....	1,126,400	123.05

After completion of the proposed Addition to the PRNC Biomedical Building in Late FY 1970, the first full year operating budget (FY 1971) for the expanded facilities is currently estimated to total approximately \$1,300,000 (at 1963 cost indices), an increase of \$114,000 over the amount budgeted for FY 1965. The major portion of this increase, approximately \$77,000, will be for building operating costs in the expanded space. The only plans at this time for pro-

gram expansion in the enlarged facility involve an increase in the number of people in long term training from about 13 to 38 which will involve an incremental cost of about \$1,500 for each additional person or about \$37,000.

The types of training courses and their enrollments presented in the Biomedical Building are indicated by the following tabulation of courses and enrollments for 1965:

Course	Length of course	Number of courses	Total enrollment
1. Radioisotope techniques courses.....	4 weeks.....	4	28
2. Clinical use of radioisotopes courses.....	2 months.....	2	8
3. Radiotherapy residency.....	1 year or longer.....	1	2
4. Cancer radiotherapy for 4th-year medical students.....	1 month.....	8	11
5. Fundamentals of radiological hygiene.....	4 months.....	1	13
6. Special training in the use of radioisotopes in agriculture.....	1 to 12 months.....	1	1
7. Radiation protection course.....	2 weeks.....	1	19
8. Radiobiology institute.....	6 weeks.....	1	20
9. Radiological physics conferences.....	1 semester.....	1	15
10. Advanced course in nuclear medicine, nephrology.....	2 weeks.....	1	1
11. Chemistry 465—Radiochemistry.....	1 semester.....	1	4
12. Biology 372—Nuclear techniques in biological research.....	do.....	1	4
13. Orientation in clinical uses of radioisotopes.....	do.....	1	14
Total enrollment.....			140

The types of research carried out in the Biomedical Building are as follows:

1. Clinical Studies

- Clinical and laboratory studies of thyroid disorders.
- Absorption of Vitamin A, Xylose and Oleic Acid in irradiated patients.
- Ureteral patency in patients with advanced cancer of the cervix uteri.
- Development of improved techniques for tumor localization.
- Renogram studies in irradiated rabbits.
- Study of thyroid gland function under the influence of a combination of estrogenic and progestational substances in Puerto Rico women.

2. Clinical and Basic Studies

- Extension of the renogram to the detection of subclinical renal dysfunction.
- Autoradiographic studies.

3. Radiotherapy and Cancer Studies

- Study and development of diagnostic laboratory procedures required for clinical studies.
- Response of tumors and normal cells to radiation using exfoliative cytology and histopathology techniques.
- Study of pre-operative irradiation in cases with cancer of the esophagus.
- Evaluation of estrogen administration on the prognosis of cases with cancer of the head and neck.
- Study of the up-take of radioactive tagged substances by tumor tissues.
- Biochemistry study of blood constituents in patients with cancer prior to and after irradiation.

4. Radiobiology Studies

- Mechanisms of antigen-antibody reactions following inoculations of mice with irradiated and normal cercariae of *Schistosoma mansoni*.
- Study of the use of neutron capture reactions in human cancer therapy.

5. Organic Chemistry Research

- Synthesis of substances of interest to the nuclear field.
- Synthesis of radioisotope containing compounds of biological interest.
- Fundamental research employing radioactive isotopes for the study of mechanisms of organic reactions.

6. Physical Chemistry Research

- Kinetic studies of isotope exchange reactions.

7. Radiation Chemistry Research

- Radiation chemistry and photochemistry of nucleoproteins and the constituent molecules in rigid matrices at liquid nitrogen temperatures.

8. *Solid State Physics Research*

a. Radiation damage in organic crystals using electrical conductivity measurements.

9. *Terrestrial Ecology Research*

a. Radioecology of a tropical rain forest at El Verde, Puerto Rico.

10. *Details of Cost Estimate*

Item	Total cost
1. Engineering, design, and inspection, 10.1 percent of construction costs-----	\$112, 000
2. Construction costs:	
a. Improvement to land-----	5, 000
b. Building addition, 20,800 gross square feet at \$26.63 per square foot-----	621, 000
c. Fixed equipment-----	300, 000
d. Movable equipment and furnishings-----	175, 000
e. Utilities-----	4, 000
3. Contingency, 15 percent of other costs-----	183, 000
Total project cost-----	1, 400, 000

11. *Major Contractor and Intended Type of Contract*

Engineering:

Puerto Rico Nuclear Center—Design Criteria and assistance to A/E.
AEC—Prime Lump-Sum, Architect-Engineer—Titles I, II and III Engineering Services.

Construction:

AEC—Prime Lump-Sum Contractor—Construction of Facility.
Puerto Rico Nuclear Center—Procurement of certain specialized equipment.

12. *Fallout Shelter*

If a fallout shelter is to be provided under this project, a gross area of approximately 3,800 square feet of space on the ground floor of the new addition will be modified to include required thickness of masonry walls and ceiling for shielding to provide shelter space for the approximately 275 people estimated to occupy the existing building and new addition, including the permanent staff, and full-time and temporary students. The estimated incremental cost is \$75,000, which includes the cost of modified space, emergency power and water supply, ventilation, etc. The shelter will be designed in accordance with the criteria established in AECM 6316, "Design Criteria for Fallout Shelters".

NEED FOR PUERTO RICAN BUILDING

Mr. ABBADESSA. Mr. Chairman, may I make a statement?

Senator Pastore asked us to furnish for the record a write-up on the need for the Puerto Rican building. I would like to point out in our letter to this committee on the requested Senate amendments, we have included a write-up on each one of our appeals. It covers the need for the Puerto Rican facility and I assume, based on past practices, that this material will be put in the record. But I think we have furnished it, Senator.

Senator BIBLE. Might I ask a question on this Puerto Rico building request of \$1,400,000?

Senator HILL. Surely.

SIZE OF FACILITY

Senator BIBLE. How large a facility do you have there now?

Dr. ENGLISH. At this particular installation, which is Rio Piedras, as the chairman indicated in his testimony, this would approximately double the space that exists now.

Senator BIBLE. Double the existing space now? Is this a one-shot deal, if we give them \$1,400,000 does this complete the addition?

Dr. ENGLISH. Senator, as far as we can see at the moment, this would complete the present planning for the facility at Rio Piedras. We have no plans at the moment at least for coming in, in the near future, for any additional facility construction funds.

Senator BIBLE. How many square feet do you have in its operation now?

Dr. ENGLISH. The total square footage of space in this building as it exists now is 18,900 square feet gross with a 12,900 square feet net usable space.

NUMBER ON STAFF

Senator BIBLE. Accommodates how many people?

Dr. ENGLISH. Somewhere over a hundred staff. There is a sizable number of students in addition to that.

Mr. RAMEY. There are a lot of outpatient people. The place is always overflowing, Senator. They bring them in for radiation treatment, for example—

Dr. SEABORG. It is the most crowded scientific research building I believe I have ever seen.

Dr. ENGLISH. The number of square feet per person is 114 at the present time and the standard normally accepted for laboratory space is 200 square feet per person.

NEW CONSTRUCTION WILL COMPLETE PRESENT PLANS

Senator BIBLE. Would this facility complete your present plans for Rio Piedras in Puerto Rico?

Dr. ENGLISH. That is correct.

Senator BIBLE. You are not going to come back next year asking for something additional for this Puerto Rico facility?

Mr. ABBADESSA. No, sir.

Senator BIBLE. This is one shot?

Mr. ABBADESSA. That is correct. We have been trying to get this for many years.

Senator BIBLE. Thank you.

Senator PASTORE. May I ask another question?

Senator HILL. Sure, go ahead.

Senator PASTORE. (Discussion off the record.)

EQUAL EMPLOYMENT OPPORTUNITY

Senator PASTORE. For the purpose of the record, will you tell us what the efforts of the Commission are to bring about this idea of equal opportunity of employment? Have we just dropped the thing because the authorization went through? Are we pursuing it? Is there any hope? I know Joliet and Wheaton went for open housing ordinances before the authorization. Has it come to a stop since?

Dr. TAPE. In the past week, Senator, Elgin, Ill., has indicated that it will go. It has made some amendments to its present plans which will be, they tell us, ratified this week, so it has not stopped. We seem to be finding additional communities adopting good open housing ordinances.

THREE ASPECTS OF PROBLEM

As far as what is going on, I think we should look at three aspects. We have the AEC itself, and we have a man in the area who is working full time on this matter, we find that this is a good approach, seeing the mayor, seeing the local political officials, helping them understand the problem and helping them move. That, we feel, is producing results.

The Argonne National Laboratory, which is in the area, too, is undertaking a more aggressive program in actually locating employees in the area as contrasted with being, say, in the Chicago area, and here they are attacking it at what I would call the professional employee level for, I think, two simple reasons: One is that they are trying to get as many of the more professional types as they can into their installations; two, they would like them to live in a community and they can go in and get them to live in the community because I think you will realize that the Argonne area has more of what you might call middle-income and upper-income housing than it does low-income housing, so they can actually do this in the area.

The third group attacking this problem in the area is the URA organization itself, University Research Association, and they are undertaking a similar move. They have been—they have contacted the University of Chicago people who have done much in the University of Chicago area, where they have made great progress in integration there, are drawing on the experience of the University of Chicago people and they are now starting to move into this area in the same way. So I think that there is no question but what we will continue to see results, and the program which you and we have been trying to push, I am sure, we can see results.

Senator HILL. Any other questions?

Senator BIBLE. I have none, Mr. Chairman.

SUBCOMMITTEE RECESS

Senator HILL. There is a live quorum in the Senate but is there anything you gentlemen want to add or think you should add, Doctor?

Dr. SEABORG. No, I don't think so. I think we have covered what we wanted to say.

Senator HILL. In that case we will stand in recess until 2 o'clock. Thank you, gentlemen, very much.

(Whereupon, at 11:35 a.m., the hearing was recessed until 2 p.m. the same day.)

