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GOVERNMENT
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Senate Hearings

PUBLIC WORKS APPROPRIATIONS

H.R. 17787

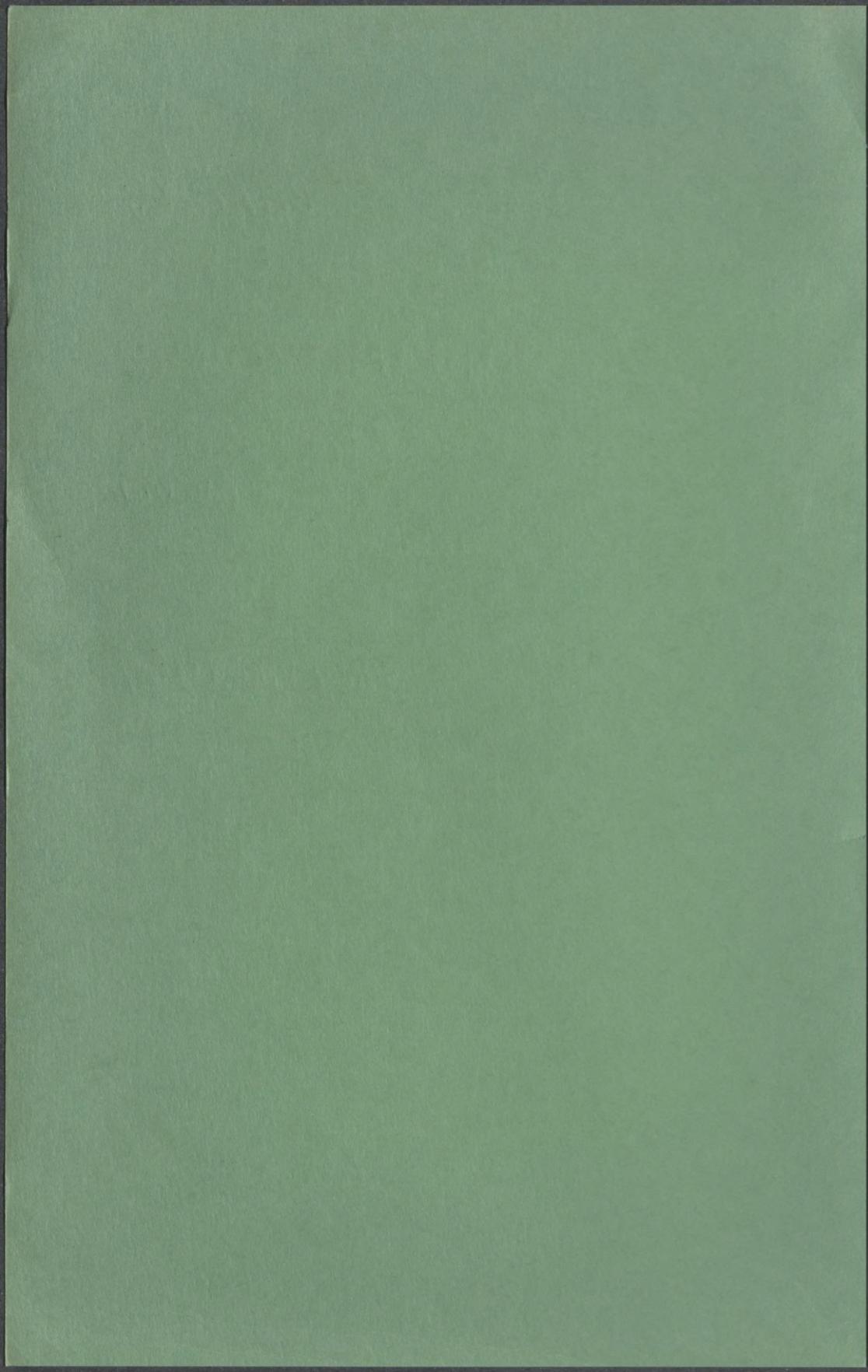
89th CONGRESS, SECOND SESSION

Fiscal Year 1967



Part 4

TENNESSEE VALLEY AUTHORITY • ATOMIC ENERGY COMMISSION



PUBLIC WORKS APPROPRIATIONS FOR FISCAL YEAR 1967

Comm. Pt.
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HEARINGS

BEFORE THE

SUBCOMMITTEE OF THE
COMMITTEE ON APPROPRIATIONS

UNITED STATES ⁴SENATE

EIGHTY-NINTH ³CONGRESS

SECOND ²SESSION

ON

H.R. 17787

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, THE SAINT LAWRENCE SEAWAY DEVELOPMENT CORPORATION, THE TENNESSEE VALLEY AUTHORITY, AND THE WATER RESOURCES COUNCIL, FOR THE FISCAL YEAR ENDING JUNE 30, 1967, AND FOR OTHER PURPOSES

PART 4

TENNESSEE VALLEY AUTHORITY—ATOMIC ENERGY COMMISSION

Printed for the use of the Committee on Appropriations



U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 1966

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¹ Deceased April 30, 1966.

PUBLIC WORKS APPROPRIATIONS FOR FISCAL YEAR 1967

TUESDAY, SEPTEMBER 27, 1966

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

The subcommittee met at 10:15 a.m., in room 1318, New Senate Office Building, Hon. Lister Hill (chairman) presiding.

Present: Senators Hill, Ellender, and Hruska.

TENNESSEE VALLEY AUTHORITY

STATEMENT OF HON. JOHN SPARKMAN, U.S. SENATOR FROM THE STATE OF ALABAMA

BEAR CREEK WATERSHED DEVELOPMENT

Senator HILL. The subcommittee will kindly come to order.

Senator Sparkman has urgently requested that he be heard first—he is here now. All right, Senator, you may proceed in your own way, sir.

Senator SPARKMAN. Mr. Chairman, Senator Ellender, I wish to testify in support of the \$1.5 million appropriation being asked so that we can continue development of the Bear Creek watershed.

The money will start construction of dams and reservoirs on the Bear Creek system, which extends into Colbert, Franklin, and Marion Counties in northwest Alabama.

The construction program will initiate flood control and help make water available for industrial and municipal use.

Development of the Bear Creek system is urgently needed. Only 1 percent of the potential water resource is now being used. The area suffers from alternate floods and drought. The farmlands and forest holdings are marginal producers. And many of the people in the area are employed in low-wage industries.

Relatively productive farmlands along creek bottoms, particularly in the western or lower half of the watershed, are subject to damage annually from one or more crop season floods. Floods also have caused severe damage to highways and bridges, but no urban areas are in the flood plains. Rainfall averages 54 inches a year, yet the typical crop season suffers from 50 to 60 drought days.

BEAR CREEK POTENTIAL

The waters of Bear Creek at present make a rather small contribution to the watershed economy. Only 11,300 acre-feet of both ground and surface water are used. This is about 1 percent of the potential water resource which could contribute to industrial and municipal uses. Most of the surface water used is by self-supplying mining industries; municipal use is more commonly from wells and springs which often prove inadequate for industrial or municipal expansion. During drought seasons, neither surface nor ground water supplies are dependable for meeting any large user requirements that might develop in the upper portion of the watershed.

I urge the committee to take favorable action and approve the full amount requested, in order that construction can be started on this urgently needed program for northwest Alabama.

Senator HILL. The floods are pretty bad at times?

Senator SPARKMAN. They are.

Senator HILL. In other words, this is a typical program where we need relief.

Senator SPARKMAN. We have water there. We need to conserve that water.

Senator HILL. All right. Thank you very much.

Senator SPARKMAN. Thank you very much.

Senator HILL. Senator Gore wishes to make a statement also. Will you kindly proceed, Senator?

**STATEMENT OF HON. ALBERT GORE, U.S. SENATOR FROM THE
STATE OF TENNESSEE**

TELLICO DAM AND RESERVOIR

Senator GORE. Mr. Chairman and Senator Ellender, I wish to appear briefly in support of the TVA budget and, particularly, in support of the TVA request, and the budget-approved request, of funds for the Tellico Dam.

The committee will recall that heretofore this was a matter of controversy. The controversy has not entirely, but largely, dissipated out of the widely recognized justification and need for this project.

It will have a vital bearing upon the river stream, the water utilization and control of the entire river. It will have, perhaps, an even more important bearing upon industrialization and economic growth that is much needed in the valley.

I respectfully request the careful consideration and approval of this item as well as the other items in the TVA budget.

Senator HILL. This particular item has been very thoroughly studied and considered for some time, is that not correct?

Senator GORE. As a matter of fact, it has been approved by the Senate repeatedly.

Senator HILL. Repeatedly.

Senator GORE. Fortunately, now the other body has reversed itself and has given the first approval.

Senator HILL. Unfortunately it was not in the right congressional district. The Senate has approved it, isn't that right?

Senator GORE. Being a loyal Tennessean, I shall——

Senator HILL. I understand. I just made that observation, I did not ask the question.

Senator GORE. I understand the observation. Thank you, Mr. Chairman.

Senator HILL. Thank you, Senator Gore.

STATEMENTS OF AUBREY J. WAGNER, CHAIRMAN OF THE BOARD OF DIRECTORS; FRANK E. SMITH, DIRECTOR; AND DON McBRIDE, DIRECTOR; ACCOMPANIED BY L. J. VAN MOL, GENERAL MANAGER; C. J. McCARTHY, GENERAL COUNSEL; LEWIS B. NELSON, MANAGER OF AGRICULTURAL AND CHEMICAL DEVELOPMENT; G. O. WESSENAUER, MANAGER OF POWER; R. M. HOWES, PROJECT MANAGER, LAND BETWEEN THE LAKES; MARGUERITE OWEN, WASHINGTON REPRESENTATIVE; R. A. ELLIOT, DIRECTOR OF WATER CONTROL PLANNING; GEORGE H. KIMMONS, DIRECTOR OF CONSTRUCTION; AND L. E. ELLIS, CHIEF, BUDGET STAFF

1967 BUDGET REQUEST

Senator HILL. Mr. Wagner. Proceed in your own way.

Mr. WAGNER. Thank you, sir.

Mr. Chairman and Senator Ellender, we are glad to come before you this morning with our request for TVA's annual appropriation for fiscal year 1967.

The total request is for \$63,635,000. This includes \$45,954,000 for capital items, and \$17,681,000 for our operating programs.

Senator HILL. Insert in the record at this point the justifications.

Mr. WAGNER. Yes, sir.

(The justifications follow:)

JUSTIFICATIONS

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:

	1965 actual	1966 estimate	1967 estimate
Appropriations (new obligational authority).....	\$47,915,000	\$59,347,000	\$63,635,000
Expenditures (accrued):			
Appropriations.....	50,273,332	59,543,942	66,050,000
Power proceeds and borrowings.....	289,856,175	347,440,000	370,167,000
Nonpower proceeds.....	24,735,455	26,630,000	25,094,000
Total expenditures.....	364,864,962	433,613,942	461,311,000
Payments to the Treasury.....	52,599,979	58,875,000	58,300,000

Budget summary (for fiscal years ending June 30, 1965, 1966, and 1967), obligation basis

	1965 actual	1966 estimate	1967 estimate
CAPITAL OUTLAY OBLIGATIONS			
River and power development:			
New lock at Gunterville Dam	\$4,929,497	\$878,000	-----
Additions and improvements at navigation facilities	473,359	760,000	\$920,000
Flood control facilities	904,253	2,321,000	2,404,000
Tellico Dam and Reservoir	-----	-----	3,200,000
Tims Ford Dam and Reservoir	-----	5,570,000	6,000,000
Nickajack Dam and Reservoir	10,808,160	26,617,000	20,437,000
Bear Creek multipurpose water control system	218,448	250,000	1,500,000
Beech River multipurpose water control system	1,876,164	564,000	-----
Melton Hill Dam and Reservoir	1,079,116	-----	-----
Additions and improvements at multiple-use facilities	341,811	632,000	308,000
Widows Creek steamplant unit 8	2,707,872	355,000	-----
Colbert steamplant unit 5	255,019	294,000	-----
Paradise steamplant units 1-2	1,346,261	-697,000	-----
Paradise steamplant unit 3	20,786,490	38,489,000	37,060,000
Bull Run steamplant unit 1	26,158,768	13,977,000	1,698,000
Additional capacity for fall of 1970	-----	41,274,000	25,500,000
Additional capacity for fall of 1971	-----	-----	40,300,000
Modernization of Wilson units 1-8	4,621,027	2,081,000	1,384,000
Transmission system facilities	58,072,294	73,493,000	53,275,000
Coal land and rights	31,748	7,435,000	-----
Additions and improvements at power facilities	1,085,705	1,503,000	1,743,000
Investigations for future facilities	1,365,314	1,394,000	1,399,000
Fertilizer, agricultural, and munitions development	6,628,572	6,587,000	3,560,000
Land Between the Lakes demonstration	4,901,439	10,412,000	11,000,000
General service activities	2,687,272	3,275,942	3,182,000
Total capital outlay obligations	151,248,589	237,464,942	214,876,000
OPERATING OBLIGATIONS			
River and power development:			
Navigation operations	2,299,314	2,416,000	2,462,000
Flood control operations	2,199,400	2,285,000	2,399,000
Power operations	180,993,659	207,782,000	223,686,000
Multipurpose reservoir operations not allocated	291,226	363,000	343,000
Surveys and studies for river development	160,618	264,000	306,000
Fertilizer, agricultural, and munitions development	27,387,034	28,298,000	27,510,000
Cooperative valley development	2,304,248	3,481,000	3,831,000
Land Between the Lakes demonstration	319,857	547,000	784,000
General service activities	5,083,693	5,610,000	5,140,000
Change in selected resources	6,724,361	-3,849,000	-183,000
Total operating obligations	227,763,410	247,197,000	266,278,000
Total obligations	379,011,999	484,661,942	481,154,000
Payments to the Treasury	52,599,979	58,875,000	58,300,000
Total obligations and payments	431,611,978	543,536,942	539,454,000
Financed from:			
Power proceeds and borrowings	-357,111,414	-456,260,000	-450,725,000
Nonpower proceeds	-24,728,150	-26,520,000	-25,094,000
Appropriation balances from prior years	-1,857,414	-1,409,942	-----
New obligational authority (appropriations)	47,915,000	59,347,000	63,635,000

Summary of 1967 budget financed from appropriations (obligation basis)

Begin construction of Tellico Dam and Reservoir near Lenoir City, Tenn. (p. 53)-----		\$3,200,000
Begin construction of Bear Creek multipurpose water control system, northwest Alabama and northeast Mississippi (p. 61)-----		1,500,000
Continue construction (nonpower portion) of Nickajack Dam and Reservoir near Chattanooga, Tenn. (p. 59)-----		12,705,000
Continue development of Land Between the Lakes demonstration, western Kentucky and Tennessee (p. 165)-----		11,000,000
Continue construction of Tims Ford Dam and Reservoir near Winchester, Tenn. (p. 57)-----		6,000,000
Continue or complete other flood control projects:		
Sevierville, Tenn., flood control (p. 30)-----	\$1,600,000	
Coeburn, Va., flood control (p. 31)-----	780,000	
Other flood control facilities (p. 31)-----	24,000	
		<u>2,404,000</u>
Continue additions and improvements to navigation and multi-purpose facilities:		
Hiwassee River dredging near Charleston, Tenn. (p. 21)-----	\$512,000	
Other navigation facilities (p. 21)-----	414,000	
Additions and improvements at multi-use facilities (p. 65)-----	308,000	
Investigations for future facilities (p. 83)-----	1,169,000	
		<u>2,403,000</u>
Continue rehabilitation and additions to chemical facilities at Muscle Shoals, Ala. (p. 92)-----		3,560,000
Continue work on a new office building at Chattanooga, Tenn. (p. 180)-----		422,000
Complete design of a medical and general service center at Muscle Shoals, Ala. (p. 180)-----		35,000
Other general facilities (office, transportation, and other general-use facilities)-----		2,725,000
Program expenses:		
River and power development-----	\$5,167,000	
Fertilizer, agricultural, and munitions development-----	7,592,000	
Cooperative valley development-----	3,819,000	
Land Between the Lakes demonstration-----	784,000	
General service activities-----	319,000	
		<u>17,681,000</u>
Total appropriation requested-----		<u>63,635,000</u>

Summary of budget financed from appropriations for fiscal years ending June 30, 1965,
1966, and 1967, obligation basis

	1965 actual	1966 estimate	1967 estimate
CAPITAL OUTLAY			
River and power development:			
Navigation facilities:			
New lock at Guntersville Dam	\$4,929,497	\$878,000	
Additions and improvements at navigation facilities	473,359	760,000	\$926,000
Flood control facilities	904,253	2,321,000	2,404,000
Multipurpose river development:			
Tellico Dam and Reservoir			3,200,000
Tims Ford Dam and Reservoir		5,570,000	6,000,000
Nickajack Dam and Reservoir	10,808,160	11,997,000	12,705,000
Bear Creek multipurpose water control system	218,448	250,000	1,500,000
Beech River multipurpose water control system	1,876,164	564,000	
Melton Hill Dam and Reservoir	265,414		
Additions and improvements at multiple-use facilities	341,811	632,000	308,000
Investigations for future facilities	1,144,486	1,169,000	1,169,000
Total, river and power development	20,961,592	24,141,000	28,212,000
Fertilizer, agricultural, and munitions development: Chemical facilities	6,628,572	6,051,000	3,560,000
Land Between the Lakes demonstration	4,901,439	10,412,000	11,000,000
General service activities: General facilities	2,735,952	3,275,942	3,182,000
Total, capital outlay	35,227,555	43,879,942	45,954,000
EXPENSES			
River and power development:			
Navigation operations	659,367	789,000	789,000
Flood control operations	518,384	595,000	665,000
Multipurpose reservoir operations	3,320,963	3,317,000	3,407,000
Surveys and general studies for river development	160,618	264,000	306,000
Total, river and power development	4,659,332	4,965,000	5,167,000
Fertilizer, agricultural, and munitions development	7,104,694	7,592,000	7,592,000
Cooperative valley development:			
Forestry projects	966,669	1,221,000	1,221,000
Mineral resources investigations	139,827	137,000	137,000
Tributary area development	1,134,389	1,200,000	1,358,000
Regional water quality management		564,000	756,000
Disposal of organic wastes as soil amendments	30,143	50,000	50,000
Multipurpose reservoir operations	29,124	297,000	297,000
Total, cooperative valley development	2,300,152	3,469,000	3,819,000
Land Between the Lakes demonstration	319,857	547,000	784,000
General service activities:			
Topographic mapping	169,228	268,000	260,000
Other expenses	52,627	36,000	59,000
Total, general service activities	221,855	304,000	319,000
Total, expenses	14,605,890	16,877,000	17,681,000
INVENTORIES AND PROPERTY TRANSFERS			
General service activities:			
General inventories	17,649		
Property transfers	-78,680		
Total, inventories and property transfers	-61,031		
Total, budget financed from appropriations	49,772,414	60,756,942	63,635,000
FINANCING			
Appropriations	47,915,000	59,347,000	63,635,000
Balance brought forward:			
Reserved for electronic computer	1,400,000		
Unobligated	1,867,356	1,409,942	
Balance carried forward	-1,409,942		
Total financing	49,772,414	60,756,942	63,635,000

Summary of 1967 budget financed from power proceeds and borrowings (accrued expenditure basis)

Paradise steamplant unit 3, Kentucky-----	\$42,060,000
Nickajack Dam and Reservoir (power portion) near Chattanooga, Tenn-----	8,486,000
Bull Run steamplant unit 1 near Oak Ridge, Tenn-----	1,750,000
Additional generating capacity for the fall of 1970 and 1971-----	21,800,000
Transmission system facilities-----	68,275,000
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-----	4,110,000
Power operating expenses-----	223,686,000

Continue construction of:

Total-----	370,167,000
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Proceeds from power operations in 1967 are estimated at \$345,243,000; proceeds from borrowings at \$75 million; and other proceeds at \$777,000. Payments to the Treasury are estimated at \$58,300,000—\$43,300,000 as a dividend (return on the appropriation investment in the power program) and \$15 million as a reduction in the appropriation investment in the power program.

Summary of budget financed from power proceeds and borrowings (for fiscal years ending June 30, 1965, 1966, and 1967), accrued expenditure basis

	1965 actual	1966 estimate	1967 estimate
CAPITAL OUTLAY			
River and power development:			
Multipurpose river development:			
Melton Hill, Dam and Reservoir-----	\$823,816		
Nickajack Dam and Reservoir-----		\$13,535,000	\$8,486,000
Power supply facilities:			
Widows Creek steamplant unit 8-----	3,793,161	378,000	
Colbert steamplant unit 5-----	245,934	316,000	
Paradise steamplant units 1-2-----	1,719,913	—550,000	
Paradise steamplant unit 3-----	329,794	28,489,000	42,060,000
Bull Run steamplant unit 1-----	38,712,980	17,061,000	1,750,000
Additional capacity for fall of 1970-----		274,000	21,500,000
Additional capacity for fall of 1971-----			300,000
Modernization of Wilson hydrounits 1-8-----	306,491	5,446,000	2,334,000
Transmission system facilities-----	55,414,202	68,275,000	68,275,000
Coal land and rights-----	121,748	7,435,000	
Additions and improvements at power facilities-----	1,076,360	1,514,000	1,753,000
Investigations for future facilities-----	220,828	225,000	230,000
Total capital outlay-----	102,765,227	142,398,000	146,688,000
EXPENSES			
River and power development:			
Power operations-----	178,789,146	205,584,000	221,437,000
Allocation of multipurpose reservoir operations-----	2,204,513	2,198,000	2,249,000
Total expenses-----	180,993,659	207,782,000	223,686,000
INVENTORIES AND DEFERRRED CHARGES			
River and power development:			
Power inventories-----	5,729,876	—3,161,000	—732,000
Deferred charges-----	367,413	421,000	525,000
Total inventories and deferred charges-----	6,097,289	—2,740,000	—207,000
Total budget financed from power proceeds and borrowings-----	289,856,175	347,440,000	370,167,000

Summary of budget financed from power proceeds and borrowings (for fiscal years ending June 30, 1965, 1966, and 1967), accrued expenditure basis—Continued

	1965 actual	1966 estimate	1967 estimate
FINANCING			
Balance brought forward.....	-\$511,954	\$8,399,426	\$5,804,426
Proceeds from borrowings.....	55,000,000	75,000,000	75,000,000
Current proceeds:			
Power operations.....	295,079,342	326,894,000	345,243,000
Sale of retired plant.....	552,887	1,332,000	308,000
Miscellaneous receipts.....	735,305	494,000	469,000
Total current proceeds.....	296,367,534	328,720,000	346,020,000
Payments to Treasury:			
Reduction of appropriation investment.....	-10,000,000	-15,000,000	-15,000,000
Dividend (return on appropriation investment).....	-42,599,979	-43,875,000	-43,300,000
Total payments to Treasury.....	-52,599,979	-58,875,000	-58,300,000
Balance carried forward.....	-8,399,426	-5,804,426	1,642,574
Total financing.....	289,856,175	347,440,000	370,167,000

Summary of budget financed from nonpower proceeds (for fiscal years ending June 30, 1965, 1966, and 1967), accrued expenditure basis

	1965 actual	1966 estimate	1967 estimate
CAPITAL OUTLAY			
Fertilizer, agricultural, and munitions development: Chemical facilities.....		\$536,000	
EXPENSES			
River and power development: Multipurpose reservoir operations.....	\$291,226	363,000	\$343,000
Fertilizer, agricultural, and munitions development: Fertilizer, agricultural, and munitions development.....	20,282,340	20,706,000	19,918,000
Cooperative valley development: Forestry projects.....	4,096	12,000	12,000
General service activities: Reimbursable services.....	4,861,838	5,306,000	4,821,000
Total expenses.....	25,439,500	26,387,000	25,094,000
INVENTORIES			
Fertilizer, agricultural, and munitions development: Chemical inventories.....	-704,045	-293,000	
Total budget financed from nonpower proceeds.....	24,735,455	26,630,000	25,094,000
FINANCING			
Balance brought forward, including continuing fund.....	1,106,445	3,597,786	3,859,786
Current proceeds:			
Navigation operations.....	3,314	24,000	
Multipurpose reservoir operations.....	291,226	363,000	343,000
Fertilizer, agricultural, and munitions development.....	21,367,725	20,577,000	19,812,000
Cooperative valley development.....	12,073	13,000	13,000
Land Between the Lakes demonstration.....	1,388	4,000	18,000
Reimbursable services.....	4,861,838	5,306,000	4,821,000
Sale of retired plant and miscellaneous receipts.....	689,232	605,000	419,000
Total current proceeds.....	27,226,796	26,892,000	25,426,000
Balance carried forward, including continuing fund.....	-3,597,786	-3,859,786	-4,191,786
Total financing.....	24,735,455	26,630,000	25,094,000

Selected data for major projects

	Fiscal year construction started	Nameplate generating capacity and service dates		Actual to June 30, 1965 (net)	Budget			Estimated incidental income, fiscal year 1966-67	Estimated total cost
		Capacity (kilowatts)	Service dates		Fiscal year 1966	Fiscal year 1967	To complete		
FINANCED FROM APPROPRIATED FUNDS									
New navigation lock at Guntersville Dam	1963		June 1965	\$16,000,436	\$878,000		\$59,000	\$16,819,436	
Flood control facilities:									
Saverville, Tenn.	1966		June 1967		975,000	\$1,600,000		2,700,000	
Coeburn, Va.	1966		do		384,000	780,000		1,200,000	
Bristol, Tenn.-Va.	1964		December 1965	1,697,931	974,000			2,671,931	
Multipurpose projects:									
Tellico Dam and Reservoir	1967		April 1970		5,570,000	3,200,000		42,500,000	
Tims Ford Dam and Reservoir	1966	40,000	November 1969	13,582,975	11,997,000	6,000,000		39,000,000	
Nickajack Dam and Reservoir	1964		November 1967	506,412	11,250,000	12,795,000		41,500,000	
Bear Creek multipurpose water control system	1967		Fall, 1970		564,000	1,500,000		96,000,000	
Beech River multipurpose water control system	1963		December 1965	8,924,183	564,000			9,488,183	
Land Between the Lakes demonstration	1964		December 1969	8,898,783	10,412,000	11,000,000	30,000	151,500,000	
FINANCED FROM POWER PROCEEDS AND BORROWINGS									
Power supply facilities:									
Widows Creek steam plant unit 8	1961	550,000	February 1965	61,338,669	378,000		68,000	61,646,669	
Colbert steam plant unit 5	1960	550,000	November 1965	65,393,371	316,000			65,709,371	
Paradise steam plant units 1 and 2	1960	1,408,000	May, November 1963	179,099,333	-550,000		39,000	178,519,333	
Paradise steam plant unit 3	1965	1,150,000	October 1969	391,371	28,489,000	42,050,000		133,500,000	
Bull Run steam plant unit 1	1962	950,000	May 1966	120,307,627	17,061,000	1,750,000	70,000	139,400,000	
Additional capacity for fall of 1970	1967	1,100,000	October 1970		21,300,000	118,226,000		140,000,000	
Additional capacity for fall of 1971	1968	1,100,000	Fall, 1971		5,445,000	2,334,000	100,000	8,000,000	
Modernization of Wilson Hydro units 1 to 8	1965		Summer, 1967	310,182	13,535,000	2,485,000		24,500,000	
Multipurpose dam: Nickajack units 1 to 4	1964	97,200	November 1967 (3); January 1968 (1).						

1 Preliminary.

RIVER AND POWER DEVELOPMENT

Development of the Tennessee River and tributaries has been one of TVA's major tasks from the beginning, more than 30 years ago. The objective in this undertaking is the greater economic and social development of the Tennessee Valley region in the national interest.

A basic system for multipurpose river control has been built which provides an artery for economical water transportation, a high degree of control over damaging floods, and low-cost electric power for an 80,000 square-mile region centered in the Tennessee Valley. Physical development of the river for the three primary purposes of navigation, flood control, and power is supplemented by operating programs conducted so as to assure maximum public benefit from the public investment. Also toward this end, the people of the region—through their state and local agencies—are encouraged to take on new and increasingly responsible functions in resource development and use.

The present dams, reservoirs, navigation locks, and powerhouses—while bringing the Tennessee River system under control for the use and benefit of man to an exceptional degree—are less than a complete development. A more nearly complete development will be approached in a variety of ways. Water transportation needs of the Valley and surrounding region are outstripping the capacity of a number of the older navigation locks and a program for adding larger locks has been under way for several years. The regional flood control system has not overcome all the situations—most of them on uncontrolled minor tributaries—where floods can rise and economic losses occur. A variety of efforts to deal with remaining flood problems is under way.

Further development of tributary water resources will, however, be concerned with more than local flood problems. There are opportunities for further additions to the regional flood control capability of the multipurpose system; or useful additions or improvements to the region's water transportation system; or additions to regional power supply. Continued water resource development in the tributaries can also be a major factor in further development of the region by overcoming local problems of water supply and quality, opening up new agricultural horizons, and creating new opportunities for outdoor recreation and industrial development.

TVA's 1967 program includes a number of significant and varied efforts in water resource development. These are discussed in the following pages.

NAVIGATION PROGRAM

One of TVA's primary statutory responsibilities is navigation improvement of the Tennessee River and its tributaries. Through a series of multipurpose dam and reservoir projects and related facilities a 9-foot navigable channel has been provided over the full length of the river. The improved Tennessee River is not an isolated transportation route of regional significance only. It is a part of a national investment in an inland waterway system connecting 20 states and their trade areas.

Tennessee River traffic volume continues to grow. Approximately 17.4 million tons of traffic moved in calendar year 1965, a new tonnage record and a 13 percent increase over 1964. Transportation savings on the 1964 traffic are estimated at \$26.2 million. This is the difference between freight charges actually paid and those which would have been paid if the river had not been improved for navigation. Freight originating outside the Valley or moving from the Valley to outside destinations accounts for about 95 percent of the transportation savings estimate.

Operation of the Tennessee River navigation channel is a closely coordinated effort by TVA, the Corps of Engineers, and the Coast Guard. Total cost to the three agencies in 1964 for operation and maintenance of the waterway, including provision for depreciation, was about 23 percent of the public benefits in the form of transportation cost savings in the same year.

The following sections describe 1967 plans for (1) engineering activities related to operating the waterway and diverse cooperative activities with private interests and state and local public agencies directed toward greater use of the waterway as an instrument of regional development, and (2) additions to navigation facilities.

NAVIGATION OPERATIONS

Appropriation requirements for navigation expense are \$789,000 in 1967. Additional costs of the program include (1) an appropriate share of multipurpose reservoir operations expenses (see page 67) and (2) depreciation on navigation facilities (which involves no cash outlay), and are included in the table below.

Breakdown of total actual expense of navigation operations for 1965 and estimates for 1966 and 1967

	1965 actual	1966 estimate	1967 estimate
Income.....	\$3,314	\$24,000	-----
Expenses:			
Navigation engineering and investigations.....	555,069	630,000	\$662,000
Other navigation expense.....	64,568	117,000	82,000
Distribution of administrative and general expenses.....	39,730	42,000	45,000
Total.....	659,367	789,000	789,000
Allocated from multipurpose reservoir operations.....	1,639,947	1,627,000	1,673,000
Total expenses before depreciation.....	2,299,314	2,416,000	2,462,000
Depreciation.....	2,222,220	2,440,000	2,465,000
Total expenses.....	4,521,534	4,856,000	4,927,000
Net expense after miscellaneous income.....	4,518,220	4,832,000	4,927,000

Navigation engineering and investigations, \$662,000

TVA has the primary Federal responsibility for navigation improvement of the Tennessee River and its tributaries. TVA has a further and broader responsibility for comprehensive resource development and economic growth of the Tennessee Valley region. This broader duty guides the manner in which TVA discharges its navigation program responsibilities. In brief, TVA's major concern is that the waterway is used, fully and effectively, in development of the region.

The estimate of \$662,000 provides for the activities which are basic to discharge of these responsibilities. The work, which does not duplicate that of any other Federal agency, consists in large part of engineering investigations to assure that physical facilities—locks, channels, safety harbors, and navigation aids—are operated, maintained, and modified or improved to meet growing needs. Transportation economic studies are made to appraise the opportunities for new uses of the waterway, the barriers inhibiting its use, and the benefits coming from the Federal investment in navigation facilities. These activities are largely of a continuing nature, in part arising from day-to-day operating problems of the waterway and in part comprised of longer range investigations leading to recommendations for improved facilities or to provide guidance for TVA's efforts to broaden public benefits from the Federal investment in the waterway through greater use.

The work also includes the review and determination of the effects of proposed structures on navigation, as required by Section 26a of the TVA Act, and revision of reservoir navigation charts and maintenance of markers on more than 200 miles of secondary channels. The higher level of activity programed for 1967 than for 1966 reflects the need for increased work on revision of navigation charts to bring them up to date, performance of essential maintenance work on the navigation service boat, and further intensification of cooperative work with state and local agencies in achieving full use of the waterway and in advising these agencies in their programs to protect and develop waterfront industrial lands. A pioneering effort is being made here to develop and utilize highly advanced market research techniques to guide industrial growth in the region. The Nation's industrial capacity is growing rapidly. TVA's objective is the development in the Valley of those classes of industry for which a Valley location is most efficient.

Breakdown of estimates for navigation engineering and investigations

	1965 actual	1966 estimate	1967 estimate
Engineering for navigation channels and facilities.....	\$164,928	\$195,000	\$213,000
Economic investigations of navigation operations.....	159,328	165,000	159,000
Navigation development and cooperation with other agencies.....	122,701	161,000	184,000
Payments to the U.S. Employees Compensation Commission.....	224		
General operating expenses.....	107,888	109,000	106,000
Total.....	555,069	630,000	662,000

The costs for this work are related to the navigation system as a whole and are not identified by projects or other elements of the system.

Other navigation expense, \$82,000

This estimate includes \$34,000 for cleanout of a secondary channel on Kentucky reservoir, \$14,000 for power furnished to the Corps of Engineers for lock operations, and \$34,000 for miscellaneous maintenance and engineering inspection activities on locks and other navigation facilities.

NAVIGATION FACILITIES

The 1967 estimate of obligations for navigation facilities of \$926,000 relates to additions and improvements at existing navigation facilities. Plans have been developed in cooperation with the Corps of Engineers.

Summary of estimates for navigation facilities—Obligations

[In thousands]

	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	Total cost
New lock at Guntersville Dam, Ala.....	\$16,000	\$878		-\$59	\$16,819
Additions and improvements at existing navigation facilities:					
Extension of Hiwassee River navigation channel:					
Upstream from U.S. Highway No. 11 bridge at Charleston, Tenn.....	22	616	\$512		1,150
Highway No. 11 bridge at Charleston, Tenn.....	256	86			342
Removal of channel restrictions, Hales Bar Reservoir.....		1	54		55
Modernization of fire suppression and control facilities at navigation locks.....	79	53	180		312
Mooring cells at mouth of Hiwassee River.....	1	48			49
Construction cleanup and miscellaneous minor additions and improvements.....	45	95	41		181
Payments to the U.S. Employees Compensation Commission.....		-139	139		
Total, additions and improvements at existing navigation facilities.....	403	760	926		2,089
Total, navigation facilities.....	16,403	1,638	926	-59	18,908

All work on construction of the new lock at Guntersville Dam will be completed in fiscal year 1966. The negative estimate shown to complete this lock represents estimated income, applicable to fiscal year 1966, from disposal of construction materials and equipment.

A dredged extension of the navigation channel, under way in 1966 on the Hiwassee River in southeastern Tennessee, is scheduled for completion during 1967. The channel will serve existing and potential industrial developments to a point about 2 miles upstream from Charleston, Tennessee. The 1967 estimate is \$512,000 and the total estimated cost of the channel extension upstream from Charleston is \$1,150,000.

The remaining estimate of \$414,000 provides for (1) installation of improved modern fire suppression and control facilities at Chickamauga, Watts Bar, and Fort Loudoun locks; (2) removal of channel restrictions (rocks and boulders) 15 miles downstream from Chattanooga, Tennessee, with a total cost estimate of \$55,000; (3) payments to the U.S. Employees Compensation Commission applicable to construction of locks; and (4) construction cleanup and miscellaneous additions and improvements.

FLOOD CONTROL PROGRAM

A primary TVA objective is to assist in the economic development of the Tennessee Valley through control of floodwaters on the Tennessee River and its tributaries. Through a system of multipurpose dams, a substantial degree of protection from floods is afforded to areas along the Tennessee River and many of its major tributaries, and significant reductions in flood heights along the lower Ohio and Mississippi Rivers are achieved. In addition to control of floods on the larger streams, the program encompasses work on smaller tributaries to improve the economies of specific communities by reducing or preventing periodic damage from floodwaters. The following sections describe the 1967 plans for (1) operations of the existing flood control system and activities to determine solutions to other flood damage problems, and (2) additions to flood control facilities.

FLOOD CONTROL OPERATIONS

Appropriation requirements for flood control expenses are \$665,000 in 1967. Total expense of the program is estimated at \$3,694,000 and includes additional costs for (1) an appropriate share of multipurpose reservoir operations expenses, and (2) depreciation on flood control facilities (which involves no cash outlay).

Breakdown of actual expense of flood control operations for 1965 and estimates for 1966 and 1967

	1965 actual	1966 estimate	1967 estimate
System flood control studies and investigations.....	\$194,905	\$220,000	\$231,000
Local flood studies and cooperation with other agencies.....	297,217	343,000	382,000
Operation and maintenance of local flood control facilities.....		4,000	22,000
Distribution of administrative and general expenses.....	26,262	28,000	30,000
Total.....	518,384	595,000	665,000
Allocated from multipurpose reservoir operations.....	1,681,016	1,690,000	1,734,000
Total expenses before depreciation and local flood control improvements.....	2,199,400	2,285,000	2,399,000
Local flood control improvements.....	14,510		
Depreciation.....	1,241,472	1,275,000	1,295,000
Total, expense of flood control operations.....	3,455,382	3,560,000	3,694,000

System flood control studies and investigations, \$231,000

Operation of the Tennessee River flood control system consists principally of (1) maintaining and using storage space in upstream reservoirs for seasonal retention of excessive runoff, and (2) regulating the discharges from reservoirs to rates of flow which can safely be handled by downstream channels and reservoirs. These operations avert damage to cities and agricultural lands in the Tennessee Valley and also reduce flood crests on the lower Ohio and Mississippi rivers. Regulation afforded by the Tennessee River system can reduce flood crests at Cairo, Illinois, by from 2 to 4 feet and by lesser amounts on the Mississippi River as far south as the Red River. Substantial reductions of flood heights at Cairo have been accomplished several times, averting considerable damage along the Ohio and Mississippi rivers. The maximum reduction achieved so far at Cairo was 3.1 feet in May 1958 and again in April 1965. A flood crest at Cairo during fiscal year 1963 was reduced by 2.4 feet and in 1964 three floods were reduced by amounts ranging up to 2.2 feet. Two crests at Chattanooga, Tennessee, were reduced 8.6 feet and 12.0 feet in March and April 1964, respectively. In fiscal year 1965 a flood crest at Chattanooga in March was reduced by 14.5 feet. This flood would have been the sixth highest since 1933 without regulation by the reservoir system.