(AFTERNOON SESSION, 2 O'CLOCK, THURSDAY, AUGUST 3, 1967)

TENNESSEE VALLEY AUTHORITY

STATEMENT OF AUBREY J. WAGNER, CHAIRMAN OF THE BOARD, ACCOMPANIED BY FRANK E. SMITH AND DON McBRIDE, DIRECTORS; CHARLES J. MCCARTHY, GENERAL COUNSEL; LEWIS B. NELSON, MANAGER OF AGRICULTURAL AND CHEMICAL DEVELOPMENT; G. O. WESSENAUER, MANAGER OF POWER; G. P. PALO, MANAGER OF ENGINEERING DESIGN AND CONSTRUCTION; E. P. ERICSON, ASSISTANT TO THE GENERAL MANAGER (BUDGET AND PLANNING); EDWIN J. BEST, BUDGET ANALYST; AND J. D. VREELAND, WASHINGTON REPRESENTATIVE

JUSTIFICATION

Senator HILL. The hearing will be in order. We are hearing the Tennessee Valley Authority today. Their justification will be placed in the record at this point. Mr. Wagner, will you proceed?

(The justification follows:)

The Tennessee Valley Authority is a corporation wholly owned by the Federal Government. It is an independent agency under a Board of Directors responsible to the President and the Congress. It was created by the Congress in 1933 for the unified conservation and development of the resources of the Tennessee Valley. TVA is charged with the responsibility for developing the Tennessee River for navigation, flood control, and power and for providing a low-cost supply of electric power to the Tennessee Valley region; for chemical research, the introduction of experimental fertilizers useful in agriculture, and production of related materials needed for national defense; and for aiding, in the national interest, the comprehensive resource development and economic growth of the Tennessee Valley region in cooperation with the states and their subdivisions and agencies.

Summaries of the budget program described on the following pages are as follows:

	1966 actual	1967 estimate	1968 estimate
Appropriations (new obligational authority).....	\$59,347,000	\$63,700,000	\$62,150,000
Expenditures (accrued):			
Appropriations.....	50,179,181	68,919,100	68,560,000
Power proceeds and borrowings.....	334,980,081	412,172,000	416,200,000
Nonpower proceeds.....	26,706,098	27,913,000	24,847,000
Total expenditures.....	411,865,360	509,004,100	509,607,000
Payments to the Treasury.....	58,873,085	62,126,710	62,010,000

BUDGET SUMMARY—ALL FUNDS (OBLIGATION BASIS)

[For fiscal years ending June 30, 1966, 1967, and 1968]

	1966 actual	1967 estimate	1968 estimate
CAPITAL OUTLAY OBLIGATIONS			
River and power development:			
New lock at Guntersville Dam.....	\$448,076	\$90,000	-----
Additions and improvements at navigation facilities.....	964,961	800,000	\$75,000
Flood control facilities.....	1,105,693	2,747,000	760,000
Tellico Dam and Reservoir.....	-----	2,950,000	7,250,000
Tims Ford Dam and Reservoir.....	2,237,725	9,082,000	11,250,000
Nickajack Dam and Reservoir.....	26,055,373	19,532,000	8,868,000
Bear Creek multipurpose water control system.....	122,713	1,127,000	4,250,000
Beech River multipurpose water control system.....	331,315	-----	-----
Additions and improvements at multiple-use facilities.....	593,733	405,000	584,000
Widows Creek steamplant unit 8.....	-157,006	74,000	-----
Colbert steamplant unit 5.....	-52,352	-----	-----
Browns Ferry nuclear plant units 1-2.....	123,552,633	24,521,000	31,845,000
Paradise steamplant units 1-2.....	661,210	-----	-----
Paradise steamplant unit 3.....	37,373,531	24,851,000	25,545,000
Bull Run steamplant unit 1.....	14,266,438	3,954,000	-----
Modernization of Wilson units 1-8.....	1,708,835	2,188,000	374,000
Additional capacity for fall of 1972.....	-----	120,000	40,560,000
Transmission system facilities.....	76,875,391	62,830,000	56,374,000
Coal land and rights.....	7,415,831	15,000	-----
Additions and improvements at power facilities.....	1,545,378	2,123,000	2,297,000
Investigations for future facilities.....	663,468	1,394,000	1,305,000
Fertilizer, agricultural, and munitions development.....	4,030,775	8,337,000	5,320,000
Land Between the Lakes demonstration.....	10,496,931	8,665,000	9,500,000
General service activities.....	3,532,412	2,591,100	3,396,000
Total capital outlay obligations.....	312,450,644	178,396,100	209,553,000
OPERATING OBLIGATIONS			
River and power development:			
Navigation operations.....	2,550,701	2,564,000	2,668,000
Flood control operations.....	2,263,119	2,495,000	2,592,000
Power operations.....	216,401,827	239,833,000	250,767,000
Multipurpose reservoir operations not allocated.....	339,206	378,000	366,000
Surveys, and studies for river development.....	193,952	306,000	304,000
Fertilizer, agricultural, and munitions development.....	27,612,721	29,863,000	30,051,000
Cooperative valley development.....	2,743,385	3,915,000	4,150,000
Land Between the Lakes demonstration.....	490,625	784,000	1,012,000
General service activities.....	5,492,429	4,393,000	3,358,000
Change in selected resources.....	-3,569,136	8,869,000	992,000
Total operating obligations.....	254,518,829	293,400,000	296,260,000
Total obligations.....	566,969,473	471,796,100	505,813,000
Payments to the Treasury.....	58,873,085	62,126,710	62,010,000
Total obligations and payments.....	625,842,558	533,922,810	567,823,000
Financed from—			
Power proceeds and borrowings.....	-545,751,060	-440,308,000	-474,820,000
Nonpower proceeds.....	-27,720,656	-27,528,710	-24,853,000
Appropriation balances.....	6,976,158	-2,386,100	-6,000,000
New obligational authority (appropriations).....	59,347,000	63,700,000	62,150,000

Summary of 1968 budget financed from appropriations (obligation basis)

Continue construction of Tellico Dam and Reservoir near Lenoir City, Tenn. (p. 75)-----	\$7,250,000
Continue construction of Tims Ford Dam and Reservoir near Winchester, Tenn. (p. 81)-----	11,250,000
Continue construction (nonpower portion) of Nickajack Dam and Reservoir near Chattanooga, Tenn. (p. 89)-----	5,211,000
Continue construction of Bear Creek multipurpose water control system, northwest Alabama and northeast Mississippi (p. 97)-----	4,250,000
Continue development of Land Between the Lakes demonstration, western Kentucky and Tennessee (p. 219)-----	9,500,000
Continue flood control projects:	
Red Bank-White Oak, Tennessee flood control project (p. 31)---	454,000
Other flood control facilities (p. 30)-----	306,000
Total-----	760,000
Continue additions and improvements to navigation and multipurpose facilities:	
Navigation facilities (p. 21)-----	75,000
Multiple-use facilities (p. 103)-----	584,000
Investigations for future facilities (p. 123)-----	1,100,000
Total-----	1,759,000
Continue rehabilitation to chemical facilities at Muscle Shoals, Ala. (p. 141)-----	5,320,000
General facilities (office, transportation, and other general-use facilities)-----	3,396,000
Program expenses:	
River and power development-----	5,564,000
Fertilizer, agricultural, and munitions development-----	8,303,000
Cooperative valley development-----	4,150,000
Land Between the Lakes demonstration-----	1,012,000
General service activities-----	425,000
Total-----	19,454,000
Total budget financed from appropriations-----	68,150,000

SUMMARY OF BUDGET FINANCED FROM APPROPRIATION (OBLIGATION BASIS)

[For fiscal years ending June 30, 1966, 1967 and 1968]

	1966 actual	1967 estimate	1968 estimate
CAPITAL OUTLAY			
River and power development:			
Navigation facilities:			
New lock at Gutersville Dam.....	\$448,076	\$90,000	-----
Additions and improvements at navigation facilities.....	964,961	800,000	\$75,000
Flood control facilities.....	1,105,693	2,747,000	760,000
Multipurpose river development:			
Tellico Dam and Reservoir.....	-----	2,950,000	7,250,000
Tims Ford Dam and Reservoir.....	2,237,725	9,082,000	11,250,000
Nickajack Dam and Reservoir.....	11,822,113	11,639,000	5,211,000
Bear Creek multipurpose water control system.....	122,713	1,127,000	4,250,000
Beech River multipurpose water control system.....	331,315	-----	-----
Additions and improvements at multiple-use facilities.....	593,733	405,000	584,000
Investigations for future facilities.....	1,026,661	1,169,000	1,100,000
Total, river and power development.....	18,652,990	30,009,000	30,480,000
Fertilizer, agricultural, and munitions development: Chemical facilities.....	3,745,338	6,519,000	5,320,000
Land Between the Lakes demonstration.....	10,496,931	8,665,000	9,500,000
General service activities: General facilities.....	3,652,908	2,591,100	3,396,000
Total capital outlay.....	36,548,167	47,784,100	48,696,000
EXPENSES			
River and power development:			
Navigation operations.....	835,956	809,000	846,000
Flood control operations.....	493,659	665,000	684,000
Multipurpose reservoir operations.....	3,484,205	3,585,000	3,730,000
Surveys and general studies for river development.....	193,952	306,000	304,000
Total river and power development.....	5,007,772	5,365,000	5,564,000
Fertilizer, agricultural, and munitions development.....	7,319,217	7,918,000	8,303,000
Cooperative valley development:			
Forestry projects.....	1,098,126	1,221,000	1,230,000
Mineral resources investigations.....	137,674	137,000	175,000
Tributary area development.....	977,603	1,308,000	1,323,000
Regional water quality management.....	464,110	930,000	947,000
Research and development of processes for recovery of sulfur.....	-----	-----	150,000
Disposal of solid wastes as soil amendments.....	25,154	50,000	50,000
Multipurpose reservoir operations.....	37,759	269,000	275,000
Total cooperative valley development.....	2,740,426	3,915,000	4,150,000
Land-Between-the-Lakes demonstration.....	490,625	784,000	1,012,000
General services activities:			
Topographic mapping.....	271,035	260,000	346,000
Other expenses.....	45,384	60,000	79,000
Total general service activities.....	316,419	320,000	425,000
Total expenses.....	15,874,459	18,302,000	19,454,000
INVENTORIES AND PROPERTY TRANSFERS			
General service activities:			
General inventories.....	68,712	-----	-----
Property transfers.....	-120,496	-----	-----
Total inventories and property transfers.....	-51,784	-----	-----
Total budget financed from appropriations.....	52,370,842	66,086,100	68,150,000
FINANCING			
Appropriations.....	59,347,000	63,700,000	62,150,000
Balance brought forward.....	1,409,942	8,386,100	6,000,000
Balance carried forward.....	-8,386,100	-6,000,000	-----
Total financing.....	52,370,842	66,086,100	68,150,000

*Summary of 1968 budget financed from power proceeds and borrowings
(accrued expenditure basis)*

Continue construction of:	
Browns Ferry Nuclear Plant units 1-2, Alabama-----	\$47,045,000
Paradise Steam Plant unit 3, Kentucky-----	43,580,000
Nickajack Dam and Reservoir (power portion) near Chat- tanooga, Tenn-----	3,710,000
Additional generating capacity for the fall of 1972-----	560,000
Transmission system facilities-----	66,500,000
Additions and replacements of other power facilities; investigations for future power facilities; modernization of Wilson hydro units 1-8; and changes in inventories and deferred charges-----	4,038,000
Power operating expenses-----	250,767,000
Total -----	416,200,000

Proceeds from power operations in 1968 are estimated at \$366,406,000; proceeds from borrowings at \$100,000,000; and other proceeds at \$967,000. Payments to the Treasury are estimated at \$62,000,000—\$47,000,000 as a dividend (return on the appropriation investment in the power program) and \$15,000,000 as a reduction in the appropriation investment in the power program.