Since the first project in the TVA system was placed in operation (1936), regulation by TVA reservoirs to reduce flood crests has averted damage of about \$325,000,000 in the Tennessee Valley and about \$40,000,000 on the lower Ohio and Mississippi rivers. These amounts do not reflect the increased land values resulting from increased security provided to six million acres of land behind levees along the Mississippi River.

Direct benefits of TVA flood control are estimated to average about \$13,300,000 a year. The net benefits, after deducting operating expenses of about \$3,600,000 a year, afford a rate of return of about 6 percent a year on the net investment in flood control facilities. The net investment, after depreciation, in flood control facilities was \$157,840,098 at June 30, 1965.

The estimate of \$231,000 in 1967 provides for (1) continuing engineering studies to appraise present flood control operating methods and results and (2) investigations to develop improved operating plans and to evaluate the need for additional flood control facilities.

Estimates for these major lines of activities are as follows:

	1965 actual	1966 estimate	1967 estimate
Flood data surveys and studies.....	\$74,205	\$81,000	\$91,000
System flood control investigations.....	120,700	139,000	140,000
Total.....	194,905	220,000	231,000

These estimates are based on streamflow occurrences expected to be experienced in an average year. When unusually high streamflows occur, special investigations, studies, and reports must be made of the conditions occurring, and the relation between water levels actually experienced and those which would have occurred without regulation must be established. Information thus gained not only is essential to aid in determining guides for reservoir operations in future similar circumstances but also is necessary to provide facts to answer damage claims which may be asserted. New work to be undertaken in 1967 includes (1) developing and drafting flood profiles for smaller streams for which data have been collected and (2) establishing level ties to floodmarks that have been set previously.

Local flood studies and cooperation with other agencies, \$382,000

This activity provides flood data and technical assistance to state and local governments to encourage their assumption of more responsibility for solution of local urban and rural flood problems. It represents application within the Tennessee Valley of an approach to solution of local flood problems recommended in a report *A Program for Reducing the National Flood Damage Potential* which TVA transmitted to the Congress on March 9, 1959.

The estimates for providing flood data and technical assistance are as follows:

	1965 actual	1966 estimate	1967 estimate
Local flood situation reports.....	\$69,299	\$76,600	\$75,000
Special local flood studies.....	84,140	117,900	143,000
Technical assistance in reaching solutions to local flood problems.....	143,778	148,500	164,000
Total.....	297,217	343,000	382,000

Local flood situation reports.—At the request of state and local planning agencies, TVA provides reports on past floods in a locality as well as information on the size of floods which may be expected. Much of the data forming the reports is already available in TVA records collected in the course of its operations. The information is assembled in report form so as to be useful to local governments and their planning agencies in deciding how damage from local floods can best be alleviated.

Ninety-two reports have been made covering 112 of nearly 150 communities in the Valley having local flood problems. The investigations and preparation of reports for 4 new locations are expected to be completed in fiscal year 1966 and 4 reports are planned for completion in fiscal year 1967.

Special local flood studies.—For many communities the critical local flood problem is in a particular locality or devolves into an immediate problem of whether a given site affords a flood-free location for a proposed new school, subdivision, or other development. TVA undertakes special investigations of such flood problems upon request. Fifty-five such requests were answered in 1965, and the number of communities with whom TVA will be working is projected to increase 40 percent by 1967. Timely technical assistance for such communities can help greatly in reducing unnecessary development in areas subject to flooding and in decreasing future demands on the Federal Government for remedial flood protection. A frequent and valuable byproduct of this kind of work with communities is the establishment or revitalization of local planning agencies.

Technical assistance in reaching solutions to local flood problems.—The ultimate test of the usefulness to a community of information on its flood problem is the action taken to deal with the problem. The number of comprehensive flood damage abatement programs undertaken by Tennessee Valley communities is growing steadily. Forty-three communities have formally adopted flood plain regulations, and 5 more have completed planning studies or partial studies for flood damage prevention. Three years ago the corresponding statistics were 24 and 11. TVA, working through state agencies, provides engineering and other technical assistance for such efforts.

Many additional communities in the Tennessee Valley are now considering similar programs that will permit developing land to its best use. Flood study committees have been appointed to consider flood control works, floodproofing of buildings, flood forecasting, zoning, subdivision regulations, building codes, city policy in controlling extension of utilities, streets, open spaces, and parks, and to determine the combination providing the best solution.

Each community's plan is submitted to the appropriate state agency and to TVA for assistance in putting it into effect. TVA reviews the plan and determines what, if any, action TVA should take. Experience has been that in many cases a satisfactory degree of prevention of flood damages can be effected through local actions without resort to flood control structures and consequent requests for capital outlays by the Federal Government. There are situations, however, where such facilities are needed to complete a plan for flood damage prevention. The cooperative programs with the cities of Sevierville, Tennessee, and Coeburn, Virginia, described on the following pages, are examples. Where this is the situation, TVA works out cost sharing and other cooperative arrangements with local officials and requests funds for Federal participation.

The 1967 estimate provides for intensification of work with communities concerning local flood problems. The number of communities with whom TVA will be working is projected to increase 40 percent above the 1965 level. The estimate also provides for assistance to two states—Alabama and Georgia—in planning, promoting, and organizing local flood damage abatement programs.

Operation and maintenance of local flood control facilities, \$22,900

The flood control facilities for the area around Bistol, Tennessee-Virginia, are scheduled for completion in fiscal year 1966. The 1967 budget includes \$22,000 to provide for TVA's participation in the operation and maintenance of these facilities, which consist of two dams and reservoirs located upstream from the cities. These activities will also provide the data by which the effectiveness of the system can be measured.

FLOOD CONTROL FACILITIES

There are a number of communities in the Tennessee Valley which are subject to severe damages from floods of local origin. As a result of studies of such situations over a number of years, plans have been developed in consultation with local people for construction at several locations of feasible physical facilities to alleviate flood damages. The 1967 budget provides for construction of such facilities as follows:

Sevierville, Tenn., flood control facilities

[In thousands]

	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	Total cost
Obligations.....	-----	\$976	\$1,600	\$124	\$2,700

Construction of flood abatement facilities for Sevierville, Tennessee, is scheduled to be started in the spring of 1966. The estimate of \$1,600,000 provides for substantial completion of construction by June 1967. The project consists of improvements on the Little Pigeon River within and adjacent to the city of Sevierville. In combination with other actions to be taken by local interests, the works to be built by TVA will provide Sevierville with a high degree of protection from damaging floods.

The channel improvements being constructed by TVA are the key element in a comprehensive plan for avoiding flood damages at Sevierville, in which the city has important responsibilities. The city's part began with its participation in development of the comprehensive plan. Furthermore, the city is responsible for enactment of adequate flood plain zoning regulations, assistance to local property owners in floodproofing buildings, appropriate participation in the cost of channel improvements to be built by TVA, and for maintenance of these improvements.

An estimate of \$2,700,000 is provided as TVA's total input into the project, \$159,000 of which is to be repaid by the local government over a period of several years. The present value of the total of local contributions to the comprehensive flood damage abatement program is estimated at \$624,000.

Coeburn, Va., flood control facilities

[In thousands]

	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	Total cost
Obligations.....	-----	\$384	\$780	\$36	\$1,200

Construction work on flood abatement facilities for Coeburn, Virginia, is scheduled to be started in the spring of 1966. The 1967 budget includes \$780,000 for substantial completion of work by June 1967. The work consists of channel enlargements and necessary adjustments to structures and utilities and of channel improvements on tributaries of the Clinch River at Coeburn, Virginia, to reduce urban damage from recurring flash floods. TVA's total input into this project is estimated at \$1,200,000, of which \$79,000 is to be repaid by the local government over a period of several years. The work by TVA is part of a comprehensive flood damage prevention plan being adopted by the city involving a number of additional actions by local interests. The present value of the total local contributions to the comprehensive local flood damage abatement program is estimated at \$427,000.

Additions and improvements at existing flood control facilities, \$24,000

This estimate includes \$9,000 for minor cleanup activities on flood protection facilities for Bristol, Tennessee-Virginia, \$12,000 for payment to the U.S. Employees Compensation Commission related to completed flood control facilities, and \$3,000 for acquiring land for flood control purposes in Norris reservoir.

POWER PROGRAM (FINANCED FROM POWER PROCEEDS AND BORROWINGS)

The TVA power program provides the Tennessee Valley region with a vital tool for social and economic development—an ample supply of electric power at low cost. The program requires the provision of facilities for producing electric

power and delivering it at wholesale to local distribution systems and to large Federal and industrial establishments. It also entails the efficient operation of these facilities and a variety of cooperative activities with the distributors of TVA power. The TVA power program discussed on the following pages is financed from power revenues and borrowings secured by future revenues.

POWER SUPPLY FACILITIES

The rapidly growing use of electricity by the farms, homes, and industries in the area served with TVA power requires large annual investments in additional power facilities. A large part of the funds required is needed for generating facilities. The program budgeted from power proceeds and borrowings for 1967 includes \$76,430,000 for such facilities. The load forecasts have been adjusted for the various load reductions (to be spread over a period of several years) already scheduled by the Atomic Energy Commission, and the program of new power facilities is predicated upon the adjusted requirements.

Of the funds budgeted for 1967, \$65,310,000 will be used in the construction of two steam-electric generating units and in cleanup work on Bull Run unit 1. The two steam-electric generating units scheduled to be under construction during 1967 are Paradise unit 3 and a new unit in the same size range scheduled for commercial operation in the fall of 1970. The turbine and generator for Paradise unit 3 were purchased under the same contract as Bull Run unit 1. Studies leading to the selection of Paradise as the site for this unit were completed in the summer of 1965.

During fiscal year 1965 it became necessary to undertake an extensive rehabilitation and modification program on units 1-8 of the Wilson Hydro Plant, both to correct major physical defects and to improve the reliability of these units. It was also found that it would be economical to increase the power output of the units in the process. This program is expected to be completed by the summer of 1967.

A summary of requirements from power proceeds and borrowings for the above described units follows.

Expenditures

[In thousands]

Plant and units	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	Total cost
Bull Run unit 1.....	\$120,308	\$17,061	\$1,750	\$281	\$139,400
Paradise unit 3.....	392	28,489	42,060	62,559	133,500
Additional capacity for fall of 1970.....	-----	274	21,500	118,226	140,000
Wilson hydro units 1-8 (rehabilitation).....	320	5,446	2,334	-100	8,000

1 Preliminary.

Schedules and the gain in rated capacity for these units are shown on the following table.

	Fiscal year construction started	Scheduled service dates	Rated capacity
Bull Run unit 1.....	1962	May 1966.....	<i>Kilowatts</i> 950,000
Paradise unit 3.....	1965	October 1969.....	1,150,000
Additional capacity for fall of 1970.....	1967	October 1970.....	1,100,000
Wilson hydro units 1-8 (rehabilitation).....	1965	At intervals to summer of 1967.	30,400

The Nickajack multipurpose project is now under construction to replace the Hales Bar multipurpose project. The net effect of the Nickajack project on power supply will be to relocate most of the 99,700 kilowatts of capacity from Hales Bar to a point 6 miles downstream. The Nickajack project is being financed from

appropriations and from power proceeds and borrowings; the 1967 estimate of expenditures to be financed from power proceeds and borrowings is \$8,486,000.

By contract with Southeastern Power Administration effective March 1, 1963, TVA agreed to purchase the output of the Corps of Engineers' Barkley hydro project. This project will have a combined nameplate rating of 130,000 kw. All four of the Barkley units are expected to be in operation prior to the end of fiscal year 1966. Terms of the contract under which SEPA can retain limited amounts of capacity and energy for delivery and sale to its customers other than TVA were described in TVA's fiscal year 1965 budget program. SEPA has given notice of retention of 65,000 kw standby power effective November 1, 1965, increasing to 75,000 kw effective November 1, 1967; and 5,000 kw of peaking power for the period from November 1, 1967, to October 31, 1968, and 13,500 kw for the period from November 1, 1968, to October 31, 1969.

Seasonal exchanges of generating capacity between TVA and the Mississippi Power & Light Company and between TVA and Southern Services, Inc., will provide TVA with additional peaking capacity during the winter as shown in the following table.

Winter of—	Seasonal exchange power to TVA—Kilowatts		
	Mississippi Power & Light Co.	Southern Services Inc.	Total
1966-67.....	500,000	150,000	650,000
1967-68.....	1,000,000	150,000	1,150,000
1968-69 and later years.....	1,500,000	150,000	1,650,000

The modification program for selected TVA steam units described in previous budget programs has been in progress for more than a year. This program, and the consequent rerating of the units, is expected to increase the system dependable capacity by 525,000 kw before the winter of 1966-1967.

With the installation of the generating units previously described, the interchange agreements with the neighboring utilities, the modifications to units permitting their operation at higher capacity on peak, and the effects of the AEC load reductions, the relationships between expected system capacity and predicted power requirements in the winters of 1966-1967 through 1969-1970 are estimated to be as shown in the following table.

Winter of—	Approximate system dependable capacity—kilowatts	Presently estimated demands—kilowatts		Capacity margin for operating requirements, breakdown, maintenance, and for other unforeseen developments	
		Total	Served by TVA capacity	Kilowatts	Percent of demand served by TVA capacity
1966-67.....	17,114,000	14,700,000	14,050,000	3,064,000	21.8
1967-68.....	17,088,000	15,600,000	14,450,000	2,638,000	18.3
1968-69.....	17,104,000	16,100,000	14,450,000	2,654,000	18.4
1969-70.....	18,274,000	17,100,000	15,450,000	2,824,000	18.3

The foregoing table indicates that the addition of Paradise unit 3 will provide adequate capacity margins during the winter of 1969-1970. Expected loads during the winter of 1970-1971, however, indicate the need for additional generating capacity. Recent experience indicates that a continuation of the large unit policy is desirable on TVA's system. Accordingly, preliminary plans are to install a unit in the 1,100,000-kw size class by the fall of 1970. In order to meet the tentatively scheduled operating date, on-site construction should start in the early part of fiscal year 1967. Studies are now in progress to determine the most desirable characteristics and location for this unit. The addition of this unit will result in a relationship between load and capacity during the winter of 1970-1971 as shown in the following table.

Winter of—	Approximate system dependable capacity (kilowatts)	Presently estimated demands (kilowatts)		Capacity margin for operating requirements, breakdown, maintenance, and for other unforeseen developments	
		Total	Served by TVA capacity	Kilowatts	Percent of demand served by TVA capacity
1970-71.....	19,374,000	18,350,000	16,700,000	2,674,000	16

The 1967 budget includes \$300,000 for preliminary design work on additional generating capacity to meet continuing expansion of power demand served by TVA capacity. It is planned to start construction in fiscal year 1968. This additional capacity is tentatively scheduled for commercial operation in the fall of 1971. A summary of estimated expenditures for this capacity follows:

	Prior to fiscal year 1967	Estimate		
		1967	To complete	Total cost
Expenditures.....		\$300,000	\$139,700,000	¹ \$140,000,000

¹ Preliminary.

POWER TRANSMISSION SYSTEM FACILITIES

Actual and budgeted expenditures for transmission system facilities

Power proceeds and borrowings	1965 actual	1966 estimate	1967 estimate
Direct:			
Primary transmission system facilities.....	\$41,031,957	\$54,500,000	\$53,000,000
Subtransmission system facilities.....	8,028,371	6,500,000	6,500,000
Miscellaneous additions and replacements of transmission system facilities.....	3,151,519	3,825,000	5,250,000
Total, direct.....	52,211,847	64,825,000	64,750,000
Engineering, design, and general expense.....	2,000,884	2,175,000	2,250,000
Total.....	54,212,731	67,000,000	67,000,000
Distribution of administrative and general expenses.....	1,201,471	1,275,000	1,275,000
Total.....	55,414,202	68,275,000	68,275,000

Primary transmission system facilities

Primary transmission system facilities operate at 161,000 volts and above. They are required for transmitting large quantities of power from generating plants to (1) the 69-kv and 46-kv subtransmission network which in turn supplies principally the loads of the municipalities and cooperatives; (2) those directly served customers, including Federal agencies, which purchase substantial quantities of power; and (3) interconnected utilities for interchange and other power transactions.

The estimate for primary transmission facilities includes extra-high-voltage facilities to be operated at 500,000 volts. Extra-high-voltage facilities provide lower unit transmission costs for delivery of large blocks of power. Some 500-kv facilities are in service and others are under construction for service by the summer of 1966. Construction will start in 1966 on additional 500-kv facilities so as to interconnect more of the system generating facilities and large load centers to the extra-high-voltage grid. The grid will include transformation equipment for feeding the 161-kv primary system and will provide additional interchange capacity for delivery and receipt of power from neighboring utilities.

The estimate for fiscal year 1967 includes \$45,175,000 for continuation of work started in fiscal year 1966 and earlier years, and \$7,825,000 for beginning construction of new facilities. The latter includes beginning construction on 10 new primary substations in the areas where load growth necessitates additional capacity to supply the subtransmission system; capacity increases and improvements at 11 primary substations; and starting of construction of new primary transmission lines to deliver greater amounts of power to growing loads in the service areas in central Kentucky, central and northeastern Mississippi, north-east Tennessee, and western North Carolina. Construction will also be started on connections for Nickajack Hydro Plant which will begin generation of power in fiscal year 1968.

Primary transmission construction started before fiscal year 1967, and which will continue in that year, includes work on 15 new primary substations, 12 of which will be completed; and capacity increases and changes at 6 existing primary substations. In addition to construction of the 500-kv grid mentioned above, work will continue on primary transmission lines to deliver greater amounts of power to supply the growing loads in the Nashville, Tennessee, area, the Calvert City, Kentucky, industrial area, the western Alabama area, the central and western Mississippi area, the northeast Georgia area with an interconnection to the Georgia Power Company for seasonal exchanges of power, and completion of connections for Paradise units 1-2. The high capacity facilities started in fiscal year 1964 to provide service to the central Mississippi area and to carry out the exchange of power with the Mississippi Power & Light Company and the Arkansas Power & Light Company will be in operation in fiscal year 1966 with completion scheduled in fiscal year 1967.

Subtransmission system facilities

Expenditures in fiscal year 1967 to increase the capacity of the subtransmission system facilities will include \$3,680,000 for continuation of or completion of work started in fiscal year 1966 and earlier years, and \$2,820,000 for new line and substation additions. Of the latter amount, \$1,230,000 is for additional 69-kv and 46-kv lines and substations to provide new service points where distributors are now serving customers over inadequate 13-kv service lines, \$1,270,000 is for capacity increases and changes at existing 69-kv and 46-kv substations, and \$320,000 is for major rehabilitation and rebuilding of subtransmission lines.

Miscellaneous additions and replacements of transmission system facilities

Of the \$5,250,000 estimate for this work, \$900,000 covers minor replacements of lines and substation facilities; \$600,000 provides for installing static capacitors to increase the load carrying capacity of subtransmission lines and the installation of low voltage switches for new service points; \$500,000 is for additions and improvements to the communication system; and \$3,250,000 is for power service centers, added storeroom and shop buildings, and for shop and laboratory tools and testing equipment.

ADDITIONS AND IMPROVEMENTS AT POWER FACILITIES

Expenditures for additions and improvements at power facilities

	1965 actual	1966 estimate	1967 estimate
Construction cleanup work on major steamplants.....	-\$145,087	-\$65,000	\$130,000
Replacement of bridges in Great Falls reservoir.....		349,000	774,000
Additions and improvements at power generating stations....	1,215,758	1,221,000	825,000
Distribution of administrative and general expenses.....	5,689	9,000	24,000
Total.....	1,076,360	1,514,000	1,753,000

Construction cleanup work on major steam plants

The 1967 estimate of \$130,000 includes \$32,000 for preparation of record drawings and technical reports and \$98,000 for payments to the U.S. Employees Compensation Commission related to completed steam plants.

Replacement of bridges in Great Falls Reservoir

With acquisition of the Great Falls hydro project from the Tennessee Electric Power Company in 1939, TVA assumed the company's obligations to provide perpetual maintenance of certain bridges in the reservoir. Under an agreement being negotiated with the counties in which the bridges are located, TVA would (1) replace seven of the old bridges with six new bridges of greater capacity, (2) make settlement in lieu of replacement for three others, and then (3) be relieved of its perpetual maintenance responsibility for all bridges in the reservoir except the two which are on or very close to the dam. Estimated cost to TVA of this arrangement is \$1,883,000, of which \$349,000 is budgeted in 1966 and \$774,000 in 1967. Completion of the arrangement would provide the counties with bridges adequate for the long-term development of their road system and would result in estimated savings to TVA of more than \$11,000 per year.

Additions and improvements at power generating stations

The 1967 estimate of \$825,000 includes \$148,000 for continuing work on changes in boilers and other equipment to gain additional steam plant capacity. This work is being done in connection with modifications to turbogenerators being made under an agreement with a major supplier of generating plant equipment. Total estimated capital cost to TVA for these changes is \$3,758,000, of which \$807,000 was expended in fiscal year 1965 and prior years and \$193,000 is estimated for fiscal year 1966. Replacement of worn-out mobile coal handling equipment will require expenditures of \$190,000 in fiscal year 1967. The remaining estimate of \$487,000 provides for miscellaneous replacements or improvements at power production plants in operation. Representative items include: replacement of roofs on generating stations; shop tools and equipment; parts for barge-unloading crane; stoplogs and tailgates at hydro plants; additions to interplant communication systems; equipment for air pollution control studies; and additions to clinker-grinders and ash handling facilities at steam plants.

POWER INVENTORIES

Power inventories are estimated to decrease during fiscal year 1967 by \$732,000. A decrease in fuel inventories of \$1,527,000 is planned, and the stock of construction, operating, and maintenance materials and equipment in the general storerooms and at generating plant storerooms is estimated to increase by \$795,000. Purchase of considerable quantities of spot coal at favorable prices, in addition to receipts under firm contracts, resulted in a buildup of the fuel stockpile in fiscal year 1965. Use of this fuel will continue in fiscal years 1966 and 1967. General storerooms and the generating plant storerooms at plants with 500-kv switchyards will add construction and maintenance materials and equipment for 500-kv facilities not previously stocked. The Bull Run Steam Plant storeroom will continue to build up its inventory during the first full year of operation, and Paradise Steam Plant storeroom will stock additional operating and maintenance items as required for that new plant.

DEFERRED CHARGES

Deferred charges consist of expenses of issuing bonds plus the discount at which bonds and notes are sold less amounts equal to the amortization of bond discount and issue expense over the life of the bonds, and amortization of the discount on notes over the term of the notes. The estimate of \$525,000 for fiscal year 1967 includes bond issue expense of \$50,000 and estimated discount of \$550,000. Offsetting credits include \$64,000 for amortization of bond discount and issue expense and \$11,000 representing the net of discount on notes sold during the year and the write-off during the year, including amortization of discount on notes issued in fiscal year 1966 with terms extending into fiscal year 1967.

Power operations (for fiscal years ending June 30, 1965, 1966, and 1967)

	1965 actual	1966 estimate	1967 estimate
INCOME			
Operating revenues:			
Sales of electric energy:			
Municipalities and cooperatives.....	\$136,775,501	\$158,020,000	\$172,140,000
Federal agencies.....	82,375,841	84,120,000	83,160,000
Industrials.....	67,137,335	72,030,000	75,070,000
Electric utilities.....	4,827,449	8,540,000	9,600,000
Total outside sales.....	291,116,126	322,710,000	339,970,000
Rents and other revenues.....	1,929,254	2,124,000	2,208,000
Total operating revenues, exclusive of interdivisional sales and rents.....	293,045,380	324,834,000	342,178,000
Interchange power delivered.....	2,033,962	2,060,000	3,065,000
Total income.....	295,079,342	326,894,000	345,243,000
EXPENSES			
Production:			
Generation.....	139,827,387	162,108,000	170,235,000
Interchange power received.....		390,000	1,690,000
Total production expense.....	139,827,387	162,498,000	171,925,000
Transmission.....	12,239,488	12,581,000	12,459,000
Customer accounts expenses.....	234,227	243,000	245,000
Demonstration of power use.....	818,364	887,000	911,000
Payments in lieu of taxes.....	9,048,337	10,210,000	11,477,000
Social security taxes.....	980,901	1,274,000	1,564,000
General operating expense.....	8,775,096	9,309,000	9,626,000
Distribution of administrative and general expenses (schedule B-4).....	2,599,517	2,767,000	2,800,000
Subtotal.....	174,523,317	199,769,000	211,007,000
Less interdivisional sales and rents.....	2,985,377	2,970,000	2,970,000
Total.....	171,537,940	196,799,000	208,037,000
Interest charges:			
Interest expense.....	11,101,391	13,785,000	17,400,000
Less interest charged to construction.....	3,850,185	5,000,000	4,600,000
Total.....	7,251,206	8,785,000	13,400,000
Total.....	178,789,146	205,584,000	221,437,000
Allocated from multipurpose reservoir operations.....	2,204,513	2,198,000	2,249,000
Total expenses before depreciation.....	180,993,659	207,782,000	223,686,000
Depreciation.....	59,108,459	62,400,000	68,000,000
Total expenses.....	240,102,118	270,182,000	291,686,000
Net income from power operations.....	54,977,224	56,712,000	53,557,000

POWER OPERATIONS

The total energy to be supplied to the power system from the generating facilities of TVA, the Department of the Army plants on the Cumberland River, the Aluminum Company of America plants on the Little Tennessee River, and exchange receipts from other utilities is estimated to be 87.4 billion kilowatt-hours in fiscal year 1967, about 13.0 billion kwh greater than the energy supplied to the system in fiscal year 1965, and about 4.6 billion kwh above the estimated supply in fiscal year 1966.

The disposition of the energy is expected to be as follows:

	<i>Billion kilowatt-hours</i>
Sales, including interdivisional.....	81.41
Interchange deliveries to other systems.....	1.29
Deliveries to Aluminum Co. of America under terms of the ALCOA agreement.....	1.86
Transmission losses and station use.....	2.84
Total.....	87.40

The net income from power operations, after depreciation, for fiscal year 1967 is estimated to be \$53.6 million as compared with \$55.0 million in fiscal year

1965 and an estimate of \$56.7 million in fiscal year 1966. The estimates assume average streamflow conditions. Better than average streamflows could produce an increase in net income over the estimates; with subnormal streamflows, net income would be reduced significantly by increases in production expense.

Power revenues

Sales of electrical energy, exclusive of interdivisional deliveries, are expected to increase in fiscal year 1967 to about 80.6 billion kwh compared with the estimate of 76.7 billion kwh in fiscal year 1966 and the actual of 69.1 billion kwh in fiscal year 1965. Compared with the actual for fiscal year 1965, deliveries to power distributors are forecast to increase 8.7 billion kwh, to industrial customers 2.0 billion kwh, and seasonal deliveries to adjoining utilities 1.0 billion kwh; deliveries to the Atomic Energy Commission and other Federal agencies are estimated to decrease by 0.2 billion kwh.

The forecast of energy requirements for fiscal year 1967 reflects a continuing increase in the use of power in the homes, on the farms, and in business and industrial establishments in the region. With the reduction in October 1966 of 90 megawatts in AEC requirements, sales to that Federal agency are expected to decrease from \$76,367,749 in fiscal year 1965 to \$75,282,000 in 1967. Outside sales, excluding Federal agencies, are forecast to increase to \$256,810,000, about 23 percent over the 1965 level. The return of Memphis as a TVA power distributor, beginning January 1, 1965, contributes to this increase.

Revenues from the sale of power, exclusive of interdivisional sales, are estimated at \$339,970,000 in fiscal year 1967, and at \$322,710,000 in fiscal year 1966; these estimates compare with the actual of \$291,116,126 in fiscal year 1965.

Power expenses

Assuming loads as forecast and average streamflow conditions, total power operating expenses before interest charges, expense allocated from multipurpose reservoir operations, and depreciation are estimated to be \$208,037,000 in fiscal year 1967 and \$196,799,000 in fiscal year 1966, compared with the actual of \$171,537,940 in fiscal year 1965. Compared with the actual for fiscal year 1965, kilowatt-hour input requirements for fiscal year 1967 are estimated to increase about 17 percent; with average hydro production conditions the amount of steam-produced kilowatt-hours required to supply the loads is estimated to be about 23 percent greater than in fiscal year 1965, contributing significantly to the increase in power production expense.

Variations in total direct production expenses from year to year are detailed in the following tabulation:

	1965 actual		1966 estimate		1967 estimate	
	Kilowatt-hour	Amount	Kilowatt-hours	Amount	Kilowatt-hours	Amount
	Billions	Thousands	Billions	Thousands	Billions	Thousands
Direct generation:						
Hydroelectric.....	18.80	\$12,451	18.54	\$13,343	17.89	\$13,876
Steam-electric.....	55.65	123,952	64.06	144,208	68.67	152,691
Total direct generation expense.....	74.45	136,403	82.60	157,551	86.56	166,567
Other direct production expense.....		3,424	.19	4,947	.84	5,358
Total direct production expense.....	74.45	139,827	82.79	162,498	87.40	171,925

The estimates of direct production expense shown in the tabulation reflect the actual streamflow and storage of energy through the early part of fiscal year 1966. Departures from normal streamflows can change the production expense by affecting steam-electric production and interchange transactions. Variations can also result from changes in the cost of fuel and its transportation; fuel costs represent approximately three-fourths of the estimated steam-electric generation expense in fiscal year 1967.

Regarding the other expenses shown in Schedule B-1, the increase from year to year in transmission expense and other costs reflects the requirements for operating and maintaining the growing power system needed to supply the expanding loads in the power service area.

The estimates for demonstration of power use provide for the studies, experiments, and demonstrations which help accomplish the better and more economical use of electric power for agricultural and domestic use and applications to production processes by small industries. These activities are carried out in cooperation with such agencies as the agricultural extension services, the vocational education departments, state universities, state and county health departments, and distributors of TVA power. Technical and advisory services are provided for distributors of TVA power on a reimbursable basis because many distributors are not large enough to maintain complete technical staffs, and the cooperative approach provides these services economically.

The estimates of payments in lieu of taxes are based on revenues from the sale of electricity, exclusive of deliveries to Federal agencies.

MULTIPURPOSE RIVER DEVELOPMENT

The navigation, flood control, and power programs discussed in the preceding pages are the foundations of TVA's present development of Tennessee River water resources. That development has been achieved through a multipurpose system designed to perform three basic functions and built and operated for the single purpose of regional economic development.

A low-cost transportation route, flood losses avoided, and low-cost electric power are but parts of the contribution multipurpose river development is making and can make to economic growth of the Valley region. An abundance of new outdoor recreation resources; improved water supplies for industries, cities, and farms; a supply of flood-free sites for new industries; elimination of malaria and control of insects and aquatic plants in TVA reservoirs—these stand out among the many additional ways in which TVA's multipurpose river development contributes to regional growth.

Further steps planned for 1967 in multipurpose water resource development are described in the following pages.

TELLICO DAM AND RESERVOIR

	Prior to fiscal year 1967	Estimate		
		1967	To complete	Total cost
Obligations.....	-----	\$3,200,000	\$39,300,000	\$42,500,000

The 1967 budget program includes \$3,200,000 for beginning construction work on the Tellico multipurpose dam and reservoir. The construction schedule calls for closure of the dam in April 1970. Total cost at completion is estimated at \$42,500,000. This total will be substantially reduced by proceeds from subsequent sales of lands acquired for project purposes. Estimated benefits exceed net project costs by a substantial margin.

The Tellico dam site is near Lenoir City, Tennessee, about three-tenths of a mile upstream from the mouth of the Little Tennessee River. The dam will be contiguous to TVA's Fort Loudoun Dam on the Tennessee River. A canal connecting the Tellico and Fort Loudoun reservoirs will provide access for navigation traffic into Tellico reservoir without the need for additional lockage facilities. Flows of the Little Tennessee River, impounded by Tellico Dam, will move through the canal and through the Fort Loudoun generators, thus adding about 200,000,000 kwh on the average to the total annual Fort Loudoun output, with no increase in installed capacity. Tellico will add 126,000 acre-feet of flood storage at a location where additional control will strengthen the flood control system's capability for dealing with Tennessee River floods. Flexibility of flood control operations will be further improved by the opportunities to interchange storage capacity with Fort Loudoun reservoir through the connecting canal. At elevation 813, same as the Fort Loudoun pool level, the Tellico pool will extend about 33 miles up the Little Tennessee River to Chilhowee Dam, and up the Tellico River about 20 miles.

Included in the project plan are steps to ensure that the very sizable recreational and industrial potentials of the Tellico reservoir are fully realized. It is anticipated that recreation benefits will develop with unusual rapidity because of the close proximity of the Great Smoky Mountains National Park and the Cherokee National Forest and the unusually good highway access to the reservoir area. Private and public investments in recreational facilities on and near shoreline lands are expected to provide a needed stimulus to the economy of the surrounding area.

The principal stimulus to the economy of the reservoir region will, however, come from industrial development of a portion of the reservoir shoreline. Tellico reservoir will extend the Tennessee River navigation channel to a crossing of the Little Tennessee River by a major railroad and an important Federal highway. At this point the terrain of a very large—about 5,000 acres—portion of the reservoir shoreline lands will be suited for industrial use. Economic analyses show that for a number of the kinds of basic industries which seek waterfront sites Tellico reservoir will be a desirable location.

To assure full development of these potentials of the new shoreline resource, TVA will require as a part of the reservoir area those lands on the margins of the reservoir most closely related and best suited for recreational and industrial development. The lands thus acquired will be sold by TVA in consultation with local agencies for appropriate further development and the net proceeds from the sales—present value estimated at \$10,900,000—will be applied to reduce the Government's investment in the project.

The Tellico project requires neither a navigation lock nor a powerhouse. On-site construction activity will require about three years, and most of the work will be done in fiscal years 1968 and 1969. During fiscal year 1967 progress will be directed mainly to design work, beginning road and utility relocation and adjustment work in the reservoir area, and purchase of an estimated 3,750 acres of land, which will bring reservoir land acquisition to about 9 percent of completion.

TIMS FORD DAM AND RESERVOIR

[In thousands of dollars]

	Actual to June 30, 1965	Estimate			Total cost
		1966	1967	To complete	
Obligations.....		\$5,570	\$6,000	\$27,430	\$39,000

The 1967 budget program includes \$6,000,000 for continuing construction of the multipurpose Tims Ford dam and reservoir on the upper portion of the Elk River in southcentral Tennessee on which work was started in 1966. The construction schedule calls for completion of the project in June 1970. The estimated total cost is \$39,000,000. Demonstrable benefits total an estimated \$57,100,000.

The Tims Ford site is in Moore and Franklin counties, about 10 miles west of Winchester, Tennessee. The dam will consist of concrete sections totaling about 1,355 feet in length with a maximum height of about 170 feet. It will include a powerhouse with one generating unit of 40,000-kw capacity and switchyard facilities which are scheduled for commercial operation in November 1969. The reservoir will extend about 34 miles upstream to the Elk River Dam of the Arnold Engineering Development Center. At normal maximum pool the area of the reservoir would be about 10,700 acres. A navigation lock will not be provided.

Tims Ford will increase the effectiveness for flood control of the existing TVA reservoir system below Chattanooga. It will furthermore reduce flood damages on about 7,800 acres of downstream agricultural land within the Elk River Watershed by about 80 percent, thus stimulating more intensive agricultural use of the land, and it will reduce flooding at Fayetteville, Tennessee. Tims Ford will add peaking capability of 40,000 kw and average annual generation of 64,000,000 kwh to the regional power supply.

Tims Ford reservoir and its related shoreline lands will constitute an important new resource in the upper Elk River drainage. The planned reservoir operating levels, the character of much of the surrounding terrain, the high order of

accessibility afforded by the road pattern, and the central location with respect to such towns as Fayetteville, Lewisburg, Shelbyville, and Tullahoma, Tennessee, and the city of Huntsville, Alabama, will make this an unusually attractive center for recreation activity and for fishing and wildfowl hunting. These values loom largest in the economic appraisal of the project. In addition, the reservoir will provide a large and dependable source of water supply to accommodate future industrial and municipal demands in the area and will enhance the usefulness of the Elk River below Tims Ford for municipal and industrial water supply. Values will be realized from future sales of land acquired for project purposes and additional increases in land values will accrue to the people in the region over a 50-year period. The total of these land values, with enhancement increments stated at present worth, is estimated at \$7,800,000.

In order to assure that the potentialities of the Tims Ford project for furthering economic development of the Elk River region are fully realized, it will be important that the people of the Elk River area have a responsible role in its management. The Tims Ford project is more than a dam and reservoir. It is being built as a major new land-water resource for an area in which the people are organized and working actively to emerge from a predominantly agrarian economy. TVA plans that the local people, acting through the Elk River Development Authority, will have important responsibilities for managing the Tims Ford project. These responsibilities will include obligations to utilize local benefits of the project, in part, to return a portion of the Federal investment in it, and in further part to assist in financing local development programs.

NICKAJACK DAM AND RESERVOIR

[In thousands of dollars]

	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	Total cost
Appropriated funds:					
Obligations	13, 583	11, 997	12, 705	3, 215	41, 500
Expenditures	12, 831	10, 816	14, 045	3, 808	41, 500
Power proceeds and borrowings:					
Obligations		14, 620	7, 732	2, 148	24, 500
Expenditures		13, 535	8, 486	2, 479	24, 500
Total:					
Obligations	13, 583	26, 617	20, 437	5, 363	66, 000
Expenditures	12, 831	24, 351	22, 531	6, 287	66, 000

Nickajack dam and reservoir will replace the Hales Bar project which was purchased by TVA from the Tennessee Electric Power Company in 1939. Construction work was started in fiscal year 1964. The power portion of the project is being financed from power proceeds and borrowings; appropriated funds finance the balance.