SUMMARY OF BUDGET FINANCED FROM POWER PROCEEDS AND BORROWINGS (ACCRUED EXPENDITURE BASIS)

[For fiscal years ending June 30, 1966, 1967, and 1968]

	1966 actual	1967 estimate	1968 estimate
CAPITAL OUTLAY			
River and power development:			
Multipurpose river development: Nickajack Dam and Reservoir.....	\$13,153,067	\$8,905,000	\$3,710,000
Power supply facilities:			
Widows Creek steamplant unit 8.....	204,667	145,000	
Colbert steamplant unit 5.....	29,895		
Browns Ferry nuclear plant units 1-2.....	843,812	16,530,000	47,045,000
Paradise steamplant units 1-2.....	513,955		
Paradise steamplant unit 3.....	16,166,071	56,790,000	43,580,000
Bull Run steamplant unit 1.....	17,165,749	4,190,000	
Modernization of Wilson hydro units 1-8.....	4,655,304	3,555,000	375,000
Additional capacity for fall of 1972.....		120,000	560,000
Transmission system facilities.....	71,927,803	62,450,000	66,500,000
Coal land and rights.....	105,607	7,325,000	
Additions and improvements at power facilities.....	1,278,134	2,382,000	2,297,000
Investigations for future facilities.....	363,193	225,000	205,000
Total capital outlay.....	124,183,837	162,617,000	164,272,000
EXPENSES			
River and power development:			
Power operations.....	214,089,186	237,463,000	248,295,000
Allocation of multipurpose reservoir operations.....	2,312,641	2,370,000	2,472,000
Total expenses.....	216,401,827	239,833,000	250,767,000
INVENTORIES AND DEFERRED CHARGES			
River and power development:			
Power inventories.....	6,671,043	9,004,000	626,000
Deferred charges.....	1,065,460	718,000	535,000
Total inventories and deferred charges.....	5,605,583	9,722,000	1,161,000
Total budget financed from power proceeds and borrowings.....	334,980,081	412,172,000	416,200,000
FINANCING			
Balance brought forward.....	8,399,426	7,333,952	3,166,048
Proceeds from borrowings.....	65,000,000	110,000,000	100,000,000
Current proceeds:			
Power operations.....	326,901,446	351,996,000	366,406,000
Sale of retired plant.....	523,377	1,104,000	580,000
Miscellaneous receipts.....	362,869	697,000	387,000
Total current proceeds.....	327,787,692	353,797,000	367,373,000
Payments to Treasury:			
Reduction of appropriation investment.....	15,000,000	15,000,000	15,000,000
Dividend (return on appropriation investment).....	43,873,085	47,125,000	47,000,000
Total payments to Treasury.....	58,873,085	62,125,000	62,000,000
Balance carried forward.....	7,333,952	3,166,048	13,993,048
Total financing.....	334,980,081	412,172,000	416,200,000

SUMMARY OF BUDGET FINANCED FROM NONPOWER PROCEEDS (ACCURED EXPENDITURE BASIS)

[For fiscal years ending June 30, 1966, 1967, and 1968]

	1966 actual	1967 estimate	1968 estimate
CAPITAL OUTLAY			
Fertilizer, agricultural, and munitions development: Chemical facilities.....	\$285,437	\$1,818,000	-----
EXPENSES			
River and power development: Multipurpose reservoir operations.....	339,206	378,000	\$366,000
Fertilizer, agricultural, and munitions development.....	20,293,504	21,945,000	21,748,000
Cooperative valley development: Forestry projects.....	2,959	-----	-----
General service activities: Reimbursable services.....	5,176,010	4,073,000	2,933,000
Total expenses.....	25,811,679	26,396,000	25,047,000
INVENTORIES			
Fertilizer, agricultural, and munitions development: Chemical inventories.....	608,982	-301,000	-200,000
Total budget financed from nonpower proceeds.....	26,706,098	27,913,000	24,847,000
FINANCING			
Balance brought forward, including continuing fund.....	3,597,786	4,206,818	2,774,108
Current proceeds:			
Navigation operations.....	29,765	-----	-----
Multipurpose reservoir operations.....	339,206	378,000	366,000
Fertilizer, agricultural, and munitions development.....	20,969,582	21,399,000	21,155,000
Cooperative valley development.....	15,256	1,000	-----
Land-Between-the-Lakes demonstration.....	8,124	58,000	64,000
Reimbursable services.....	5,176,010	4,073,000	933,000
Sale of retired plant and miscellaneous receipts.....	777,187	573,000	452,000
Total current proceeds.....	27,315,130	26,482,000	24,970,000
Payments to Treasury.....	-----	-1,710	-10,000
Balance carried forward, including continuing fund.....	-4,206,818	-2,774,108	-2,887,108
Total financing.....	26,706,098	27,913,000	24,847,000

SELECTED DATA FOR MAJOR PROJECTS

Fiscal year construction started	Nameplate generating capacity and service dates	Capacity (kilowatts)	Service dates	Actual to June 30, 1966 (net)	Budget		Estimated incidental income, fiscal year 1967-68	Estimated total cost
					Fiscal year 1967	Fiscal year 1968		
FINANCED FROM APPROPRIATED FUNDS								
1963	Navigation lock: New lock at Guntersville Dam		June 1965	\$16,344,186	\$30,000			\$16,424,186
1966	Flood control facilities:							
1966	Sevierville, Tenn.		September 1967	456,908	1,983,000	\$260,000		2,699,908
1966	Coeburn, Va.		June 1967	422,852	777,000			1,199,852
1968	Red Bank-White Oak, Tenn.		March 1969			454,000		950,000
Multipurpose projects:								
1967	Tellico Dam and Reservoir		January 1971	2,425,521	2,950,000	7,250,000		47,000,000
1966	Trims Ford Dam and Reservoir	45,000	May 1970	9,082,000	11,250,000	17,742,749		40,500,000
1964	Nickajack Dam and Reservoir		November 1967	25,378,865	11,639,000	5,211,000		43,000,000
1967	Bear Creek multipurpose water control system		January 1971	629,125	1,127,000	4,250,000		27,500,000
1964	Land-Between-the-Lakes demonstration		June 1970	19,397,572	8,665,000	9,500,000		51,500,000
FINANCED FROM POWER PROCEEDS AND BORROWINGS								
1961	Power supply facilities:							
1967	Widows Creek steamplant unit 8	550,000	February 1965	61,069,874	145,000		\$17,000	61,197,874
	Browns Ferry nuclear plant units 1-2	2,304,000	October 1970	843,812	16,530,000	47,045,000		247,000,000
1966	Paradise steamplant unit 3	1,150,000	October 1969	16,566,363	56,790,000	43,580,000		144,000,000
1962	Bull Run steamplant unit 1	950,000	April 1967	137,425,218	4,190,000		61,000	141,483,218
1965	Modernization of Wilson hydro units 1-8	131,840	End of 1967	4,974,022	3,555,000	375,000	132,000	8,816,022
1969	Additional capacity for fall of 1972	21,100,000	Fall of 1972		120,000	560,000	88,000	
1964	Multipurpose dam: Nickajack units 1-4	97,200	November 1967	13,153,067	8,905,000	3,710,000		26,000,000
			(3), January 1968 (1).				231,933	

1 Increment. 2 Preliminary.

SCHEDULE B-4.—ADMINISTRATIVE AND GENERAL EXPENSES

[For fiscal years ending June 30, 1966, 1967, and 1968]

	1966 actual	1967 estimate	1968 estimate
Board of Directors.....	\$164,780	\$168,000	\$168,000
Office of the General Manager.....	182,554	181,000	185,000
Budget Staff.....	194,834	198,000	198,000
Regional Studies Staff.....	223,324	402,000	357,000
Washington office.....	65,750	66,000	66,000
Information Office (including technical library service).....	514,163	555,000	579,000
Division of Personnel.....	1,408,297	1,600,000	1,630,000
Division of Finance.....	2,208,870	2,354,000	2,354,000
Division of Law.....	521,199	540,000	540,000
Division of Property and Supply.....	962,784	1,049,000	1,097,000
Medical and safety services.....	623,376	721,000	867,000
Other administrative and general expenses.....	93,596	107,000	107,000
Total administrative and general expenses.....	7,163,527	7,941,000	8,148,000