The 1967 estimates are based on a plan calling for the initial installation of a navigation lock with a 110-foot by 600-foot chamber and construction of under-water work on a second lock, planned for future completion, with a chamber 110 feet by 800 feet. Four power generating units are to be installed for a total rated capacity of 97,200 kw, which is slightly below the 99,700 kw now installed at Hales Bar. Two of the Nickajack units will utilize salvageable portions of two of the present Hales Bar units, both relatively new. The 14 older Hales Bar units will be replaced at Nickajack by two large units of modern design.

The site is in Marion County, Tennessee, about 39 miles below Chattanooga, Tennessee. Normal maximum pool will be at elevation 634, same as the Hales Bar level. The reservoir will extend 46.3 miles to Chickamauga Dam.

Dam closure is scheduled for November 1967, and the 110-foot by 600-foot navigation lock and three of the generating units are scheduled for operation at that time. The fourth generating unit will be placed in operation during January 1968.

Construction of this major project requires a complete diversion of the Tennessee River. This has now been accomplished, and the construction activities in fiscal years 1966 and 1967 have as their principal objective permitting return of the river to its natural channel by January 1967, normally the beginning of

the flood season. Adequate financing of the work in these two fiscal years is vital to achieving this important construction objective and to over-all economy of the construction job.

Total estimated cost of the Nickajack project with the installations, financing, and schedules as described is \$66,000,000.

BEAR CREEK MULTIPURPOSE WATER CONTROL SYSTEM

[In thousands of dollars]

	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	Total cost
Obligations.....	\$506	\$250	\$1,500	\$23,744	\$26,000

Extensive investigations have demonstrated the engineering feasibility and economic justification for multipurpose development of the water and related land resources of the Bear Creek Watershed. Bear Creek is the eighth largest tributary of the Tennessee River. Its watershed extends over portions of Colbert, Franklin, and Marion counties in northwestern Alabama and Tishomingo County in northeastern Mississippi.

The marginal productivity of many farm and forest holdings and a labor force concentrated primarily in low-wage industries and services limit the average income, average educational levels, and living standards of Bear Creek people. A few examples might be noted: The median family income of \$2,845 in Bear Creek Watershed is only about half the national average. More than 60 percent of the people over 25 years of age dropped out of school before the ninth grade (although this ratio does not apply to the younger generation); more than 4 out of 10 families live in houses classified by the census as either dilapidated or deteriorating. Over 2,000 family or individual units in Franklin County alone receive public assistance.

It is against this background that TVA has been working for several years with the leadership of the Bear Creek area to plan and bring into being a cooperative program for economic development. This program is as broad as the resources of the area, rural and urban, physical and human.

Indigenous physical resources with potential for significantly enlarging economic opportunities are sharply limited. One of the few having such potential is the water resource, which is now undeveloped.

The stream rises in the Bankhead National Forest of northwestern Alabama, flows about 135 miles in a general northwesterly course, and for its last 60 miles roughly follows the Alabama-Mississippi state line to the Tennessee River. In an average year Bear Creek empties 1,100,000 acre-feet of water into Pickwick Lake, enough to fill that major TVA impoundment to the top of the gates. Flow is poorly sustained during dry seasons, however, and many of the smaller streams cease entirely.

Relatively productive farm lands along creek bottoms, particularly in the western or lower half of the watershed, are subject to damage annually from one or more crop-season floods. Floods also have caused severe damage to highways and bridges, but no urban areas are in the flood plains. Rainfall averages 54 inches a year, yet the typical crop season suffers from 50 to 60 drought days.

The waters of Bear Creek at present makes a rather small contribution to the watershed economy. Only 11,300 acre-feet of both ground and surface water are used. Most of the surface water used is by self-supplying mining industries; municipal use is more commonly from wells and springs which often prove inadequate for industrial or municipal expansion. During drought seasons, neither surface nor ground-water supplies are dependable for meeting any large user requirements that might develop in the upper portion of the watershed.

The 1967 estimate of \$1,500,000 provides for beginning construction work on the Bear Creek multipurpose water control system. The system will include four retention dams and reservoirs and approximately 80 miles of channel enlargement work. This system will have flood relief for agricultural lands in the lower Bear Creek valley as its major function, but it will also be capable of a significant degree of control over Bear Creek's contribution to floods on the lower Tennessee River. Two of the reservoirs will provide needed municipal and industrial water supplies for several communities in the area. In addition,

the reservoir complex is expected to provide a new base for recreation activities in the watershed. The system is scheduled to be completed by the fall of 1970. On the basis of present plans and schedules, the estimated total cost of the system is \$26,000,000. Net capitalized benefits are estimated to exceed \$32,800,000.

Local interests will be expected to participate responsibly in development and management of the project, thus helping to assure that it produces the intended economic benefits to the region. Also resulting will be reductions or partial recovery of the Federal capital outlay.

ADDITIONS AND IMPROVEMENTS AT MULTIPLE-USE FACILITIES

Obligations for additions and improvements at multiple-use facilities

	1965 actual	1966 estimate	1967 estimate
Construction cleanup work	\$89,196	\$36,000	\$118,000
Miscellaneous plant and equipment	243,178	574,000	168,000
Distribution of administrative and general expenses	9,437	22,000	22,000
Total	341,811	632,000	308,000

Construction cleanup work, \$118,000

This category includes an estimate of \$55,000 for technical and legal services in connection with uncompleted land acquisition cases, allowances for court awards for land acquisition cases in process of condemnation, and preparation of permanent land record plats and technical reports for completed projects and \$63,000 for payments to the U.S. Employees Compensation Commission related to completed projects.

Miscellaneous plant and equipment, \$168,000

The 1967 estimate of \$168,000 includes (1) \$85,000 for continuing conversion of the VHF radio system for transmission of hydrologic data to a narrow-band system to meet requirements of the Federal Communications Commission, (2) \$8,000 for improvements to grounds and visitor reception facilities at Cherokee Dam, and (3) \$75,000 for such varied items as improvements to the vector control laboratory, acquisition of boats and motors for vector control, and mowers, rakes, and small tools for maintenance of dam reservations.

FERTILIZER, AGRICULTURAL, AND MUNITIONS DEVELOPMENT

TVA maintains and operates chemical laboratories and experimental production facilities at Muscle Shoals, Alabama, as a national research and development center for new and improved fertilizers and for munitions. The principal peacetime objectives of the fertilizer, agricultural, and munitions development program are:

1. To develop new and improved chemical fertilizers and processes for their manufacture in order to lower their cost to the farmer and to increase their effectiveness;
2. To test and demonstrate the value and best methods of fertilizer use; and
3. To aid in agricultural development in the Valley.

The first two objectives pertain to the Nation at large. All objectives are reached through the cooperative efforts of TVA, other Federal agencies, state land-grant colleges, the fertilizer industry, and farmers.

The TVA chemical research and production facilities are important to national defense. During World War II and the Korean War, TVA conducted research and supplied essential munitions materials in substantial quantities at the request of defense agencies. TVA aided the Department of the Army in developing and constructing a plant at Muscle Shoals, Alabama, for production of an intermediate material used in the manufacture of nerve gas. TVA operated this plant for the Army and now maintains it in a standby status. TVA's chemical research and production facilities at Muscle Shoals are immediately available for national defense. For example, with the intensification of hostilities in Vietnam, TVA's phosphorus production schedules have been revised upward quickly and repeatedly to accommodate the increasing needs of the Department of Defense.

LAND BETWEEN THE LAKES DEMONSTRATION

CAPITAL OUTLAY, \$11 MILLION; OPERATING EXPENSES, \$784,000

Land Between the Lakes is a national recreation area being developed by TVA as a demonstration in resource development. The purposes of the demonstration were defined by the President on June 14, 1963:

"Development of the project will demonstrate how an area with limited timber, agricultural, and industrial resources can be converted into a recreation asset that will stimulate economic growth of the region. It will also help establish and define guidelines for the acquisition, development, and operation of other outdoor recreation areas."

Land Between the Lakes is a peninsula, roughly 40 miles long and 8 to 10 miles wide bounded on one side by TVA's Kentucky reservoir and on the other side by the Corps of Engineers' Barkley reservoir, a total area of some 170,000 acres. It lies in western Kentucky and Tennessee, within approximately a day's drive for a third of the Nation's population. It is thinly settled, predominantly wooded, and effectively isolated by the Kentucky and Barkley reservoirs which frame it. Its recreation potential lies principally in its 300 miles of shoreline on the two reservoirs and its proximity to large population centers. Despite the isolation furnished by the reservoirs, highway access to the area is good; there are points of entrance for travelers from the north, south, east, and west.

TVA began acquisition and development of the area in the early months of 1964. Limited recreation facilities were opened for public use in the summer of 1964; more in the summer of 1965. Land acquisition and population removal will be completed by the summer of 1968. General development plans through fiscal year 1970 have been defined. Ensuing development will be shaped by future events.

CAPITAL OUTLAY

Actual and estimated capital outlay through fiscal year 1970

	Obligations (in thousands)				Total
	Actual to June 30, 1965	Estimate			
		1966	1967	Ensuing years	
Acquisition of land.....	\$4,169	\$7,500	\$7,989	\$4,342	\$24,000
Development of project facilities.....	3,436	2,062	2,030	15,869	23,397
Planning and administration.....	389	341	310	570	1,610
Surveying and mapping.....	758	374	436	275	1,843
Distribution of administrative and general expenses.....	147	135	235	133	650
Total.....	8,899	10,412	11,000	21,189	51,500

Major emphasis in work to date has been on *acquisition of land*; approximately 60 percent of capital outlay for Land Between the Lakes through fiscal year 1966 is for this purpose. Nearly three-fourth of the proposed \$11,000,000 outlay in fiscal year 1967 will be for land acquisition. Less than 45 percent of the project area was in public ownership when TVA began work in fiscal year 1964. By the end of 1967 more than 80 percent of the total project area will be in public ownership, and acquisition of the remainder should be essentially complete in the following year.

	Land purchase statistics				Total
	Actual to June 30, 1965	Estimate			
		1966	1967	To complete	
Tract.....	395	795	840	470	2,500
Acres.....	4,208	27,900	34,000	31,492	97,600

The principal objective in TVA's land acquisition program has been to minimize the uncertainties and problems of relocation of the landowners. Accordingly, TVA has dealt first with those wanting or needing to sell quickly. At the beginning of fiscal year 1966 there was a backlog of 540 tracts which owners wished to sell immediately. Hundreds of land purchase transactions have already been made and many more will be made during 1966, but the backlog is not expected to be appreciably reduced by yearend. Owners of stores, service stations, and other commercial establishments are among those desiring to sell quickly. With the departure of the services provided by these establishments from the area, along with schools and churches, it becomes increasingly important that those dependent upon these services be enabled also to leave.

Early development of project facilities becomes increasingly important as the project area moves into public ownership. Land Between the Lakes can be a strong stimulus to the economy of the region which surrounds it; but first, Land Between the Lakes must be attractive to visitors and capable of accommodating and holding them in large numbers. TVA's plans for development call for (1) improvement of the area's basic recreation resources, including the forests, open fields, and 300 miles of shoreline; (2) provision of areas and facilities for various outdoor recreation activities; (3) establishment of a conservation education center; (4) provision of adequate reception and access facilities; and (5) cooperative programs with state and local agencies to help guide development of the surrounding area. These five elements of the development program will be accomplished in part through capital outlay and in part through the manner of operation of the project.

Improvement of the basic recreational resources.—The outstanding recreation resource of the Land Between the Lakes is its 300 miles of shoreline, of which approximately half is formed by Lake Barkley. The lake's scheduled impoundment in the fall of 1965 made urgent the early completion of certain planned improvements which would become impracticable or prohibitively expensive after the lake reaches normal operating levels. Three small dams were built across arms of Lake Barkley. These dams now create lakes ranging in size from 190 to 370 acres. They provide the stable water levels, independent of the fluctuations of the main lake, which are desirable for recreation and wildlife programs. A considerable amount of work has been done to eliminate potential breeding places of the malaria mosquito, and incidentally to provide a shoreline more usable for general recreation. Other work along the Barkley shore includes grading and paving the underwater portions of eight launching ramps for small craft and the deepening of two future boat harbor areas to depths satisfactory for year-round use by pleasure craft of all sizes.

Much of the remaining improvement in the area's basic recreation resources is being accomplished through reforestation and forest land management activities undertaken as a part of the operating plan (see page 172). Capital outlay for improvement of basic recreation resources in fiscal year 1967 will be limited to \$57,000 for preparation of selected lands for wildfowl and wildlife food production and habitat.

Recreation areas and facilities.—In planning for the development and use of Land Between the Lakes for outdoor recreation, the basic idea is to provide as simply as possible an environment which is appropriate for the contemplated uses. In general, this entails a division of the land into areas which will be left substantially in their natural state and areas where special facilities for recreation purposes will be provided. By far the greater part will be maintained in its natural state, including most of the acreage long owned by the Federal Government and used as a national wildlife refuge. Such use will be continued and expanded into newly acquired areas. In addition, much of the natural area will accommodate a wide variety of outdoor activities such as hiking, camping, nature study, hunting, and sightseeing. There are also a few sites within the area with historic value which will be made available to the public.

The specially developed recreation areas will include family camping areas, group camping areas, day-use areas, and casual-use facilities.

The major item of work in this category planned for fiscal year 1967 is continuation of construction of the project's second family camping area, located on the Kentucky reservoir shore near the northern entrance. Also to be provided will be a number of areas along lakeshores and roadsides for informal camping and day uses (such as picnicking, boat launching, fishing, and water skiing).

Conservation education program.—A central feature of the Land Between the Lakes concept is the development of a conservation education center as a part of

an outdoor recreation area. TVA is devoting a 4,500-acre area fronting on Lake Barkley for this purpose. Each passing year our rapidly urbanizing society sees the removal of millions of people from contact with the natural environment which supports our civilization. In this portion of the Land Between the Lakes visitors and students will be able to regain this contact and see with their own eyes the "seamless web" of natural wonders—water and soil, trees and crops, wild and domestic animal life, birds and insects, fish and fowl. This demonstration can show their ecological dependence on one another, and man's dependence on them.

A series of stations, connected by drives and trails, will be developed, and visitors will be able to see and to participate in a variety of conservation activities. For example, a series of forestry stations will include demonstrations of tree thinning, erosion control, and tree planting; an arboretum of native trees; examples of fire and grazing damage; and modern methods of timberutilization. Likewise, agricultural stations will acquaint city children with farm animals; trace the evolution of some of the hybrid varieties of plants that have helped make the United States a nation of abundant foods and fibers; illustrate some of the best soil and water conservation practices; and show the results of sound fertilization. Wildlife stations will include a beaver lodge and places where deer, wild geese, turkey, and other wildlife may be seen.

The Conservation Education Center will include a youth activities station and an adult activities station to house students, teachers, and other organized groups at all seasons. The youth activities station has just been opened for use by school groups. It includes dormitories and simple classroom and eating facilities. Work on the adult activities station is planned to begin in fiscal year 1967 and to be completed in fiscal year 1969. This facility will be capable of handling simultaneously groups of varying sizes and interests. It will consist of meeting, laboratory, and study facilities, living accommodations for 250, and educational exhibits for both residents and day visitors. Other work will consist of development of an educational farm, interpretive facilities associated with an old iron furnace which operated in the area in the 1800's, and the construction of trails, footbridges, wildlife observation blinds, and associated facilities.

Reception and access facilities.—Three reception and service centers will be built in the Land Between the Lakes. They will be located at the northern, central (east-west), and southern entrances to the area to welcome visitors and to provide information guiding them to the specific area or facilities in which they are interested. The principal information service facility will be near the center of the area along with the project's administrative headquarters. Work on reception centers and headquarters facilities is planned to begin after fiscal year 1967.

The roads and trails that will comprise the circulation pattern of the Land Between the Lakes will be centered around U.S. Highway 68, which crosses the area from east to west, and a north-south route which extends the length of the peninsula from the canal connecting Barkley and Kentucky lakes southward to U.S. Highway 79. The north-south road will be the backbone for the interior circulation pattern; access laterals will lead from it to developments along the lake fronts. Other roads are planned as scenic drives along portions of the lakeshores. A system of trails will be developed radiating out from and connecting with the various campground and activity centers in the area. The trails will be for walking, hiking, or horseback riding. Improvements to the existing north-south road and the beginning of a relocated permanent access road from U.S. Highway 79 to the southernmost part of the area will be the focus of effort on the access program in fiscal year 1967.

Summary of estimates for capital outlay in fiscal years 1966 and 1967 for the categories of development work discussed in the preceding paragraphs

	1966 estimate	1967 estimate
Improvement of basic recreation resources	\$476,000	\$57,000
Recreation areas and facilities	477,000	480,000
Conservation education program	430,000	534,000
Reception and access facilities	305,000	573,000
Design and service activities	374,000	386,000
Total	2,062,000	2,030,000

OPERATIONS

During fiscal year 1967 the following major facilities will be in operation:

- Rushing Creek family camping area.
- Hillman Ferry family camping area (part).
- Jones Creek day-use area.
- Conservation Education Center (part).

In addition, there will be a number of lesser facilities for such varied day uses as picnicking, water access, hiking, riding, and wildlife observation. The major portion of the operating effort will be required for day-to-day operation of these facilities, receiving and providing information to visitors and campers, directing visitors within the area according to their interests, protecting property and ensuring the safety of the public, collecting registration or service fees, the maintenance of roads, structures, and facilities, and application of vector control measures. All of these are necessary supports of the purposes of the Land Between the Lakes project.

There are in addition two elements of the previously described development program which depend particularly upon the approach to project operation. One of these is the *improvement of the basic recreation resources*. The other is cooperative programs for *development in the surrounding area*. The first is fundamental to all objectives of the Land Between the Lakes demonstration. The second is a specific demonstration objective.

With respect to improvement of *basic recreation resources*, the major concerns of operating activities are the forest and wildlife resources. The forestry potential of the Land Between the Lakes is not attractive to commercial forest interests since the area is not economically competitive with other sections of the region better suited to growing pulpwood and sawtimber. There are, however, forest management techniques that can and will greatly improve the quality of the project's forested area for wildlife and outdoor recreation. In the process of applying these techniques TVA expects ultimately to harvest up to 3 million board feet of cull timber annually during the period of demonstration. Trees that serve no useful or aesthetic purpose will be removed. The area is now being protected against fire under cooperative agreements with the forestry divisions of the states of Tennessee and Kentucky.

About half a million seedling trees a year will be planted. Plantings will not be limited to trees of commercial value but will also include those noted for seasonal bloom and fall color. Other species are being selected for their value as wildlife food and habitat or to demonstrate superior strains of the most valuable forest species.

Suitable open land will be kept open for aesthetic variety, wildlife, and recreation activities. As former farm lands are acquired, they are evaluated to determine whether they should be planted to trees or kept open. About 35,000 acres—20 percent of the area—will be cleared of scrub trees or kept open in order to provide scenic vistas, browse for deer and other large game, and habitat for quail, songbirds, and small wildlife.

The management and development plans for improving the outdoor recreation resources of the Land Between the Lakes are based on sound ecological principles which, it is believed, can be applied to literally millions of acres of presently unproductive public and private land in the Tennessee Valley region and throughout the eastern part of the United States.

With respect to *development in the area surrounding the project* TVA has two basic concerns. First is the desire to protect the project's values from air and stream pollution, roadside slums, and other visitor deterrents in the environment outside the project boundaries. Second is the objective of assisting the people in the surrounding counties to take full advantage of the economic potential that will be generated by the Land Between the Lakes.