DISTRIBUTION OF ADMINISTRATIVE AND GENERAL EXPENSES

	1966 actual		1967 estimate		1968 estimate	
	Appropriations	Proceeds	Appropriations	Proceeds	Appropriations	Proceeds
River and power development:						
Capital outlay.....	\$315,000	\$2,228,140	\$566,000	\$2,337,000	\$664,000	\$2,316,000
Expenses:						
Navigation operations.....	49,399		55,000		55,000	
Flood control operations.....	26,110		30,000		30,000	
Power operations.....		2,868,333		3,000,000		3,100,000
Multipurpose reservoir operations.....	201,553	132,972	221,000	144,000	225,000	147,000
Surveys and general studies for river development.....	6,357		10,000		10,000	
Total expenses.....	283,419	3,001,305	316,000	3,144,000	320,000	3,247,000
Fertilizer, agricultural, and munitions development:						
Capital outlay.....	103,692	8,632	150,000	37,000	150,000	
Expense of fertilizer, agricultural, and munitions development.....	284,168	498,526	317,000	556,000	330,000	570,000
Cooperative valley development:						
Expenses:						
Cooperative valley development.....	147,488		180,000		180,000	
Multipurpose reservoir operations.....	2,094		10,000		13,000	
Total expenses.....	149,582		190,000		193,000	
Land Between the Lakes demonstration:						
Capital outlay.....	111,696		154,000		162,000	
Expense of Land Between the Lakes demonstration.....	11,291		31,000		38,000	
General service activities:						
Capital outlay.....	48,772		53,000		78,000	
Expense of general service activities.....	8,468	110,836	10,000	80,000	10,000	70,000
Total distribution by funds.....	1,316,088	5,847,439	1,787,000	6,154,000	1,945,000	6,203,000
Total distribution.....	7,163,527		7,941,000		8,148,000	

PAYMENTS TO THE TREASURY

Payments to the Treasury for fiscal year 1968 are estimated at \$62,010,000. This will bring total cumulative payments from TVA to the Treasury to \$724,323,726, of which \$682,784,596 is from power proceeds and \$41,539,130 from non-power proceeds. Of the payments from power proceeds, \$65,072,500 represents retirement of bonds issued prior to 1942, \$280,059,019 represents reduction of the appropriation investment in power facilities, and \$337,653,077 represents a return on that investment in the nature of dividends.

PAYMENTS FROM POWER PROCEEDS

Prior to August 6, 1959, payments to the Treasury from power proceeds were made pursuant to Section 26 of the TVA Act and Title II of the Government Corporations Appropriation Act, 1948. Under this legislation, payments totaling \$250,131,519 were made toward reduction of the Treasury's investment in TVA power facilities. Of these payments, \$185,059,019 represented reduction of the appropriation investment in power facilities and \$65,072,500 represented retirement of bonds sold by TVA to the Treasury prior to 1942 under Sections 15, 15a, and 15c of the TVA Act.

As amended on August 6, 1959, the Tennessee Valley Authority Act provides for payments, beginning in fiscal year 1961, of stipulated minimum annual amounts as reductions of the appropriation investment in TVA power facilities until a total of \$1,000,000,000, in addition to previous payments, shall have been repaid. The amended act also provides for payments to the Treasury of a return on the appropriation investment in the power program. The total to be paid annually is determined by applying to the unrepaid appropriation investment the computed average interest rate payable by the Treasury upon its total marketable public obligations as of the beginning of each fiscal year. Actual and estimated payments to be made under the provisions of the amended TVA Act are presented in the following table:

Fiscal year	Computed average interest rate	Return on appropriation investment	Repayment of appropriation investment	Repayable appropriation investment as of June 30
1960				\$1,000,000,000
1961	3.449	\$41,432,398	\$10,000,000	990,000,000
1962	3.063	36,541,640	10,000,000	980,000,000
1963	3.285	38,874,543	10,000,000	970,000,000
1964	3.425	40,206,432	10,000,000	960,000,000
1965	3.659	42,599,979	10,000,000	950,000,000
1966	3.800	43,873,085	15,000,000	935,000,000
1967	4.134	47,125,000	15,000,000	920,000,000
1968 ¹	4.178	47,000,000	15,000,000	905,000,000
Total		337,653,077	95,000,000	

¹ Estimate.

PAYMENTS FROM NONPOWER PROCEEDS

The balance of nonpower proceeds at the end of each fiscal year not required for the purposes enumerated in Section 26 of the TVA Act is paid into the Treasury prior to the end of the following calendar year. The total of such payments through June 30, 1968, is estimated at \$41,539,130. A payment of \$10,000 is estimated for 1968, representing income received by TVA from the Beech River Watershed Development Authority toward liquidation of that agency's obligations incurred in cooperative development of a multipurpose water control system. An initial receipt of \$1,710 from the Beech River Development Authority is being returned to the Treasury in 1967.

CHEMICAL AND FERTILIZER PLANT, MUSCLE SHOALS, ALA.

Mr. WAGNER. Senator, I thought I might describe briefly the progress in some of our programs, and then touch on the major items in our appropriations request, and respond to any further questions that you might have.

Senator HILL. All right, sir.

Mr. WAGNER. Let me say first that an important part of TVA's operations, as you will well recall, Senator, is centered in the chemical fertilizer and munitions plant at Muscle Shoals, Ala.

DUAL FUNCTIONS: MUNITIONS AND FERTILIZER

You know better than I that when TVA was created we were instructed to use that facility to provide munitions in time of war, and to improve and cheapen the cost of fertilizer in peacetime.

Senator HILL. The war clouds kept getting closer and closer. So Congress passed the Defense Act of 1918, and section 124 provided for the construction of these plants, and such power facilities as needed to operate the plants.

Mr. WAGNER. This facility can serve dual purposes because both phosphorus and nitrogen are essential ingredients in both fertilizer and in munitions.

Currently about 20 to 25 percent of our basic production capacity is going to munitions materials for the Military Establishment.

Senator HILL. What percent?

Mr. WAGNER. Between 20 and 25 percent.

The initial instruction to use the plant for munitions production in time of war or national emergency is being carried out.

We are, of course, also producing fertilizer materials.

Senator HILL. I was not here at the time, but if my friend Senator Gore was here, and passed that act in 1916, that was a case of good vision, wasn't it? Since we passed that act, we are now in our fourth war.

It is serving this country right now. After all these many, many years—some 51 years—it is serving the purpose for which it was built.

Mr. WAGNER. That is right. It has continued to do so.

The plant has continued to meet defense requirements, intermittently, as the need has risen.

EDUCATION AND DEMONSTRATION PROGRAMS

We are also producing experimental fertilizers. Currently we are using some 15 different materials in our education and demonstration programs, conducted in cooperation with the land-grant colleges and with fertilizer manufacturers, distributors, and dealers in 44 States. Nine of these 15 materials are brand new since 1962. So the experimental flavor of the operation continues.

Senator HILL. Would you supply for the record the names of those nine materials?

Mr. WAGNER. Yes, sir; I would be glad to do that.

(The information follows:)

The requested information is as follows:

Ammonium nitrate with 8% zinc

Ammonium phosphate nitrate (25-25-0)

Ammonium polyphosphate

Anhydrous ammonia with sulfur

Granular high analysis phosphate (60% P_2O_5)

Granular high analysis phosphate (40% P_2O_5 with 20% sulfur)

Liquid fertilizer (12-40-0)

Nitric phosphate (20-20-0)

Nitric phosphate (26-13-0)

FERTILIZER NITRATE AND PHOSPHATE CONTEST

Senator HILL. What is the nitrogen content of what you are producing today?

Mr. WAGNER. I do not have the nitrogen content separately, Senator. But the plant food content of TVA fertilizers averages about 43 percent; that is, the total content of nitrogen and P_2O_5 . Some of our materials go up much higher than that, as high as 75 percent. For the United States as a whole the nutrient content of fertilizers averages about 37 percent, up from 21.5 percent 20 years ago. We believe this upgrading is in large measure due to our work. However, we are still leading.

INDUSTRY UTILIZATION OF TVA FERTILIZER PATENTS AND PROCESSES

Senator HILL. In the old days you had to pay for the production, for the shipping, the handling?

Mr. WAGNER. The savings in shipping cost and handling costs from using concentrated fertilizers are very great. They are greater than would be indicated by just the production of our plant. We produce less than 1 percent of the fertilizer that is produced in this country. But as you know, the private companies use our patented processes under license, and also experiment with our advanced products. For example, about three-quarters of all the granular fertilizer that is manufactured in this country is produced by using a TVA process.

Other TVA patents are used in production of much of the others—such as mixed fertilizers and liquids and slurries. There are nearly 300 private firms using TVA licenses in more than 400 different plants, and 39 different States. The influence of our work has spread far and wide.

PLANT REHABILITATION

You will recall that we have been engaged since 1960 in a modernization program of our chemical plant. We are now a little more than halfway into it. The budget before you provides something over \$5 million to continue that work.

The plant, as you indicated earlier, is a World War I plant. Many of the facilities date back—

Senator HILL. Pre-World War I, so far as we are concerned?

Mr. WAGNER. Yes, sir.

We have now replaced some of the older facilities. We have provided a new phosphorus furnace, a new nitric acid plant, and two new phosphoric acid plants, some new storage and shipping facilities, and a number of other things.

We are this year putting in some new furnace charge preparation equipment, replacing some 1918 equipment in the plant.

UREA AMMONIUM PHOSPHATE PLANT ADDITION

Senator HILL. Last year when you were before this committee you talked about a very wonderful fertilizer that seemed to have all the qualities anyone could ask for. I believe it was called urea-ammonium phosphate. Do you have funds included for a plant to produce this material?

Mr. WAGNER. No, sir; we do not, but to keep the Fertilizer Development Center at the leading edge of fertilizer technology, as we try to do we need very soon to add the urea-ammonium phosphate plant which you inquired about a year ago. Urea ammonium phosphate is the next major technological step in our program for improvement of chemical fertilizers. Its manufacturing cost is about 10 percent below the cost of equivalent fertilizers manufactured by present methods.

Senator GORE. You say urea-ammonium phosphate?

Mr. WAGNER. Yes, sir; this is a new material.

Senator GORE. It is not a new chemical.

Mr. WAGNER. No; the individual components, urea and ammonium phosphate, are not new, but the combination of them is. Urea-ammonium phosphate has not been used in this country except for the experimental quantities that we have produced in a pilot plant.

Senator GORE. Does urea have plant food quality?

Mr. WAGNER. Yes; it does.

Senator GORE. Is it synthetic protein?

Mr. WAGNER. It is a synthetic compound, used as a nitrogen fertilizer.

Dr. NELSON. It is used also in livestock feed, Senator.

Senator GORE. I knew about that.

Dr. NELSON. Urea is a high-analysis nitrogen fertilizer. It has been on the market since about 1938. It is widely used as a solid nitrogen fertilizer today and also as an ingredient in liquid nitrogen fertilizers. It can be used in compounding solid mixed fertilizers.

Senator GORE. Is nitrogen—

Dr. NELSON. The chemical formula is $\text{CO}(\text{NH}_2)_2$.

Senator GORE. Thank you.

PLANT COSTS

Senator HILL. What would be the cost of this plant?

Mr. WAGNER. This plant would cost about \$14 million at present prices, Senator. It would involve a modernization of our ammonia plant, which should be done anyway, and new facilities for the production of urea-ammonium phosphate. Besides being a more economical fertilizer to manufacture, this is a very concentrated one. It can be made in formulations containing up to 60 percent plant food, which would provide great savings in shipping costs, for its use in both this country and abroad. It has excellent storage and handling qualities, which have been problems with some of the older fertilizers. It is a versatile fertilizer, it will perform well for most crops on most soils. It can be made in a wide range of nutrient ratios to suit the specific needs of the crop that is being raised or the needs of the soil on which it is being applied.

It is a wholly water soluble fertilizer, which again adds to its versatility.

RICE SPECIFIC

It is almost a specific for rice. This comes about from the fact that its nitrogen is in ammonium forms which rice prefers over nitrate forms. On flooded rice fields its nitrogen is less likely to leach out or volatilize into the atmosphere. Also it contains no sulphur, so that hydrogen sulphide is not formed as happens when the fertilizers

containing nitrates are applied to flooded rice fields. I understand that hydrogen sulphide tends to damage the roots of the rice plant.

For these reasons we think that urea-ammonium phosphate, in addition to having major and very important applications in this country, would also be very useful in the rice-eating countries of the world, where food supply is a problem.

Senator HILL. Senator Gore is a member of the Foreign Relations Committee. We see so much about the starvation—in the faces of a lot of other peoples—in many nations of the world.

Mr. SMITH. Mr. Chairman—the people involved in the present shipments of fertilizer to Southeast Asia, and South Vietnam, estimate the savings alone from using urea-ammonium phosphate will equal its development cost in 3 years. Mr. Wagner mentioned the fact of its lack of sulphur. Shipping urea-ammonium phosphate to rice-growing countries would give them a better product than materials now being shipped which contain sulphur. This should benefit rice production.

UNBUDGETED ITEM

Senator HILL. Did you ask the House for any funds for this?

Mr. WAGNER. No, sir. This is not in our budget.

Senator HILL. Was the question raised in the House to any extent?

Mr. WAGNER. It was mentioned in the discussion; yes, sir.

Senator GORE. Did you present it to the Bureau of the Budget?

Mr. WAGNER. Yes, sir; it has been presented to the Bureau of the Budget.

Senator GORE. But it was declined?

Mr. WAGNER. Yes, sir; it was declined.

PRODUCT SALINE FEATURES

Senator GORE. Back to the chemical qualities—is there any saline element released through the process of absorption?

Mr. WAGNER. I would like to ask Dr. Nelson to respond to that.

Dr. NELSON. Any soluble plant nutrient carrier has some saline properties. Urea-ammonium phosphate is not unusual in this respect. It should not present any problems, however.

Senator GORE. I will not go into this. But it did appear to me that might be a problem. Particularly with rice, where so much water solubility is involved.

Dr. NELSON. It should have no deleterious effects upon rice whatever.

Senator GORE. I mean on the soil—not on the rice.

Dr. NELSON. Not in the ordinary quantities used as fertilizer.

Mr. WAGNER. Testifying has been done on this fertilizer, Senator Gore, using the small quantities that we produced in a pilot plant. They have indicated that it is not only acceptable, but a superior fertilizer in almost all respects. Is that correct, Dr. Nelson?

Dr. NELSON. Yes. We have tested about 30 tons in 31 States and eight foreign countries.

FOREIGN FERTILIZER AND FOOD SUPPLY

Senator GORE. Well, Senator Hill has referred to the possible need of fertilizer in many foreign countries. It would be far more economical for us to supply fertilizer to India, for instance, than wheat.

Let them do the work to produce it. With the fertilizer there is less shipping charges, less financial outlay.

This is a very necessary undertaking.

However, as mankind continues to use more and more fertilizer, both here and around the world, these tangential chemical effects must be carefully examined, else we will build into our soil over a period of decades qualities that could be very deleterious to it.

Mr. SMITH. This material will have no adverse effects upon the soil. We can meet your concern right now.

Senator GORE. You mean that this plant is calculated to be——

Mr. SMITH. Completely beneficial. You mentioned the matter of the plant food content. One of the values of this type of fertilizer is the savings in shipping space. You are familiar I am sure with the critical problem involved in overseas shipping space.

Senator GORE. There is really not much to be gained from shipping sand.

Mr. SMITH. That is correct. It might ultimately prove even more expeditious to put the commercial-scale plants over there, where the fertilizer will be used.

Mr. WAGNER. Senator Gore, apropos of your comments about providing fertilizer versus wheat, I am not expert in problems abroad, but in the Tennessee Valley——

Senator GORE. You understand Senators must be experts in many fields.

Mr. WAGNER. Yes, I do.

Our experience in the Tennessee Valley was that to accomplish the changes that were needed in agriculture there, it made sense to make the fertilizers available, encourage their use, and rely on the farmers themselves to make the changes in agriculture, and to produce more and better crops. This is a typical TVA approach.

MODERNIZATION OF MUSCLE SHOALS PLANT

Senator, to continue, the modernization of the chemical plant at Muscle Shoals was undertaken in part to improve its efficiency and reliability. We have had good results. Last year the improvements that we had made saved us nearly a million dollars in operating costs, and by 1969, the improvement now underway will increase that figure to something over \$2 million a year.

So we are——

Senator HILL. Out of an expenditure of how much altogether?

Mr. WAGNER. The operation of that plant costs in the neighborhood of \$20 million annually.

POLLUTION CONTROL

The modernization program also has been undertaken to improve the quality of air and water in the environment. The pollution control devices that we were using several years ago met the accepted standards of that day, but to meet today's higher standards, it has been necessary to further reduce the materials going into the water and into the air. Since 1965, changes that we have made have removed over 80 percent of the materials that were being discharged into the river

in 1965, and we expect that by the end of the current fiscal year this figure will be up to 90 percent.

Over half of the material that was going into the air in 1965 is now being removed, and by the end of this fiscal year we will have about 80 percent of it removed. This will give us water and air quality that will test well above today's standards, and we believe we should be doing better than merely meeting standards.

RECOVERY OF SULFUR FROM STACK GASES

We are also engaged in research at our fertilizer development center on methods for the recovery of sulfur from stack gases of steamplants. This budget contains \$150,000 to start research on the recovery of sulfur in usable forms. We are interested in this, first of all, as the operator of steamplants. We want to clean up our stack gases as well as we can. We are also interested from the standpoint of our concern with conservation. Sulfur is in short supply. The price is going up. It is an important ingredient in fertilizer production. If sulfur could be recovered from stack gases in usable form, it would be a very significant conservation step.

In addition to this research project of our own, we are currently engaged with two research projects with the Public Health Service—projects which they are financing, but using our expertise.

NAVIGATION

To leave the chemical plant—another major objective of the Congress in creating TVA was the development and use of the Tennessee River navigation channel. You gentlemen will recall that in the early thirties traffic was about a million tons a year. It was mostly local traffic—much of it sand and gravel dredged and put ashore.

In 1966 the traffic volume moving on the river was over 20 million tons. This was 18 percent more than the year before, and for the past 5 or 6 years there has been a new record established each year. Apparently the same will be true again in 1967, because the first 6 months of this year showed an increase of about 14 percent over the same period last year.

INDUSTRIAL DEVELOPMENT

The importance of this growth in traffic, of course, is in the industries served and in the jobs provided; in the enhancement of the economy of the area.

Private capital has invested more than one and a half billion dollars in new plants along the waterfront; plants that are either built or now under construction. There are more new plants being planned on the waterfront today than at any time previously.

You may have noticed that within the past month Champion Paper Co. announced a new \$100 million paper plant on the Tennessee River in north Alabama, and planning is well along on another large paper plant in that same area.

Such developments are important to forestry in the area, and to land-owners, because they provide a new market from plantings and natural woodlands that have been developed in the area in recent years.

As you know, about 60 percent of the valley is forested. If that great resource is to provide more jobs and better income we must find more high-value uses for forest products.

WATERWAY MODERNIZATION REQUISITE

The growth in river traffic and the dependence of waterfront industries on the availability of that channel emphasize the need for keeping it modern. We have in recent years completed new large locks at Wilson, Wheeler, and Gunter'sville.

Senator HILL. Does that complete your program for providing new locks at the Tennessee River dams?

Mr. WAGNER. No, sir. We need badly to provide a new second lock at Pickwick Dam—this is the only dam below the shoals area and Decatur that has a single lock in it.

Senator HILL. What would be the cost of the second lock at Pickwick Dam?

Mr. WAGNER. About \$33 million, Senator.

Senator HILL. You have nothing in your budget estimate for it now?

Mr. WAGNER. No, sir. There is nothing in this budget for it. I am simply pointing out the need for it.

The Nickajack project when it is completed will have one lock in operation, and another one built up to the water level, so that we can complete the work above water at minimum cost—the underwater work will be done.

Senator HILL. You have some money in this budget for that?

Mr. WAGNER. Not for completing the second lock. We have money in the budget to complete the first lock. And the second lock ought to be done soon.

FLOOD CONTROL

Turning to the flood control program a moment, it continues to yield benefits. There were no major floods this past winter—the normal flood season—but there were a couple of smaller ones which we regulated for the benefit of the lower Ohio and Mississippi Rivers—one in March, and we reduced its crest by 1.3 feet at Cairo, Ill., another in May, which we reduced by 1.7 feet. These two operations together prevented about a million dollars' worth of damage, largely to agricultural crops. Not a tremendously large figure in comparison with the potential, but as I say, these were relatively small floods.

In total, nearly \$400 million worth of damages have been prevented by the operation of the TVA system since we began operating Norris in 1936. Just for comparative purposes, this is more than double the investment in the flood control system which is less than \$200 million.

Senator HILL. A very good dividend, isn't it?

Mr. WAGNER. Yes; it is. And, of course, it will continue to provide dividends for countless years into the future.