Both of these interests require action, but TVA does not control the decisions that need to be made. The economic benefits, if they are to be realized, will reflect the sum-total of thousands of decisions made by individuals, organizations, and government at state and local levels. TVA can, however, offer advice and financial assistance, and it is offering both through agreements with the state planning and development agencies. TVA hopes thereby to encourage sound regional plans for future development of the surrounding area. TVA personnel has been meeting with local, county, and state officials to review land-use patterns, future highway development plans, and to analyze the region's future.

TVA first predicted that some \$25 million in private capital would be invested in the area immediately surrounding the Land Between the Lakes before the

end of the demonstration. That prediction now appears to have been much too conservative. The project was officially approved less than three years ago, and more than \$20 million in proposed private investment has already been announced.

PAYMENTS TO THE TREASURY

Payments to the Treasury for fiscal year 1967 are estimated at \$58,300,000, all from power proceeds. This will bring total cumulative payments from TVA to the Treasury to \$658,488,931, of which \$616,961,511 is from power proceeds and \$41,527,420 from nonpower proceeds. Of the payments from power proceeds, \$65,072,500 represents retirement of bonds issued prior to 1942, \$265,059,019 represents reduction of the appropriation investment in power facilities, and \$286,829,992 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 represents reduction of the appropriation investment in power facilities and \$65,072,500 represents 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	Return on appropriation investment	Repayment of appropriation investment	Repayable appropriation investment as of June 30
1960.....			\$1,000,000,000
1961.....	\$41,432,398	\$10,000,000	990,000,000
1962.....	36,541,640	10,000,000	980,000,000
1963.....	38,874,543	10,000,000	970,000,000
1964.....	40,206,432	10,000,000	960,000,000
1965.....	42,599,979	10,000,000	950,000,000
1966 ¹	43,875,000	15,000,000	935,000,000
1967 ¹	43,300,000	15,000,000	920,000,000
Total.....	286,829,992	80,000,000	-----

¹ Estimated.

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, 1965, is \$41,527,420. No payment is contemplated for 1967.

OPERATING PROGRAMS

Mr. WAGNER. These operating programs include our regular program for navigation, for flood control operations, the operation of our multiple-purpose reservoirs, water quality control activities, our work in forestry and agriculture, and the tributary area development program, all the usual programs.

In addition to the appropriation request, we will use \$370,167,000 of power proceeds and borrowings for power construction activities and in the operation of the power system.

Senator HILL. These borrowing procedures do not involve the Treasury at all?

Mr. WAGNER. No, sir. The revenue bonds we issue are guaranteed only by the resources of the TVA power system.

Senator HILL. In no way affect the Treasury or the budget.

Mr. WAGNER. Our revenue bonds are sold directly to the public; that is correct.

Senator ELLENDER. Where does that show in this committee print we have before us; do you show it at all?

Mr. WAGNER. I do not believe I have the committee print here, Senator. It is summarized on page 9 of our budget justification book, and detailed on pages following that.

Senator ELLENDER. How much are you spending in funds other than those appropriated?

Mr. WAGNER. We are spending \$370,167,000 from our power proceeds and borrowings. In addition we will pay \$62,125,000 to the U.S. Treasury, \$47,125,000 as a return, a dividend, on the appropriation investment in power facilities, and \$15 million as a reduction of that investment.

NEW FACILITIES CONSTRUCTION

Senator ELLENDER. Well, how much of this sum is paid in order to construct new facilities?

Mr. WAGNER. Out of the \$370 million, \$146,688,000 is for construction of power facilities.

Senator ELLENDER. Where do you have that shown? Did you expect to put that in the record any place?

Mr. WAGNER. Page 10 of our justification shows the specific items.

Senator ELLENDER. How much of that is being spent to develop the electricity from falling water in contrast to steam generated power?

MODERNIZATION PROJECTS

Mr. WAGNER. \$8,486,000 will be applied to the Nickajack project, and \$2,334,000 will be used in modernization of the hydro units at Wilson Dam.

Senator HILL. Those units are very old, are they not?

Mr. WAGNER. Yes, sir, they are very old, and being modernized.

Senator ELLENDER. I notice an item here for \$17 million-plus that was spent last year or set aside last year for the Bull Run steamplant, unit 1. What is the status of that plant now?

Mr. WAGNER. That plant has reached the operating stage, Senator. There still is finishing work to be done, but the plant is now in operation.

Senator ELLENDER. Where do you get your fuel from?

Mr. WAGNER. That coal comes from east Kentucky.

PLANTS IN OPERATION

Senator ELLENDER. I do not suppose we have had furnished for the record in recent years the number of steamplants that you now have

under operation in the TVA system? I wonder if you could give us that, and also give us percentagewise, the amount of electricity that is sold by TVA that is produced from falling water in contrast to that sold and produced from steamplants.

Mr. WAGNER. Yes, sir; I can provide that for the record.

(The information follows:)

Including the Bull Run plant, TVA is now operating 11 steam electric generating stations.

STEAM AND FALLING WATER PLANTS

Senator ELLENDER. Yes. As I recall, the last time the amount of electricity generated in the TVA through steam aggregated over 70 percent.

Mr. WAGNER. It is about 75 percent, and about 25 percent from falling water, give or take a few percentage points.

Senator ELLENDER. So that today, of all the electricity that is produced and sold in the valley, 75 percent of it is produced by steam, and the rest of it through falling water.

Mr. WAGNER. That is correct.

BULL RUN STEAM PLANT

Senator ELLENDER. Now, does that include the Bull Run steamplant, this figure that you have just given us?

Mr. WAGNER. The figure I have given you would be the figure for last year, and the Bull Run steamplant has just come into production. As the system grows, the Bull Run plant would increase the percentage produced by steam.

Senator ELLENDER. So that the figure of 75 percent does not include the Bull Run steamplant.

Mr. WAGNER. That is correct; yes, sir.

Senator ELLENDER. To what extent will that plant increase the amount of electricity percentagewise that will be produced and sold from generating plants that operate with steam?

Mr. WAGNER. I do not have the figure in mind, Senator, but it will increase the percentage, of course.

Senator ELLENDER. Two, three, four or five percent, or what?

Mr. WAGNER. I would think not over two or three.

Senator ELLENDER. Two or three.

Have you any other plants in contemplation that you expect to build in the near future?

PARADISE STEAM PLANT

Mr. WAGNER. We have under construction an additional unit at the Paradise location in west Kentucky. This is Paradise steamplant unit 3 listed in the line above the one to which you referred.

Senator ELLENDER. So that I notice that the estimated cost of that is \$28 million.

Mr. WAGNER. That was the estimate for fiscal year 1966. There is an estimate for it in fiscal year 1967, and the unit will—

Senator ELLENDER. Will that be \$42 million for 1967?

Mr. WAGNER. Yes, sir; and the unit will be completed in 1969.

Senator ELLENDER. 1969?

Mr. WAGNER. That is right.

STEAM GENERATION OF POWER

Senator ELLENDER. Now, can you put in the record what amount of electricity that will be sold, in the valley that will be generated from the plants if, and when all of the plants that you are now constructing or which are under construction, including the Paradise steamplant, and such other as—

Mr. WAGNER. Yes, we will provide that estimate.

Senator ELLENDER. Have you any idea of what it will be?

Mr. WAGNER. Mr. Wessenauer.

Mr. WESSENAUER. By the time the Paradise unit is in and the Brown's Ferry units are in, thermal power will provide somewhere between 80 and 85 percent of total generation.

Senator ELLENDER. So that 85 percent of all of the electricity that will be sold in the valley will be produced from steam?

Mr. WESSENAUER. Between 80 and 85 percent; yes, sir.

Senator ELLENDER. Eighty and 85 percent. And only 15 to 20 percent will be produced from falling water?

Mr. WESSENAUER. Yes, sir.

Senator ELLENDER. Is there any reduction in the production of electricity from falling water?

Mr. WESSENAUER. No, sir. The reason for the percentage changes will occur to you as—

Senator ELLENDER. Construction of more steamplants.

Mr. WESSENAUER. As the total increases, and the increase is largely in one category, the percentage from hydroelectric plants will have to decrease. The amount of hydro power will remain essentially the same, although it does vary from year to year, depending upon the amount of rainfall.

TVA DEVELOPMENT PERCENTAGE

Senator ELLENDER. The point I wanted to make was that it is a far cry to what was contemplated when TVA was first put on the statute books in order to make this a hydroelectric development plant. But today when you conclude your present program from 80 to 85 percent of your electricity will be produced from steam.

Mr. WAGNER. The TVA Act, you will recall, Senator, does provide for the construction and operation of steam plants.

Senator ELLENDER. I know that.

Mr. WAGNER. And the situation has come about simply because the demand for electricity has increased so tremendously.

Senator ELLENDER. Sure.

Mr. WAGNER. Since the resources of the rivers have been almost fully developed, the only way to supply the power is from steamplants. I should add that the steamplants make the hydro capacity more effective than it would be otherwise.

Senator ELLENDER. At one time, yes, surely.

Mr. WAGNER. It is still true.

Senator ELLENDER. To firm it.

Mr. WAGNER. Yes.

Senator ELLENDER. I voted to firm it, and the only time that I voted against the construction of most steamplants is when you went beyond the point of producing electricity from steam in excess of that needed to firm the power, your hydro electric power.

You stand out there, as I have often pointed out, as a little oasis in America wherein the Government is deeply engaged in the production of electricity from steam instead of letting private enterprise do it.

POWER SYSTEM OPERATIONS

Mr. WAGNER. We would hope that the operation of that power system, which is really in response to the votes and the wishes of the people in the area—we would hope its operation has been a useful demonstration to the entire Nation as to what low-cost electricity can do and how steam and hydro capacity can be fitted together.

We think that the electric utility industry has profited from our operations through our development of larger and more efficient units, higher voltage transmission, a thoroughly integrated system and a demonstration that low rates will produce high use, which, in turn, is profitable.

Senator HILL. And it would be 1969 before all your steamplants—

Mr. WAGNER. 1969 is when the Paradise plant will come in. But it is clear, I think, that beyond 1969 there will be additional demands for electricity, and additional capacity will be needed.

Senator HILL. Well, you see, this act was passed in 1933, and even in 1969, there is a difference of 36 years, isn't it?

Mr. WAGNER. That is right.

Senator HILL. There have been a lot of changes.

When this act was passed, I think about, was it, only 3 percent of the farm homes had electricity. Today that percent runs at least 95 percent; is that correct?

Mr. WAGNER. Ninety-nine percent. It is hard to find a home without it.

Senator ELLENDER. If you farmers get this electricity—It is all industry, most of it.

Mr. SMITH. Mr. Chairman—

Senator HILL. Mr. Smith.

EXCHANGE OF POWER

Mr. SMITH. I might point out about a month ago I attended a Jackson, Miss., ceremony in connection with the tie-in for an exchange of power between the TVA and the Mississippi Power & Light Co., and the Middle South power companies. One of Senator Ellender's constituents, Mr. Anders, president of a company that we make the exchange with, was present. We exchange about a million and a half kilowatts of power during the peak seasons with these companies in Mississippi and Louisiana and further Southwest. This arrangement is to the benefit, we think, of our customers in the Tennessee Valley area, and also to the customers of these private companies of some 11 States to the Southwest, in which Louisiana and Mississippi are two of the chief ones.

Senator ELLENDER. Well, I am not arguing against that, Mr. Smith, at all.

The point is that this is developing into a publicly owned utility, and that sort of thing can spread. You mark what I am saying to you. In time you are going to have the same situation developing in the Northwest, because there the development of electricity from falling water, is going to be far short of what is needed, and the first thing

you know you are going to have a lot of demands from the people in that area to have the Government furnish or provide the money or secure it in some way to construct steam plants in order to firm the power in the Northwest, and in other areas. The first thing you know you are going to end up with the Government owning and controlling a good deal more in the future of the development of electricity throughout the country. Perhaps some want that kind of a business, I do not.

TERRITORIAL POWER SYSTEM LIMITATION

Senator HILL. So far as TVA is concerned, you have a territorial limitation today.

Mr. WARNER. That is right. The TVA power system is circumscribed by a definite limitation. The system, as we indicated earlier, supports itself. There are no appropriations required.

WHOLLY OWNED GOVERNMENT FACILITY

Senator ELLENDER. No, but it is a Government facility, though.

Mr. WAGNER. That is right.

Senator ELLENDER. It is a Government facility, and when I voted for TVA—I was not here when TVA was constructed, it was before my time—I could envision a TVA making enough money to help build and construct other plants in other parts of the country. But instead it is all centered in that little area where the taxpayers of this Nation have been contributing toward the development of that small area of our country.

You are using a Government facility there wherein you are producing enough electricity to satisfy the desires and the needs of all of the people in that whole area, and the profits that are derived from that instead of being used to help us balance the budget, you are going deeper and deeper and building more and more, so that the Government will not find too much use or too much benefit except that which may be derived from the expansion of industry, and industry paying income taxes, and so forth and so on.

Mr. WAGNER. Senator, may I speak to that point?

Senator ELLENDER. Yes.

PAYMENTS TO THE TREASURY

Mr. WAGNER. As I indicated the growth of the power system is almost entirely accomplished by the use of borrowings and revenues. We are making payments into the Treasury each year. In the current fiscal year we will pay \$62,125,000 to the Treasury as a part repayment of the investment in power facilities and a dividend on the investment at a rate equal to the rate of interest that the Government currently pays on all of its marketable obligations.

Now, the two figures are not related to each other because the power program has no obligation to pay for navigation, flood control, and so on; but I think it is of interest that so far as the cash position of the Federal Treasury is concerned, this payment of \$62,125,000 is almost equal to the appropriations request for \$63,635,000.

DEBT RETIREMENT

Senator ELLENDER. That is payment being made to the Government for moneys that were borrowed by TVA years ago.

Mr. WAGNER. No, for moneys that were appropriated to TVA.

Senator ELLENDER. Just repaying a debt is what you are doing.

Mr. WAGNER. There is no cost to the Government, because we are paying a return on this investment, equal every year to the current cost of money to the Government.

Senator ELLENDER. I would not say that. To pay back a debt you are just doing your duty, the same as any citizen. If you borrow, you have to pay back.

INVESTMENT IN A SYSTEM

Mr. WAGNER. It really is not paying back a debt, Senator, because this money was appropriated for a system which the Federal Government owns.

Senator ELLENDER. Yes.

Mr. WAGNER. After we have repaid \$1 billion of the appropriations investment, the Federal Government will still own it, so it is not money that has been loaned. It is money that has been invested in the system, and which the Federal Government, as owner, is now taking out.

Senator ELLENDER. Well, as I said, the TVA was organized the same as you now have in the Northwest. We appropriated hundreds of millions of dollars there to develop electricity from falling water. We have done that all over the country. And, as I have often said, it is nothing new. You have heard me say it before, but I like to repeat it now and then, we have established a precedent here that is going to grow in our country, in my opinion, whereby as electricity is needed in the Northwest, and it cannot be produced from falling water, then the cry will be, "Well now, let's take the revenues from these great facilities and construct steamplants so that we can continue to expand and develop," and in that way, of course, the Government will never be able to take advantage of the profits that were supposed to have been made here in order to put these profits back into the Treasury so that those profits can be used to develop on a legitimate basis, that is, whereby it will be repaid in other parts of the Government.

I am not going to argue with you any more and, as I will bring out a little later, instead of relegating your work to the development of electricity, to the selling of it, you are expanding in other fields, as will be brought out shortly.

Senator HILL. You will pay into the Treasury some \$62 million this year.

Mr. WAGNER. That is correct.

BONDS AND NOTES OUTSTANDING

Senator ELLENDER. That is on past appropriations. You take the amount of money that you are paying here, how many bonds have you that are outstanding now?

Mr. WESSENAUER. We have about \$385 million of bonds and notes outstanding.

Senator ELLENDER. And that is to be paid out of the revenue.

Mr. WESSENAUER. Yes, sir.

Senator ELLENDER. Except for that, the chances are that a good deal of the profits that have been made by TVA could have gone to the Treasury to repay all that has been spent in the past to develop TVA.

TOTAL PAYMENTS TO THE TREASURY

Mr. WAGNER. Senator, by the end of the current fiscal year we will have paid into the Treasury over \$600 million from power proceeds. So to a considerable degree the results of this operation have been reflected in payments to the Treasury.

Senator ELLENDER. I do not deny that. But the thing is that many of these profits are being used to further expand TVA and have it more or less in the category of a publicly owned facility.

Mr. WAGNER. Yes.

Senator ELLENDER. That is what I am complaining about.

Mr. WAGNER. The revenues are used to provide the generating capacity that is required to supply the needs of the area that Congress has agreed TVA should serve.

Senator ELLENDER. If other areas follow the same pattern as has been set by TVA, I would imagine in the next 20 years the Government is going to be into the business of manufacturing or producing much of the electricity that is used throughout the country.

Mr. WAGNER. I suppose that is a matter, Senator, that is under the control of you gentlemen and others in the Congress, and not us.

Senator ELLENDER. That is why I am complaining about it now.

TVA REVENUE BONDS

Senator HILL. These bonds are not any obligation on the Treasury.

Mr. WAGNER. No, sir. They are not guaranteed by the Treasury.

Senator HILL. They are not guaranteed by the Treasury.

Senator ELLENDER. They are not guaranteed by the Treasury, but they are being paid and retired from revenues that ought to go to the Treasury. That is what I am complaining about.

Senator HILL. If you did not have the bonds you would not have the revenue because you would not have the facilities.

Senator ELLENDER. I am not going to argue it any more.

Senator HILL. If you did not have the facilities you would not have the bonds.

Senator ELLENDER. I am sure Mr. Wagner sees the point I am driving at and so do you, Senator.

Senator HILL. All right, Mr. Wagner.

BUDGET FINANCED FROM NONPOWER FUNDS

Mr. WAGNER. In addition to these funds there will be some \$25 million of nonpower proceeds used. These are derived largely from receipts from the operation of chemical and munitions plants and used in those operations. There are also some reimbursable services involved.

NICKAJACK DAM AND RESERVOIR, CHATTANOOGA, TENN.

To return to the use of funds for which appropriations are requested, these activities are fully described in the budget justification document that you have before you. I will mention briefly the major

items of capital expenditure which total \$45,954,900. This total includes funds to continue several projects now underway and which, as they were initiated, were described in some detail before this committee. For instance, \$12,705,000 is to continue construction of the Nickajack multiple-purpose dam and reservoir project below Chattanooga.

Senator HILL. How well along is that?

Mr. WAGNER. This is well along. The reservoir will be filled late in 1967.

Senator HILL. Yes.

Senator ELLENDER. How much of that cost will be paid by TVA from revenues that will be produced from the sale of electricity?

Mr. WAGNER. The total cost is about \$66 million, Senator; and of that amount approximately \$24.5 million would be paid out of power proceeds.

Senator ELLENDER. \$24 million?

Mr. WAGNER. Yes, sir.

Senator ELLENDER. And the other \$42 million will rest on the Government. Will you state what the benefits will be for that to the Nation.

NAVIGATION AND FLOOD CONTROL BENEFITS

Mr. WAGNER. Well, the benefits would be in the form of navigation and flood control benefits. This project, you may recall, was to replace a dam that had been built by private interests early in the present century, from about 1905 to 1913. It was built at a time when construction methods were not as advanced as they are now. There were some very serious foundation problems that had not been solved, and the dam leaked badly.

A number of efforts were made, both before TVA acquired it and afterward, to solve these problems of leakage and foundation difficulty. But it became clear that the cost of doing so was excessive, and that ultimately the dam would have to be replaced. So we went downstream about 6 miles to a point where foundation conditions were good. There we are building the Nickajack project as a replacement of the old Hales Bar Dam and Reservoir which will form a key section in the navigation channel between the mouth of the Tennessee River at Paducah and its head at Knoxville.

CONSTRUCTION BY CORPS OF ENGINEERS

Senator ELLENDER. Ordinarily such a project would have been constructed by the Corps of Engineers.

Mr. WAGNER. Well, not on the Tennessee River.

Senator ELLENDER. I said ordinarily.

Mr. WAGNER. If this were another river, yes; this would be a Corps of Engineers project.

Senator HILL. And the funds would come out of the Treasury.

Mr. WAGNER. Yes.

Senator ELLENDER. They do here.

Senator HILL. If they would be constructed by the Engineers it would come out of the Treasury.

Senator ELLENDER. I say it comes out of the Treasury.

Mr. WAGNER. Not the \$24.5 million.

Senator ELLENDER. Yes, it does. You are going to be repaid that. The \$24 million—

Mr. WAGNER. This \$24 million will come either from revenues from the power system or from borrowings which we repay from our revenues.

Senator ELLENDER. The same as other projects.

Senator HILL. Which is not an obligation of the Federal Treasury.

Mr. WAGNER. No.

FEDERAL TREASURY OBLIGATION

Senator ELLENDER. It is an obligation of the Federal Treasury now; the \$66 millions is. Of course, it is. It is in the same category as the original dam you constructed.

Mr. WAGNER. The \$24.5 million are not being appropriated. The total appropriations request is only \$42 million.

Senator ELLENDER. Yes.

Mr. WAGNER. If this were on another river the appropriations request would be \$66 million.

Senator ELLENDER. Well, the \$24 million then will be from the borrowings out of this sum that you said.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. It comes out of that.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. But only for the construction for the hydroelectric plant.

Mr. WAGNER. Plus part of the multiple-purpose facilities that would be allocated to power.

Senator ELLENDER. All of which would be necessary to develop power.

Mr. WAGNER. Yes; but it also includes a part of the costs of the reservoir, for example, which serves navigation, flood control, and power.

CORPS OF ENGINEERS PROJECTS

Senator ELLENDER. I understand. But assuming that this whole multiple-purpose dam were constructed by the Corps of Engineers, would it not show that whatever is constructed for the developing of electricity would be paid out of revenue that would come from electricity?

Mr. WAGNER. I am not familiar with their procedure.

Mr. SMITH. Yes.

Senator ELLENDER. Well, that is the way it was.

Mr. WAGNER. But the appropriation request would be made for \$66 million.

Senator ELLENDER. I understand that. But the \$42 million, of course, goes toward assisting in navigation and flood control.

Mr. WAGNER. That is correct.

Senator ELLENDER. Which is paid for by the Federal Government.

Mr. WAGNER. That is correct.

Senator ELLENDER. And, as I said, ordinarily a program of this kind if constructed by the Corps of Engineers would be handled almost in the same manner, so much charged to navigation, so much charged to flood control, and so much charged to—

Mr. WAGNER. The allocations would be similar, the financing would be different.

Senator ELLENDER. Yes.

TIMS FORD DAM AND RESERVOIR

Now, in the case of the Tims Ford Dam and Reservoir that we had a little trouble about last year, I notice that you are asking for \$3.2 million for 1967.

Mr. WAGNER. No. The estimate for Tims Ford is \$6 million.

Senator ELLENDER. Excuse me, \$6 million?

Mr. WAGNER. And the House has recommended a change in that estimate to \$9 million.

Senator ELLENDER. You mean they have increased it by \$3 million?

Mr. WAGNER. Yes, sir.

FINANCING TIMS FORD AND TELLICO PROJECTS

Senator ELLENDER. I see my friend, Mr. Joe Evins has been very busy here. [Laughter.]

I wonder if you could give us a thumbnail sketch on how much of this entire cost of both the Tellico Dam and the Tims Ford Dam will be paid from funds that will be borrowed by TVA, and how much will be paid from appropriations?

Mr. WAGNER. Both of these projects will be financed from appropriations. A part of the cost of each will be allocated to power and, of course, payments will be made into the Treasury on account of the added power investment.

Senator ELLENDER. Why aren't those two handled the same as you have handled Nickajack? In other words, you are going to, necessarily you are, since both of these are multipurpose dams—for navigation and flood control—and doubtless for the production of electricity by falling water. Why aren't these two programs handled in the same manner as Nickajack is handled?

Mr. WAGNER. The Tellico project has no power installation in it, Senator. You will recall this will be connected to the Fort Loudoun Reservoir by canal, and the two operate really as one reservoir.

Senator ELLENDER. But, as I understood, though, by doing that you would increase the production of electricity.

Mr. WAGNER. Yes, we would do that.

Senator ELLENDER. Why don't you pay that now?

Mr. WAGNER. Well, as I say, we will pay into the Treasury a return on the amount that is allocated to power.

Senator ELLENDER. This payment will be made over the years?

Mr. WAGNER. Yes, at specified rates.

Senator ELLENDER. Well, in the case of Nickajack you are putting up the money from borrowings.

Mr. WAGNER. Yes.

Senator ELLENDER. Why don't you handle those two projects the same as you handled Nickajack?

Mr. WAGNER. As I indicated, we felt since there were no direct power facilities in the Tellico project the amount allocated should be handled by appropriations.

Senator ELLENDER. You just want the Government to put it up instead of getting it from the bonds.

Mr. WAGNER. The arrangement would not be much different than it is on projects in other rivers in this case.

Senator ELLENDER. I do not know. You could save in appropriations. If you handled the Nickajack the same way as you propose to handle Tellico and Tims Ford, in the case of Nickajack you could ask the Government to put up \$24 million. But instead you put it up, that is, through moneys that you borrowed, and I am surprised that you do not follow the same procedure in respect to Tellico Dam and Tims Ford Dam. I think it is safer to borrow it through TVA now, than the Federal Government. The Federal Government is so deeply in debt now that I am just surprised that you do not do it that way.

Mr. WAGNER. The reason that we did not, is, as I have explained it, Senator. I am sure my colleagues appreciate the compliment you have just paid us, and I hope it is deserved.

Senator ELLENDER. In these two dams, how much of the moneys, that will be spent in Tellico and Tims Ford, respectively, would be allocated under ordinary circumstances to the development of electricity from falling water?

TELLICO POWER BENEFIT

Mr. WAGNER. We have not completed the allocations, Senator, and we would not, of course, make them final until the projects are completed and total costs are available. But the power benefit from Tellico is estimated at \$8 million out of the—

Senator ELLENDER. You mean in firming, is that the one—

Mr. WAGNER. Essentially in firming, yes. This adds to the energy that can be produced at Fort Loudoun.

Senator ELLENDER. I understand, by way of firming it.

Mr. WAGNER. Yes.

Senator ELLENDER. Producing more—holding back more water.

Mr. WAGNER. That is right.

Senator ELLENDER. All right.

Mr. WAGNER. And that power benefit is estimated, capital benefit, at about \$8 million. The allocation would probably be somewhat less than that because all the benefits total more than the project cost.

TIMS FORD POWER BENEFIT

In the case of Tims Ford, the power benefit is estimated at \$6,600,000, and the allocation would be close to that.

Senator ELLENDER. And the entire cost of that project would be \$27 million, is it?

Mr. WAGNER. No, sir; \$39 million at Tims Ford.

Senator ELLENDER. \$39 million; and only \$6.6 million would be for the development of power?

Mr. WAGNER. Yes, sir.

This is not a major power project. It is on a rather small stream, and the purpose of development, while it includes power and flood control—there is no navigation involved here—

Senator ELLENDER. As I recall, this is the one in which you want more space on which to locate manufacturers, and so forth.

DAM RESERVOIR, TELLICO PROJECT

Mr. WAGNER. I think you are referring to Tellico now, Senator. The Tellico project is a major addition to our multiple-purpose system.

As we indicated, 200 million kilowatt-hours of additional power will be generated at Fort Loudoun Dam. It will add 126,000 acre-feet of flood control storage to our regional flood control system, which could in a single storm save several million dollars worth of damage at downstream points. It will extend the navigation channel about 30 miles up the Little Tennessee River without the necessity for building a lock, because the barges and towboats would move up the Tennessee River through the Fort Loudoun lock, and then through a very short canal, 850 feet long, into the Tellico Reservoir. The navigation channel will extend 30 miles up the Little Tennessee River. So there would be substantial benefits for navigation, flood control and power.

These benefits were visualized at the time that we built the Fort Loudoun Dam back in the early 1940's, and when we built Fontana Dam in the upper reaches of Little Tennessee River. It was planned that the Fontana storage would be used through the additional head that the Tellico project makes available. So it is a good river development project.

OUTMIGRATION AND UNEMPLOYMENT

It will be built in an area that is badly in need of some kind of an economic stimulant. The three counties that are most directly affected are in an area of high unemployment; it is an area where people and, particularly the young people, have been outmigrating for a number of years.

In the last decade, for instance, 15 percent of the people between 20 and 40 years of age, which is the normal working age, left the area because there were not jobs for them.

It is an area where welfare payments are above the State average, and in the last 5 years the proportion of the people receiving welfare payments, has increased at double the State rate. Employment in new jobs in the area is increasing only half as fast as it is in the State as a whole.

This is an area which has been basically an agricultural area, but agricultural income, according to a University of Tennessee study, has not increased in the period from 1950 to 1962. It has remained stable. At the same time, 50 percent of the people who had worked in agriculture had to leave it because there was no profitable employment for them.

INDUSTRIAL NEEDS

Now, to come to the point that you asked about, this reservoir will create a favorable environment for new industries in an area which badly needs new sources of employment—industries that will be based on the resources of the area, and that will use the labor of the area.

The channel will carry to a point—

TELLICO AREA NATURAL RESOURCES

Senator ELLENDER. What resources are there that you would use?
Mr. WAGNER. There are timber resources; there are some mineral

resources, and there is coal in the general area. It has to be moved to this point, but the Tennessee Valley has coal deposits.

Senator ELLENDER. Well, in other words, there will be sites available to develop industry so that industry can give work to the population that is there now, and may attract others that have left, is that it?

Mr. WAGNER. We would hope that it would stop the outflow, that is correct. Based on the experience that we have had over more than 30 years in other reservoirs, we have found that industries will develop where you bring a navigation channel to point where you have good rail access, good highway access, and land in large enough areas and level enough and free enough of rock so that you can build on it. Based on that experience we estimate that this particular area would, over a reasonable period of years, attract private investment of about \$265 million in industries providing about 6,600 new jobs, and this would—

MELTON HILL DAM AND RESERVOIR

Senator ELLENDER. As I recall, there was a dam constructed not far away where that same argument was advanced, and very little industry has developed. Has the condition changed since your last appearance here?

Mr. WAGNER. Yes, it has. You are referring to Melton Hill dam?

Senator ELLENDER. That is right.

Mr. WAGNER. Where, incidentally, there are no sites of this size at all. They are generally smaller in size, but there are a number of them. On that reservoir, since we last appeared before this committee, one industry has been located, which has been very gratifying to the people of the area. I understand it will provide about 300 jobs.

There are four other industries that are actively looking at sites now. There has been a total of 10, I believe, who have investigated Melton Hill sites. Some of these have now decided to locate somewhere else. But this industrial development, Senator, takes place over a long period of time. That has been our general experience.

Wheeler reservoir was filled, I believe, in 1936. There were initially only some oil terminals on the new shoreline. But year-by-year new industries have located there and this is continuing. When a project is constructed, the shoreline that is made available must serve longer than the near-term future. It must also serve the long-term future, and that is what the Tellico project will do.

BENEFIT-COST RATIOS

Senator ELLENDER. Well, you will remember the last time you appeared I asked you or somebody from your organization to give us the benefit-cost ratio of the two projects.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. And use the same yardstick as the Corps of Engineers. Have you been able to do that?

Mr. WAGNER. Using the yardstick that we had, we had a benefit-cost ratio for Tellico of 1.4 to 1.

Senator ELLENDER. Pardon me?

Mr. WAGNER. 1.4 to 1.

Senator ELLENDER. That was in anticipation of the future, that is for getting sufficient shoreline land to allow construction of manufacturing plants on.

Mr. WAGNER. A part of this benefit was predicated on the assumption that there would be economic development along the shoreline, and the benefits from it were included.

Senator ELLENDER. Yes. And the same thing occurred in the other dam we have just been talking about.

Mr. WAGNER. To a lesser extent. There is a substantial recreation benefit included in the Tims Ford Dam which we did not calculate as such in the Tellico project; or were you talking about Melton Hill?

Senator ELLENDER. Yes.

Mr. WAGNER. The Melton Hill project was justified entirely on the basis of navigation and power development, Senator. It had a favorable cost-benefit ratio.

Senator ELLENDER. Also, as I recall, on sites that would be made available for industry.

Mr. WAGNER. There were some sites earmarked for industry, but the use of them and the benefits that they would generate were not figured on a dollar basis.

We said these are intangible benefits, and in the justification for the Melton Hill project this economic impact was not a factor.

Senator ELLENDER. Well, are you familiar with the yardsick used by the Corps in providing the benefit-cost ratio for the projects in which they propose Federal funds for?

Mr. WAGNER. I am not completely familiar with it; no, sir.

Senator ELLENDER. Well, from my experience I would say that neither of these projects qualified. That is what I stated last year, and I stand by that. But, of course, the TVA is for itself, it is just a little branch of the Federal Government, and it uses apparently a different yardstick from what the Corps of Engineers use, and it is my judgment if you were to use the same yardstick for the Tellico and Tims Ford that your benefit-cost ratio would not be sufficient to warrant the Federal Government to put up any money.

Mr. WAGNER. We did make an evaluation of the Tellico project using the kinds of benefits and the methods that are set out in Senate Document 97 which is one recognized basis for evaluating, and using those methods we would have a benefit-cost ratio of about 1.9 to 1. I do not know the extent to which the Corps of Engineers uses that.

RECREATION BENEFITS

Senator ELLENDER. That is by putting in a lot of recreation which you already have in that area. You know, I find this, that even the Corps of Engineers are pressing a little bit on increasing the benefits from recreation.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. I am not quarreling with that at all. I think that a sufficient amount of recreation should be charged by way of benefits.

But I came across a few cases where the benefits from recreation were as much as 52 percent, and I did not think that was fair. I am trying to hold the Engineers down, you know, and not putting so much in for recreation so as to make it a more justifiable program.

Mr. WAGNER. Senator, shall I proceed?

Senator HILL. Go ahead. Senator Ellender?

Senator ELLENDER. I am through. I know, I am just trying to bring out a few facts for the record so that in the next 4 or 5 or 6 years I will be able to tell you I told you so.

Mr. WAGNER. Senator, you and I have discussed these projects on several occasions.

Senator ELLENDER. I know.

Mr. WAGNER. And I have never had the opportunity to show you the area and some of the development there. I would like it very much if we could do that.

Senator ELLENDER. I have been there.

Mr. WAGNER. I know you have, but I have not had the privilege of being your guide.

Senator ELLENDER. It is a wonderful thing for a small area of the country to have the taxpayers there bear the burden of it, I agree with you. It is a wonderful thing. I wish you would develop—I am kind of jealous of you—I wish you could develop something like that in Oklahoma, Texas, or the Northwest. But, in my opinion, it is coming for those areas.

PER CAPITA COMPARISONS

Mr. WAGNER. Well, Senator, I would like a day or two to be able to talk with you as we see the developments in the Tennessee Valley.

The fact is that Federal expenditures in the area that we serve, since TVA was created in 1933, have been less per capita than they have been in the Nation as a whole. We think this has been largely because we built the kind of projects which the people of the area can use as tools to help in their own developments. New avenues of investment for private capital have been created which then provides jobs. These are the things that I would be glad to discuss with you if some time you could find a day or two on your way home to stop over. We would be very pleased to show the valley to you and let you talk with some of the people in the area.

Senator ELLENDER. It would simply result in making me more envious.

Mr. SMITH. Senator, you compare the per capita expenditures, per capita appropriations, in the Tennessee Valley for water projects with those in areas of Alabama and Mississippi, Oklahoma, Louisiana, and you will find that all of those States, they are higher outside the Tennessee Valley.

Senator ELLENDER. I agree to that. But you are using a Government-owned facility, that is what you are doing, to do that with. You are borrowing this money. It is true that the Government itself is not back of it, but yet TVA is a Government—is a branch of the Federal Government.

Mr. SMITH. Well, even including, even if you include, the TVA appropriation, that statement still holds.

FERTILIZING AND AGRICULTURAL EXPERIMENTS

Senator ELLENDER. But you have been developing your fertilizing and agricultural by way of experiments there for a long time. I do not know what good you are doing there.

Mr. SMITH. We are holding down the price of fertilizer to Louisiana farmers.

Senator ELLENDER. I know. But you can do it by using Government facilities, and so forth, I agree to that. You can do that, and that is what you are leading to in the long run.

MUSCLE SHOALS CHEMICAL FACILITIES, REHABILITATION AND ADDITION

Mr. WAGNER. This is the next item—

Senator ELLENDER. Setting the stage for it.

Mr. WAGNER (continuing). That I want to talk about briefly, Senator, the chemical and munitions facilities at Muscle Shoals. There is an item in this budget of \$3,560,000 for continued rehabilitation and addition to those facilities.

As you know, this plant was originally a World War I plant, and we are still in World War I buildings in many instances, and using some World War I and even World War II facilities which are now badly outdated.

In 1961, you will recall, we began the program of modernization of this plant which we hope to complete by 1970. The purpose of it was to achieve increased efficiency.

This plant is operated as a facility of service to farmers all over the United States. We have tried consistently, from the beginning, to develop fertilizers of higher analysis, which helps hold down costs, including shipping costs. As a matter of fact, the cost of fertilizer per unit of plant food today is less than it was 10 or 12 years ago, because of the research and development in the field.

As you know, the processes that we develop and the patents on them are available to private industry, and are widely used, and the research is available to private industry.

MICRONUTRIENTS

In addition to working for higher analysis fertilizers, we are now spending considerable effort in the field of micronutrients. These are elements which, in almost miniscule quantities, which we find are necessary additions in some instances in order to get full response from fertilizer and from the soil.

IMPROVEMENT OF FERTILIZER APPLICATION METHODS

We are also doing extensive work to try to develop fertilizers or methods of application which will get more of the fertilizer that the farmer puts on the field into his plants. At the present time 25 to 50 percent of the nitrogen fertilizer is either leached out of the soil or volatilized and lost, and only 20 to 30 percent of the phosphate is actually finally found in the plants, so if we could find ways to apply the fertilizer or kinds of fertilizers so that a farmer got, let us say, 70 percent of the phosphate in, it would greatly reduce his fertilizer costs and increase in his yields.

The changes that we have made, improvements in the plant so far, are achieving annual operating savings of better than \$1.25 million, and this will—

Senator ELLENDER. You mean in contrast to the old plant?

Mr. WAGNER. Yes, sir; that is correct. So we are getting better efficiency in addition to getting newer equipment, which lets us do, explore more modern technology and do a better job.

Senator ELLENDER. This is more in the line of research.

DEMONSTRATION SCALE FACILITIES

Mr. WAGNER. Yes, sir. Research and education, let me say, because we build demonstration scale facilities after we have taken a process through research and pilot plant operations, and we produce enough fertilizer to make extensive tests in many States.