These are benefits of the regional system—regional flood control system.

LOCAL FLOOD PROTECTION

As you know, we have had very intense local rains and some local floods in the Tennessee Valley this year. These floods illustrate the value and the importance of local flood control projects.

For instance, in July, in Oliver Springs, Tenn., there was a very heavy rainstorm one night which, by our estimates, did nearly a million dollars' worth of damage. We are working intensively now with the officials of Oliver Springs, and we have been in contact with State officials and with others, to see if we can work out a joint program to avoid a recurrence of that damage. This may involve some channel widening; it may involve tying it in with highway reconstruction and relocation programs in the area; it may involve moving some of the buildings out of the lower areas.

We are talking with the local people about making a new approach to the question of solving their flood control problems. We may have something next year to tell you about that.

The wisdom of local flood protection projects was illustrated this spring in Coeburn, Va.

In March they had a storm which produced almost the same volume of streamflow as they had in a 1963 flood. The 1963 flood did \$400,000 worth of damage. Subsequently, we built a channel improvement project in Coeburn. It was nearly completed when the flood struck in March. Again, although the streamflow was the same which caused \$400,000 worth of damage in 1963, it passed through within the limits of the channel, and there was no damage. The saving in this one flood was very nearly half the cost of the project, which was in the neighborhood of a million dollars.

A similar project is being completed at Sevierville, Tenn. It did not get as severe testing this winter as the Coeburn one did, but it will provide the same kind of benefits.

TRIBUTARY AREA DEVELOPMENT

We have been making progress on many fronts—in several areas of the valley through our tributary area development program.

Literally thousands of citizens are at work with us in the tributary area development program in a coordinated and integrated approach to development of all the available resources to build their economy, to provide more jobs and better employment.

BEAR CREEK AREA

Just to give you a few examples of the kind of work that is being done—in Bear Creek we have started construction on the first of four dams for a water control system, largely to provide flood control and to enlarge the water supply in an area having difficulties with its water supply. This is part of an overall program of resource development.

YELLOW CREEK AREA

In the Yellow Creek area we have helped organize some intensive training programs for new jobs that are becoming available in the area, but for which people were not trained. We are investigating the feasibility of port facilities on Yellow Creek which would open new industrial growth vistas for the people there. We are doing such simple things as a couple of catfish production demonstrations on farms in the area. These are being conducted cooperatively with the Yellow Creek Watershed Authority and the Mississippi State University.

Catfish dinners are becoming more and more popular in the Tennessee Valley. A good commercial market for catfish is developing. Producing catfish in farm ponds would be one way to get some additional income to farmers.

Senator GORE. Like cornbread—if we can ever effectively invade the North with cornbread and catfish, we will have it made in the South.

Senator HILL. Put a little bream in there, and some bull.

DUCK RIVER AREA

Mr. WAGNER. In the Duck River tributary area in Tennessee, an interesting project is a four-county water grid system, which will link the water systems of the five principal cities in these counties, and at the same time provide water supply—a dependable and pure water supply, for the rural areas.

This is an interesting experiment which may have future significance as rural areas elsewhere find it more and more difficult to find a satisfactory answer to problems of water supply.

UPPER FRENCH BROAD RIVES AREA

In the Upper French Broad River Basin we are planning in cooperation with the Upper French Broad Economic Development Commission a water control system which would greatly reduce flooding of bottom lands, and also improve the quality of water in an area where pollution from existing industries is quite a serious problem.

In these tributary area development programs, TVA's role has been to help get the local organizations established and at work, to provide the resource data that they need to make their analyses and their plans, relating them to the plans and resources and developments in other sections of the Tennessee Valley. As water control structures or facilities are required, we provide them. We provide continuing technical assistance in all fields.

EXPANSION OF ELECTRICITY USE

The use of electricity continues to expand in the Tennessee Valley, and its growing use is improving the quality of living in the region, and is setting an example for other areas of the United States.

Last year we sold about 82 billion kilowatt-hours of electricity. To put that in scale, the same area in 1933 used only 1½ billion kilowatt-hours.

Senator HILL. One and a half to 82 billion?

Mr. WAGNER. Yes, sir; that is the rate of growth—a very substantial increase.

ELECTRIC CARS

Senator GORE. Has TVA done anything about an electric car?

Mr. WAGNER. We had an electrically operated car at one time, using standard storage batteries. We follow the development work being done in this field. We have not done any research in it ourselves.

This is a very complicated and expensive research area. We hope that success will come soon.

Senator HILL. You do not get any pollution from electricity, do you?

Mr. WAGNER. Electric cars would help to solve the pollution problem; yes sir. When they come, they will further expand the use of electricity.

DOMESTIC AND FARM ELECTRICITY USE

About half the electricity we sell goes to the municipal and co-operative distributors of TVA power, and their sales are up 8 percent in the last year. Their sales have doubled since 1960, in a 7-year period. Power use in the Nation as a whole is doubling every 10 years.

The average home in the valley now uses nearly 12,000 kilowatt-hours a year, which is over twice the national average.

The use of electricity on farms is tremendously important, and growing in importance.

ELECTROFARMS

We have about 250 electrofarms in the Tennessee Valley. This is a name we have given to certain farms that we and our distributors are working with on intensive use of electricity. We also work in cooperation with the extension services in this program.

Senator HILL. Can you give an illustration?

Mr. WAGNER. The program is aimed at helping individual farm families use electricity to save time and labor, thereby increasing production and profits. Each electrofarm is a demonstration of the planned use of electricity for a variety of purposes—for grinding feed, for distributing feed, for drying feed or crops, and use of electricity in the home. Special planning assistance is given to help the farmer achieve maximum results from the use of electricity. Following a definite plan leads to increased use.

Each step is analyzed for what it will do to increase the farmer's income-producing potential. Last year those farms used an average of 49,000 kilowatt-hours each, four times what the average home uses. Some used as much as 240,000 kilowatt-hours, which makes the farm almost the equivalent of a small industry. I think this illustrates the potential for the future use of electricity to further improve the efficiency and the quality of living on farms.

I am often impressed—and I am sure both of you Senators remember this—by the emphasis which Senator Norris and you, Senator Hill, and others placed in the debates that preceded the creation of TVA, on what electricity can do in rural areas.

We believe that the hopes which you then expressed are being realized, or even exceeded.

Is there anything more that should be said about that electrofarm program, Mr. Wessenauer?

Mr. WESSENAUER. You have summarized it very well.

Senator HILL. Can you pick some cotton with it?

Mr. WAGNER. No electric cottonpickers yet.

Senator HILL. They do it now with gasoline, don't you?

Mr. WESSENAUER. That is right.

POWER RATE INCREASES

Mr. WAGNER. During recent months we have been working with our power distributors to reach agreement on increases that became necessary in the wholesale rate and consequently in the retail rates for electricity in the TVA area.

These increases have been made necessary by the higher costs that have been falling on us, especially in labor rates which have gone up 23 percent in 5 years, fuel prices which have gone up 5 percent in 5 years, and interest rates which have gone up 30 percent in 5 years.

Those three items make up about 70 percent of the cost of generating and supplying electricity. The increases in these and other costs have been more than we have been able to overcome with our cost reduction program.

TVA has a continuing cost reduction program which has been very effective in keeping down costs.

We have been building larger and more efficient steam generation units. Almost every unit that we buy is bigger and more efficient than the last one, and generally larger than anything that had been previously built.

We have gone to extra high voltage transmission, to 500,000-volt transmission. A 500-kilovolt transmission line costs about twice as much to build as the 161-kilovolt transmission line such as we had been using, but it will carry 12 to 14 times as much power.

We have gone to long-term contracts and to other fuel purchasing arrangements designed to give the producers the best opportunity to provide fuel for us at lowest cost.

We have worked with the railroads in the development of unit trains to cut down transportation costs. We have used barge transportation extensively.

We have undertaken programs for improving efficiency in the use of labor.

For instance, the amount of labor that goes to operate a unit of capacity in our steamplants is only 72 percent of what it was just 5 years ago, and about the same increase in efficiency has been made in our hydroplants.

Nevertheless, it has been necessary for us to increase our wholesale rates to get some \$25 to \$30 million a year added revenues. This has necessitated the first increase in retail residential rates since they were first set in 1933.

The industrial rates were increased in 1953, and have been essentially stable since then.

The increases are not large. For residential users the range of increases is from 22 cents a month for small users to \$1.43 a month for the large users of electricity. TVA residential rates will still be less than half the national average.

The increases in rates to industry average about 7 percent. For the very large users of power, we have been able to keep the increase down to about 4 percent. These very large users generally have a high load factor and the cost of electricity is generally a higher percentage of the cost of their product.

We believe these rates are still low enough to be attractive to industry, and this is evidenced by the interest that continues to be shown in industrial development in the area.

OHIO RIVER LOCKS

Senator HILL. You talk about navigation. I understand that the Corps of Army Engineers are now estimating locks 52 and 53 on the Ohio River, is that right?

Mr. WAGNER. I understand that is correct; yes, sir.

Senator HILL. I believe they have made a study, and that study has been submitted to the Committee on Public Works. The bill this year that passed in the House carries \$300,000 for planning remedial works, is that correct?

Mr. WAGNER. I believe that is correct, Senator, although it is not in our budget.

Senator HILL. It would not be in your budget.

What is TVA's estimate as to how much of the tonnage of coal and other products moving on the Tennessee River goes through lock 52 on the Ohio River?

Mr. WAGNER. We have looked at that, Senator. And in 1966—that is the last year for which I have that particular figure—about 7½ million tons of Tennessee River traffic moved through lock 52. That is about 37 percent of the traffic that moves on the entire Tennessee River.

We estimate that by 1974, that would probably amount to 10 million tons or more.

In addition, 1.2 million tons of coal moved to TVA steamplants through lock 52 in 1966, and by 1974 we estimate that this traffic will be about 2 million tons.

I think it is of interest that while only about 37 percent of the traffic on the Tennessee River moves through lock 52, this traffic is long haul, and so the savings to shippers are much more important than that. In fact, about 60 percent of the total savings to shippers on barge movements on the Tennessee River are realized from this 37 percent of the traffic that moves through dam 52.

So adequate lock facilities at that location are important to the development of the Tennessee Valley and to the existence of industries on the Tennessee River.

Senator HILL. The information I have is that the Corps of Army Engineers estimate it to be at least 8 years before the present location there can be replaced. Is that right?

Mr. WAGNER. I do not know.

Senator HILL. Does anybody here have the information?

TOTAL FINANCIAL PROGRAM

Mr. WAGNER. Turning now to our general appropriation request, it is for \$62,150,000, which is slightly less than \$63,700,000 that was appropriated in 1967. We will also spend \$24,847,000 of nonpower proceeds, primarily funds realized from the sale of fertilizer.

And in addition to that, we will spend \$416,200,000 of power proceeds and borrowings. Authority to spend power proceeds is contained in the original TVA Act. Authorization for borrowings to support the power program was conferred in the 1959 amendment.

Pursuant to the 1959 amendment, we will in 1968 fiscal year pay into the Treasury about \$62 million, part of this being a return on the appropriations investment, and \$15 million of it as a return of the appropriations investment.

POWER EXPENDITURES

I might talk about the power expenditures of \$416,200,000, bearing in mind these are not from appropriations, but are from proceeds and borrowings. Of that amount \$251 million is for the operation of the power system, and \$165 million of it is for construction in the power program. This includes funds for three units at the Browns Ferry nuclear plant in north Alabama, funds for two large coal steam units—one at the Paradise steamplant, to be in service in 1969, and another to be in service in 1972 at a location which has not been determined.

Senator HILL. That is Paradise—

Mr. WAGNER. That is in Kentucky, on the Green River.

There also are funds in this power construction budget to complete the power portion of the Nickajack Dam on the Tennessee River, and about \$66½ million for additions and improvements to our transmission system.

APPROPRIATIONS-FINANCED PROGRAMS

On the appropriations side, about \$20 million is for our regular operating programs in navigation, flood control, operation of the reservoirs, our forestry program, agricultural program, the operations of the tributary area development program, and others with which you are familiar.

The balance is for continuing construction of several projects that are underway. The major items are continuing the Tims Ford project, which is a multipurpose project on the Elk River, scheduled to be in service in 1970. The Nickajack project—appropriations here are for the navigation and flood control portion. This project is near completion, and the reservoir will be filled in 1967. We have discussed it before at length with the committee.

There are funds to continue the construction of the Bear Creek water control system, which we expect to finish in 1971. Also, funds to continue the Tellico multipurpose project on the Little Tennessee River.

Senator GORE. You had no trouble with that in the other body since the redistricting bill, I take it?

Mr. WAGNER. Senator, we always describe our projects to the best of our ability. We hope the reasons for building them are so compelling, that you gentlemen in the Congress will always agree with us.

Senator GORE. All right.

Mr. WAGNER. And there are funds in here for continuing land acquisition and construction of facilities in the Land Between the Lakes.

Finally, among the major items—There is about \$5 million which I mentioned earlier for rehabilitation of the chemical plant. Those are the major items in the budget.

APPEAL OF HOUSE REDUCTION

The House, in acting on this budget, following our hearings there, recommended an appropriation of \$60 million, a reduction of \$2,150,000, and we would like to appeal that.

Their action, I believe, was based on two major assumptions.

DELAYS AND SAVINGS IN CAPITAL PROGRAM

Senator HILL. You anticipated savings from delays in capital outlay estimate?

Mr. WAGNER. One of the assumptions by the House was there could be this \$2 million reduction due to delays and savings in the capital program.

As far as the savings are concerned, we build as economically as we can and save everywhere we can. We try to present cost estimates that are realistic and that are close. We think the cost estimates in this budget are particularly tight because our construction schedules are already considerably slower than originally planned. Nonavailability of funds has forced us to these slower schedules. This will tend to increase rather than decrease costs because of price increases and because slower construction schedules are normally more expensive than fast schedules.

So I think it is not realistic to assume that we would have these savings in our construction cost.

Now, as far as the delays are concerned, these funds are spread over a considerable number of on-going projects. And we cannot accommodate reductions, further reductions of this amount, in our construction program without deferring completion of some project or other. The consequences would not be good. We hope that this \$2 million can be restored.

CARRYOVER BALANCE

I mentioned earlier that there were two basic assumptions that the House made, which I wanted to discuss. The other is that there would be a carryover from fiscal 1967 of \$6 million.

The budget justification document that we sent to the Congress, and which was before the House at the time of our hearings, does show an expected \$6 million carryover.

Senator HILL. What day were you before the House?

Mr. WAGNER. On the 11th of April, sir. And of course this budget document was prepared about the first of the year.

At the time it was prepared, we, along with other Federal agencies, were asked not to spend all of the 1967 funds that were appropriated to us. Specifically we were asked to hold up on \$6 million. And so we showed that as a carryover into 1968.

This amount was released shortly before the House hearings, and I believe I indicated then, if my memory is correct, that we would probably have less than a \$6 million carryover. I did not then know how much would be left. The record is complete now for fiscal 1967, and the carryover actually was only about \$2 million. So that \$6 million that was assumed we would carry over was not, as a matter of fact, carried over.

Senator HILL. It did not exist.

Mr. WAGNER. That is correct.

Senator GORE. I thought TVA was an independent corporation. Does the Budget Bureau have authority to tell you not to spend money that Congress has appropriated?

Mr. WAGNER. We were asked —

Senator GORE. I know of no such authority.

Mr. WAGNER. We were asked by the administration to hold up on the expenditure of \$6 million, Senator. And that was the situation, until in March, when it was released.

Senator GORE. Who in the administration asked you?

Mr. WAGNER. The Bureau of the Budget.

Senator GORE. You are appointed to run the TVA, not to take dictation from the Bureau of the Budget.

PURCHASE OF SEDANS

Mr. WAGNER. Yes, sir.

There are two other items in the House action that I would like to mention briefly. The House recommended a reduction of \$60,000 for the purchase of 40 sedans; this would require as one alternative that we increase our use of rental cars.

Senator HILL. How many sedans do you have altogether?

Mr. WAGNER. At the end of fiscal year 1967 we had 872 sedans.

Senator HILL. How many employees do you have today?

Mr. WAGNER. Between 17,000 and 18,000.

The elimination of these sedans would require us to go to greater use of rental automobiles as one alternative, and this would increase our costs substantially. We operate our own sedans for a little over 5 cents a mile. Rental automobiles cost us 16 cents a mile or better.

We would hope that this money could be restored in the interests of holding our costs down.

TRUCKS AND HEAVY MOBILE EQUIPMENT

Elimination of \$90,000 from the amount needed for the purchase of trucks and heavy mobile equipment was also recommended. This is equipment needed in our construction program. If we do not purchase new equipment we have to patch up and repair and continue to use older equipment. This is expensive and such equipment is more subject to breakdown, which can result in costly delays to our construction forces. Also the newer equipment generally has improved capacities and mechanical and technical improvements, and if we are denied those, the equipment is less adequate.

Senator HILL. Not a very business-like way to operate.

Mr. WAGNER. Another alternative is to use rental equipment. But this again is more expensive.

For those reasons, we hope that these funds can be restored.

Senator HILL. Anything you gentlemen would like to add?

Mr. Wessenauer, anything you would like to add?

Mr. WESSENAUER. No, sir.

Mr. WAGNER. Senator—we do appreciate the chance to come before you again, and we appreciate your advice and comments on our program.

REPAYMENTS TO TREASURY

Senator HILL. You have brought us a very fine statement. I want to thank you for it and express our appreciation for a very fine statement.

Let me ask you this: In your figures, did you put in the total amount of money that you paid back into the Treasury?

Mr. WAGNER. Not the total—just this year. Do you want the total?
Senator HILL. I would like to have the total.

Mr. WAGNER. The \$62 million payment in fiscal 1968 will bring the total cumulative payments to the Treasury to something over \$724 million, of which nearly \$683 million is from power proceeds, and about \$41½ million from nonpower proceeds.

APPROPRIATION INVESTMENT IN TVA

Senator HILL. What has been the Federal Government's total investment to date—that is appropriated funds I am speaking of now?

Mr. WAGNER. Appropriated funds, about \$2.3 billion, I believe, Senator. We can correct that figure if it is off, or provide the precise figure.

Senator HILL. You might check and make sure.

Mr. WAGNER. Some of it has been repaid. It has been more than that.

Senator HILL. All right.

(The information follows:)

The appropriation investment in power facilities is only \$1.1 billion.

TELLICO AND TIMS FORD DAMS

Senator HILL. Senator Ellender, do you have some questions at this time?

Senator ELLENDER. How much are you asking for the two dams, Tellico Dam and Tims Ford?

Mr. WAGNER. The request for Tellico Dam is \$7,250,000, and for Tims Ford, \$11,250,000. This appears on page 5 of our justification document.

NICKAJACK DAM AND RESERVOIR

Senator ELLENDER. I see Nickajack Dam and Reservoir, \$5,211,000.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. Have you any other dams on which you are making studies for construction in the near future?

Mr. WAGNER. Yes, sir.

Senator HILL. Excuse me just a minute.

I notice the House report says, "Requests for \$5,211,000 on the Nickajack Dam and Reservoir is a nonpower proposal." Is that for navigation?

Mr. WAGNER. Yes, sir. This is for all purposes other than power. There will be additional funds from power proceeds and borrowings to fill out the cost of that dam. About 40 percent of the total project cost is to be borne from power funds and about 60 percent from appropriations.

Senator HILL. That will be navigation?

Mr. WAGNER. Yes, sir, navigation, flood control.

Senator ELLENDER. Are there any TVA funds used to pay for Nickajack?

Mr. WAGNER. Yes, sir.

Senator ELLENDER. How much of it?

Mr. WAGNER. It is about 40 percent of the total.

Senator ELLENDER. Regarding Tellico and Tims Ford, I understand the whole amount is being furnished by the Federal Government?

Mr. WAGNER. Yes, sir. Those are being financed entirely from appropriations.

BEAR CREEK PROJECT

Senator ELLENDER. What other project you say is in contemplation for design or construction in the future?

Mr. WAGNER. Well, we have initial construction funds now being expended for the Bear Creek multiple-purpose water control system which consists of four small dams and some channel widenings and deepening in the Bear Creek watershed in north Alabama. There is \$4,250,000 for that in this request.

Senator ELLENDER. That is for actual construction; is it not?

Mr. WAGNER. Yes, sir.

Senator ELLENDER. What would be the entire cost of that project?

Mr. WAGNER. About \$27½ million.

Senator ELLENDER. That is for navigation and what else?

Mr. WAGNER. This is for flood control and for water supply and features other than navigation or power. There are no power facilities, and there is no navigation involved.

Senator ELLENDER. The entire cost is being borne by the Federal Government?

Mr. WAGNER. Yes, sir.

LOCAL CONTRIBUTIONS

Senator ELLENDER. No contributions?

Mr. WAGNER. Yes, sir. There is a local contribution of about—

Senator ELLENDER. Is that the usual contribution for damsite—the land?

Mr. WAGNER. We will buy the land. The local contribution consists of highway relocation work and other assistance in the general development program.

These are larger reservoirs than the usual local flood control projects. They are designed primarily to provide flood control for agricultural land in the watershed.

COOPERATION WITH SCS

Senator ELLENDER. Is that done in cooperation with the Soil Conservation Service?

Mr. WAGNER. The Soil Conservation Service is working with us on the Bear Creek project.

Senator ELLENDER. Any contribution made?

Mr. WAGNER. Not to the cost of these dams. The Federal cost of these dams would be financed entirely through TVA appropriation. The Soil Conservation Service will do further work in the watershed, such as farm ponds, terracing, and so on—the usual soil conservation programs but not the construction of dams and reservoirs of this size.

COST OF TELLICO AND TIMS FORD DAMS

Senator ELLENDER. To what extent, if any, has the cost of the Tellico Dam and the Tims Ford Dam increased from the original estimate?

Mr. WAGNER. The Tellico Dam is up four and a half million dollars from the year-ago estimate to the figure of \$47 million.

Senator ELLENDER. How has that affected your benefit-to-cost ratio?

Mr. WAGNER. The benefit-to-cost ratio is still satisfactory.

Senator ELLENDER. Of course, that means—

Mr. WAGNER. While we have not recalculated them, the benefits do increase to a considerable extent for the same reasons that the costs increase.

Senator ELLENDER. Ordinarily that would be true in projects under the Corps. There is quite a bit of difference in the methods of calculating the benefit-to-cost ratio under the Department of the Interior than what prevails in the Corps of Army Engineers.

You have listed on one of them, as I recall, \$15 million for benefits to be derived by having available sites to construction manufacturing or industrial plants.

Mr. WAGNER. That is included.

Senator ELLENDER. That has not increased, has it?

Mr. WAGNER. Even at the new estimated project cost of \$47 million, the excess of benefits over cost is \$10,700,000.

Senator ELLENDER. That would be 1 to 1 plus—something?

Mr. WAGNER. About 1.3, I believe.

Senator ELLENDER. How about the Tims Ford?

Mr. WAGNER. The new estimate for Tims Ford is \$40½ million, up one and a half million.

Senator ELLENDER. I see.

Mr. WAGNER. This generally is a result of slower construction schedules, and the increase in prices in that period.

INVESTIGATIONS FOR FUTURE FACILITIES

Senator ELLENDER. I notice that you have investigations for future facilities; \$1,100,000. What kind of facilities are those?

Mr. WAGNER. Those would be dam and reservoir projects on tributaries of the Tennessee River—the Duck River, the Emory River, the Elk River, and the upper French Broad—and other tributaries where there are problems of flooding or water supply, and where we are working with local groups on total resource development programs, with water resource development as a part of them.

Senator ELLENDER. Is that mostly for flood control?

Mr. WAGNER. It would be for a variety of things. In most instances flood control is a major part. In the upper French Broad, for instance, planning is well advanced, and flood control is the principal feature.

Senator ELLENDER. To what extent are you making studies in the hope of constructing more dams for the production of electricity from falling water?

Mr. WAGNER. In each watershed, as we look into water resource possibilities, if there are damsites and water supply which indicate a potential for hydroelectric power, we look into them.

Generally the opportunities left for more hydroelectric development are limited.

The Tims Ford Dam under construction has a power installation. The Bear Creek projects do not. The French Broad projects, as we now plan them, would not.

So it depends on the circumstances in each watershed, Senator Ellender.

LAND BETWEEN THE LAKES DEMONSTRATION

Senator ELLENDER. I see.

Coming to the development of Land Between the Lakes demonstration, have you reduced in any manner the number of acres that you first contemplated purchasing, or is it the same pattern?

Mr. WAGNER. The pattern is the same, Senator.

Senator ELLENDER. As I recall, it involved the purchase of about 110,000 acres.

Mr. WAGNER. Just under a hundred thousand acres Senator—97,598.

Senator ELLENDER. I am wondering where I got the 110,000 figure from.

Mr. WAGNER. The total area is nearly 172,000 acres. The total land area includes lands previously acquired by the Fish and Wildlife Service, and also land which we already owned along the—

Senator ELLENDER. Of your original 97,598 acres that you intended to buy in the Land Between the Lakes, how much have you actually acquired?

Mr. WAGNER. We have actually acquired 56,506 acres.

Senator ELLENDER. At what cost?

Mr. WAGNER. The total cost so far has been approximately \$19,530,000; 41,092 acres remain.

INCREASED LAND COSTS

Senator ELLENDER. To what extent has the cost of that land increased in the last 4 or 5 years?

Mr. WAGNER. The cost of land in that area has been increasing. We assumed in making our estimate an average escalation of about 9 percent a year. A recent study of the Bureau of Outdoor Recreation shows for the Nation as a whole an escalation of 5 to 10 percent, but recreation land they use 10 percent.

In the area along the Barkley Reservoir on the east shore, where most of these people are moving, the acceleration in land values appears to be somewhat greater than 10 percent a year.

Senator ELLENDER. Could you tell us the extent to which the price of this land has increased from what was originally contemplated?

Mr. WAGNER. The last time we were before you, it was \$24 million for the 97,600 acres.

Senator ELLENDER. I mean the first time.

Mr. WAGNER. The original estimate was for \$12 million for land.

Senator ELLENDER. You were going to buy all of that land for that figure?

REVISED LAND COST ESTIMATES

Mr. WAGNER. We revised that figure after we started work on the project, and you will recall we discussed that with you 2 years ago when we revised the figure upward to \$24 million.

Senator ELLENDER. I guess my prognostication is going to come true. You are going to pay maybe six times more than you originally contemplated?

Mr. WAGNER. I think not, Senator.

Senator ELLENDER. I am talking about the \$12 million figure. You have already spent \$19.5 million for 56,000 acres, and you still have 41,000 to go. I presume those 41,000 acres will cost you much more than the 56,000 acres have cost you.

Mr. WAGNER. No. As a matter of fact, they should cost us less per acre, because, to begin with, we bought out the people who were pressing us to buy so that they could move. This means we first bought the smaller developed tracts on which people were living. We have deferred to the end the large tracts which are largely timber tracts.

You may be right to the extent that we may have to go over \$24 million. But we think it will not be substantially over that.

Senator ELLENDER. You mean it would not be substantially over the \$24 million?

Mr. WAGNER. That is right.

Senator ELLENDER. In other words, you expect to buy 41,000 acres for about \$4 million?

Mr. WAGNER. No. Just to get to the \$24 million is about four and a half million more than we have so far spent and I say it will run over that some. I do not know how much, but not more than a very few million dollars, we believe. We are in the process of reappraising that now.

Senator ELLENDER. Let us set the record straight now.

Your first estimate was \$12 million?

Mr. WAGNER. Yes, sir.

Senator ELLENDER. For almost 100,000 acres?

Mr. WAGNER. Yes, sir.

Senator ELLENDER. And you have increased that now to \$24 million?

Mr. WAGNER. Yes. And I am saying now I think it is going to be somewhat more than \$24 million, but how much more, I do not know. Not a whole lot more.

Senator ELLENDER. That will cover, you say, the full——

Mr. WAGNER. The full 97,598 acres.

Senator ELLENDER. I hope you can do it.

Mr. WAGNER. We are trying.

Senator ELLENDER. You started this. And I hope you do succeed in buying it. I tried to stop it at one time. Of course your fine Senators from Tennessee—if I had my hat on my head I would take it off to them—they worked hard. In the long run it will be a fine investment. The only thing I objected to was the fact that you had TVA in the position of acquiring this land and buying it for park purposes. We had other departments of Government doing that. I am very hopeful that as soon as you acquire it, you will turn it over to either the Interior or the Park Service.

OBJECTIVES OF LAND-BETWEEN-THE-LAKES DEMONSTRATION

Mr. WAGNER. This is a little more than just a park, Senator. We are conducting some——

Senator ELLENDER. Experiments. I know that. You are trying to find out how best to create and manage parks.

Mr. WAGNER. It is more than that. We are also conducting a conservation education program in Land-Between-the-Lakes.

Senator ELLENDER. How much money are you spending for that purpose?

Mr. WAGNER. Our budget estimate for project operations in 1968 is \$1,012,000. The operating cost, of course, includes the operation of the camp areas and other recreation facilities. But while people are there,

we hope that they will learn something about conservation, which they have not known before or may have forgotten. We have some conservation trails laid out. We have a Youth Conservation Education Center where schools are sending classes of students now for a few days or a week or more. And it is this sort of thing that is experimental. The cost, in addition to what it would cost to operate the camps, is small.

Senator ELLENDER. Are you building facilities there to accommodate these people?

Mr. WAGNER. In the Youth Conservation Education Center we have built a dining facility and some sleeping quarters for the young people while they are there.

Senator ELLENDER. How much do you contemplate spending for the facilities you deem necessary to operate that park? Have you any estimate?

Mr. WAGNER. The total land cost is \$24 million, and the total cost of the project is estimated at \$51½ million. Most of that remainder, or \$27½ million, is for improvements, such as roads, campsites, beach facilities, picnicking facilities, the Conservation Education Center, and these other—

Senator ELLENDER. That will be almost as much as the value of the land.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. Thank you, Mr. Chairman.

CONCLUSION OF HEARING

Senator HILL. Mr. Wagner, we want to thank you very, very much. The subcommittee will recess subject to call of the Chair.

(Whereupon, at 3:30 p.m., Thursday, August 3, 1967, the hearings were concluded and the subcommittee was recessed, to reconvene subject to the call of the Chair.)

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