Senator ELLENDER. I am not trying to throw any cold water on it, by any means. But the point is that you are operating more or less as a branch of Government, separate from the Department of Agriculture. As you will bring out after awhile, I guess, when you talk about the land between the lakes demonstration, here you are trying to show the Park Service how to develop parks, and so forth. You will remember we had that out for the last 2 years.

Mr. WAGNER. Yes, sir; we did.

LAND COSTS

Senator ELLENDER. It is turning out as I said it would, the Government is going to spend many, many million dollars more than you said they would, and I will be able to again tell you so.

As I remember, I think it is in the record, the cost of this land would be about \$120 an acre. I think that was the total. But you are going to spend around \$12 million, and here you are asking almost \$12 million a year, so that before you get through acquiring land and showing how to operate parks, the Federal Government is going to be in the red that much more because of the costs. But I do not want to rehash that. I got licked on the Senate floor and I got licked before this subcommittee with the chairman here.

LAND BETWEEN THE LAKES

I simply think we could save a lot of money in this area by cutting off this demonstration project and simply using the lands that the Interior Department had plus a few more acres that were necessary to complete the acquisition of the land between the water.

HIGHWAYS

There was a highway running through that.

Mr. WAGNER. Yes, sir; two highways running across.

Senator ELLENDER. You people insisted you wanted more, and you won your point. But I am sure some of these days you are going to admit that the cost of this was much, much more than you anticipated.

LAND COSTS

Mr. WAGNER. Well, yes. But we gave you last year for land purchase a figure of \$24 million, and we believe that is where the estimate will stay.

You are correct, we did underestimate the land costs when we first looked at this project. But one of the very important factors was that as time went on, land values in the adjacent areas rose, and in fairness to the people whose property we were buying, we had to give them enough money so that they could about acquire comparable fa-

cilities elsewhere. But we are still sticking with the estimate that we gave you last year, Senator.

Senator ELLENDER. I have a figure running in my head of \$39 million.

Mr. WAGNER. Land costs are estimated at \$24 million, and the total costs, including development of camping facilities, roads, and this sort of thing are estimated at \$51.5 million.

Senator ELLENDER. \$51.5 million.

Mr. WAGNER. Yes, sir; total. This is a large area. But I think we need to recognize that we are again planning for the long-term future. If we believe that our population of the future—an urbanized population, living and working in industries, offices, and shops—should have places where they can get back to the out-of-doors, then the importance of acquiring areas such as the land between the lakes becomes obvious.

PARK VISITORS

The number of people who used the facilities there this year, to the present time, is double the number that used it all last year. There were over 100,000 people using the facilities last year, and we get letters back from people who say they have camped all over the United States, and that they never have seen anything to compare with it. It is not elaborate, but it does get them back to natural surroundings with lakeshore to enjoy.

Senator ELLENDER. I have no doubt of that. I have no doubt of that. It is a beautiful area. I have been in it, and all of that. But my only complaint is that you are forcing people there to sell this land that otherwise would do pretty well with it.

Mr. WAGNER. We find that a great majority of these people, after they have sold their land agree that they are better off after the change than they were before. There are some very heartwarming stories that I wish we had time to tell you.

OPERATION OF FACILITIES

Senator ELLENDER. Now that we are discussing that, I notice the House allowed you \$784,000 on "Operation of facilities."

Mr. WAGNER. That is for operation of the facilities.

DEVELOPMENT AND LAND PURCHASES COSTS

The amount for purchase of land and construction is \$11 million.

Senator ELLENDER. \$11 million. What does that total up to now, after you use this \$11 million?

Mr. WAGNER. Let me see if I have the figure—about \$30 million in total up to the present time.

Senator ELLENDER. I thought you said awhile ago it would cost \$24 million?

Mr. WAGNER. \$51.5 for development and land purchase.

Senator ELLENDER. No, no; I mean for land purchase.

Mr. WAGNER. How much have we spent for land purchase? Let me see if I have it.

Senator ELLENDER. You said the total for land purchases, your estimates are now \$24 million.

1967 LAND COST EXPENDITURES

Mr. WAGNER. The amount spent for land so far is \$11,767,000 and we will spend in 1967 an additional nearly \$8 million. We will have spent about \$19.5 million, through the current fiscal year.

ACREAGE—ACQUIRED AND PROPOSED FOR ACQUISITION

Senator ELLENDER. How much of the acreage that you proposed to buy, will be in your keep, or in your name, I mean that you will have title to?

Mr. WAGNER. By the end of June 1967, we will have bought about 71,000 acres out of a total of about 97,000 that need to be acquired.

Senator ELLENDER. \$71,000. So that you will have remaining—

Mr. WAGNER. That will leave about 26,000.

Senator ELLENDER. Remaining.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. 26,000 acres.

Mr. WAGNER. Yes.

The land that has been bought by that time will include practically all of the land with houses or other improvements, the acreage that is bought last is generally just unimproved acreage, mostly timberlands. We are holding that until last in fairness to the people who need to move out and find new locations.

Senator ELLENDER. What about the lands located at, I think, at the extreme east end of—

Mr. WAGNER. At the northern end.

Senator ELLENDER. Yes, northern end. I remember there was quite—

Mr. WAGNER. There were a number of people from there who were much disturbed. I do not have the precise figures on that, but a very considerable number of those tracts have been bought, and a number of people have moved to other areas and in other locations.

Senator ELLENDER. Now you say you have already spent for land acquisition or you will have spent at the end of this fiscal year, around \$20 million?

Mr. WAGNER. Yes, sir; a little less than \$20 million.

Senator ELLENDER. And \$4 million more will complete the purchase?

Mr. WAGNER. Yes, sir; that is what we estimate.

Senator ELLENDER. All right. Put that in the record so I can tell you I told you so. [Laughter.]

MUSCLES SHOAL CHEMICAL PLANT, MODERNIZATION

Mr. WAGNER. Mr. Chairman, if I can return to the chemical plant for just a minute, this modernization, in addition to providing for more efficient operation of the plant, also is making a considerable further improvement in the quality of the air in the area. We are doing—spending some of this money for air pollution control, and further treatment of processed water that is used so that we do not pollute the river.

I believe that I have covered most of the items in the capital budget. The operating budget programs, as I say, are the usual programs. If you have questions about them or any other items, we would be glad to answer them.

(Whereupon, there was a short discussion off the record.)

LAND COSTS AND ACREAGE—ACQUIRED AND PROPOSED FOR ACQUISITION

Senator ELLENDER. Will you state for the record the number of acres that you first contemplated buying, your first estimate of the cost of the land; also, the amount that has been spent through fiscal year 1966, the amount that will be spent through 1967, and how many acres you proposed to buy during 1967, and what will be the remaining number of acres to buy after fiscal year 1967.

Mr. WAGNER. You want us to provide it for the record?

Senator ELLENDER. He says he has it.

Mr. ELLIS. I do not have it.

Mr. WAGNER. He meant he had the request.

Senator ELLENDER. I see. Put in that, as you just said awhile ago, that your new estimate to complete the purchase of all of this land will be \$24 million.

Mr. WAGNER. That is our present estimate.

Senator ELLENDER. I understand that. Just 2 years ago it was about a quarter of that, but that is what I would like to have for the record.

Mr. WAGNER. We can provide it; yes, sir.

Senator ELLENDER. And you can put in your answer to the question that I have just given you, giving all this acreage and the data and the number of acres that will remain to be purchased at the end of fiscal year 1967, and what you believe that will cost.

(The information follows:)

LAND BETWEEN THE LAKES PROJECT LAND STATISTICS

Acres first contemplated buying-----	¹ 100,000
First estimate of cost of the land-----	¹ \$12,000,000
Acres now scheduled for purchase-----	97,600
Present estimate of cost of land-----	\$24,000,000
Costs of land through fiscal year 1966-----	\$11,767,000
Estimated costs of land through fiscal year 1967-----	\$19,656,000
Estimated acreage to be purchased in fiscal year 1967-----	34,000
Acres to be purchased after fiscal year 1967-----	31,482

¹ Senate hearings, Public Works Appropriations, 1965, p. 12.

EXPENDITURES AND PROPOSED EXPENDITURES

Senator ELLENDER. If I am to understand your figures, the figures you have just given me, by the end of fiscal year 1967 you will have spent almost \$20 million.

Mr. WAGNER. That is correct.

Senator ELLENDER. Out of the \$24 million estimate, and all you require thereafter under your present estimates will be \$4 million to complete the purchase of the remaining amount of land that you contemplated buying from the beginning.

Mr. WAGNER. A little more than \$4 million; yes, sir.

Senator ELLENDER. A little more. How much more?

Mr. WAGNER. Well, the figure through fiscal year 1967 is between \$19 million and \$20 million.

Senator ELLENDER. Yes; I understand.

Mr. WAGNER. It is very close to \$4 million.

Senator ELLENDER. Okay. I am going to surely be here next year because I was recently renominated, and I will be here again, and I hope you will still—

Mr. WAGNER. I hope you will all be here, sir.

Senator HILL. Renominated by a magnificent majority.

Mr. WAGNER. I understood that; very good.

Senator HILL. And one reason he is so young is he takes advantage of recreation. [Laughter.]

Mr. WAGNER. Senator, there is nothing more that I would—

REDUCTION FOR ANTICIPATED DELAYS AND SLIPPAGE

Senator HILL. There is an item I wanted to ask you about. But is there anything more you want to add?

Mr. WAGNER. No.

Senator HILL. There is this item here of reduction for anticipated delays and slippage. The House knocked out \$2,360,000. Just what does that go to? Insert at this point the table of payment to the fund. (The table follows:)

Payment to Tennessee Valley Authority fund

	Appropriation, 1966	Estimate, 1967	House allowance
CAPITAL OUTLAY			
River and power development:			
Navigation facilities:			
New lock at Gunterville Dam	\$878,000		
Additions and improvements at navigation facilities	760,000	\$926,000	\$926,000
Flood control facilities	2,321,000	2,404,000	2,404,000
Multipurpose river development:			
Tellico Dam and Reservoir		3,200,000	3,200,000
Tims Ford Dam and Reservoir	5,570,000	6,000,000	9,000,000
Nickajack Dam and Reservoir	11,997,000	12,705,000	12,705,000
Bear Creek water control system	250,000	1,500,000	1,500,000
Beech River water control system	564,000		
Additions and improvements at multiple-use facilities	632,000	308,000	308,000
Investigations for future facilities	1,169,000	1,169,000	1,169,000
Total, river and power development	24,141,000	28,212,000	31,212,000
Fertilizer, agricultural, and munitions development: Chemical facilities			
	6,051,000	3,560,000	3,560,000
Land Between the Lakes demonstration			
	10,412,000	11,000,000	11,000,000
General service activities:			
General facilities:			
General construction equipment and inventories	714,000	-367,000	-367,000
Office facilities and equipment	122,000	232,000	232,000
Transportation facilities and equipment:			
Passenger sedans	436,000	441,500	366,500
Trucks and heavy equipment	1,996,000	2,989,500	2,489,500
Aircraft		60,000	60,000
Special and miscellaneous	311,000	369,000	369,000
Subtotal	2,743,000	3,860,000	3,285,000
Less depreciation on facilities and equipment in service	-1,350,000	-1,350,000	-1,350,000
Total, transportation	1,393,000	2,510,000	1,935,000
Chattanooga office building	696,000	422,000	422,000
Medical and general service center, Muscle Shoals, Ala.	214,000	35,000	35,000
Other general facilities and equipment	136,942	350,000	350,000
Total, general facilities	3,275,942	3,182,000	2,607,000
Total, capital outlay	43,879,942	45,954,000	(48,379,000)
Reduction for anticipated delays and slippage			
			-2,360,000
Total			
			46,019,000
EXPENSES			
River and power development			
	4,965,000	5,167,000	5,167,000
Fertilizer, agricultural, and munitions development			
	7,592,000	7,592,000	7,592,000
Cooperative valley development			
	3,469,000	3,819,000	3,819,000
Land Between the Lakes demonstration			
	547,000	784,000	784,000
General service activities			
	304,000	319,000	319,000
Total, expenses	16,877,000	17,681,000	17,681,000
Total, appropriation			
	59,347,000	63,635,000	63,700,000

Amounts required to complete projects

Tellico Dam and Reservoir.....	\$39,300,000
Tims Ford Dam and Reservoir.....	27,430,000
Nickajack Dam and Reservoir.....	5,363,000
Bear Creek multipurpose water control system.....	23,744,000

HOUSE ACTION

Mr. WAGNER. The House action, as you indicated, in addition to the \$3 million that I said was added for Tims Ford shows this \$2,360,000 for slippage and delay.

Senator HILL. Yes.

Mr. WAGNER. This is on the assumption that savings could be achieved by either deliberate deferment or deferment that would result from delays in getting equipment, and bad weather, and this sort of thing, and the House estimated that that could, perhaps, amount to \$2,360,000, about 5 percent of the construction program, and recommended that change in our budget estimate.

Senator HILL. What is your best judgment on that?

Mr. WAGNER. Well, it is true that slippages and delays do occur. The estimate, as we presented it, and as it was contained in the President's budget, is what we believe that we needed. There are two additional changes the House suggested.

ELIMINATION OF REQUEST FOR PASSENGER SEDANS

Senator HILL. What were they?

Mr. WAGNER. They eliminated our request for 45 new passenger sedans. We can operate without those 45 new sedans, but it may not result in savings of \$75,000. We will have to use more rental sedans, and the added cost might be as much as \$35,000.

ELIMINATION OF REQUEST FOR TRUCKS AND CONSTRUCTION EQUIPMENT

There also was a recommended elimination from our estimate of \$500,000 for trucks and heavy mobile construction equipment. If that equipment is not purchased, we would have to repair, patch up equipment that otherwise would be disposed of. This would probably cost us a couple hundred thousand dollars extra, and the equipment would be usable but only for a short time.

The net effect of the House action was to add \$65,000 to our request, raising it from \$63,635,000 to \$63,700,000.

TIMS FORD DAM AND RESERVOIR

Senator HILL. How much would the additional \$3 million for the Tims Ford Dam and Reservoir accelerate that project?

Mr. WAGNER. Well, the completion date for that project is estimated to be 1970, the closure date for the reservoir, and that would still be the date. It is controlled as much by weather and seasons as it is by amounts.

We would use about half of this \$3 million for buying land, and about half of it in the construction program. It would advance the program, but it would not change the season in which the reservoir could be filled.

Senator HILL. In other words, the reservoir would not come into operation sooner.

Mr. WAGNER. It might be a few days.

Senator HILL. A few days, I mean, no material difference.

Mr. WAGNER. But it would still be filled—

CONSTRUCTION AND LAND ACQUISITION DELAY COSTS

Senator ELLENDER. I presume in the long run you would probably save some money by buying the land now, and the expense of operation would decrease.

Mr. WAGNER. Yes, sir; that is right. When we start a project we like to get in and finish it as fast as construction and land acquisition will permit. That is the way we like to build it.

Senator ELLENDER. I am for that. I have advocated that as chairman of Public Works Subcommittee.

The delays in the construction of many of the projects fully authorized, and in which we provided construction funds are costly. Every year you delay it will cause from 3 to 4 percent more in additional costs to be incurred.

Mr. WAGNER. Yes, sir. Delays are expensive, and they are one of the things that result in project costs finally overspending the actual estimates that may have been made on an assumption that you could build on a reasonable schedule.

Senator ELLENDER. May I ask a question?

Senator HILL. Go ahead.

RELATIONSHIP BETWEEN BUDGET REQUEST AND SALE AND DISTRIBUTION OF TVA PRODUCED ELECTRICITY

Senator ELLENDER. Mr. Wagner, can you point up to any item in this \$63,700,000 that is directly, will directly, be used in the sale and distribution of electricity that is produced at TVA?

Mr. WAGNER. Not in the sale and distribution; no, sir.

Senator ELLENDER. In other words, these expenses or this amount of \$63,700,000 are more or less for projects that are not connected directly with the construction of new facilities for TVA nor for the distribution of the electricity that is now being produced there either through the steam plants or from plants already constructed.

Mr. WAGNER. Your statement is correct, with the exception of the Tims Ford and Tellico appropriations which you discussed earlier. Otherwise, your statement is correct.

REPAYMENT TO GOVERNMENT

Senator ELLENDER. Yes. But in the future though you said, or you expect to get that \$9 to \$12 million repaid to the Government.

Mr. WAGNER. There would be a return paid on it and it would become a part of the appropriation investment in the power program.

Senator ELLENDER. With interest, because you can well afford it. [Laughter.]

Senator HILL. Any other questions?

Mr. Wagner, anything else you would like to add?

Mr. WAGNER. Nothing further; no, sir.

UREA AMMONIUM PHOSPHATE PLANTS

Senator HILL. Let me ask you this question. I know for some time you have been studying urea ammonium phosphate plants of a somewhat different nature from what we have today. Just what is the status of that matter now? What are your thoughts about it?

Mr. WAGNER. Well, Mr. Chairman, we have, as you indicated, studied the possibility of urea ammonium phosphate in our laboratories since 1956, and in our pilot plants since 1961, and that is where the matter rests now.

Urea ammonium phosphate is, so our technicians tell us, a next major step in developing fertilizer technology. This is a high analysis fertilizer that can be—

Senator HILL. When you say high analysis, you mean food content?

Mr. WAGNER. Higher food content; yes, sir.

The average fertilizer used in the United States today has 36 percent plant food. Urea ammonium phosphate can contain up to 60 percent plant food. So it has all the benefits that go with high plant food content in the fertilizer.

It can be produced at lower manufacturing costs, about 10 to 15 percent savings over other fertilizers with comparable food content. It is a more versatile fertilizer. It has wider applications, and it generally stores and handles better.

Senator HILL. Why more versatile?

Mr. WAGNER. It can be used on a wider variety of crops, under a wider variety of soil conditions, and in addition to that it has storage properties that are much better than other fertilizers. It does not cake the way many fertilizers do, and it is a granular fertilizer which handles well. It is really a new step in fertilizer technology.

IMPROVEMENT OF RICE CROPS

We have tested it in our own greenhouse and in State experimentations. It is excellent for all crops. It has special value for application to rice on flooded fields. This is true both of rice production in this country and abroad, and it has particular significance in the rice-consuming countries of southeast Asia.

Senator HILL. What would be the effect of rice in a State like Louisiana?

Mr. WAGNER. We are testing this fertilizer in the State of Louisiana, and it will make possible better rice crops in that State.

Urea ammonium phosphate is a better fertilizer for rice. This is true, Senator, because rice cannot use nitrogen in the form of nitrates. Urea ammonium phosphate has its nitrogen in the forms of ammonia and urea.

Now, these forms do not leach out, and they do not volatilize, so that the fertilizer is more useful, particularly where it is applied to rice crops.

It contains no sulphates, and for this reason it is less acid-forming than some fertilizers, and that is damaging to some crops. It does not produce hydrogen sulphide in water as ammonium sulphate, for example does, and hydrogen sulphide damages the roots of the rice plant.

So this is a good fertilizer for all crops; it has special application for use in rice, and at the present time we have brought it through the pilot plant stage, and there it stands.

OPERATING PLANT, COST

Senator HILL. What is your estimate of the cost of an operating plant?

Mr. WAGNER. Our estimated cost is about \$13.5 million, Senator, and it would require 2 or 2½ years on a normal construction schedule to build it.

A demonstration scale plant would let us perfect the process. We often find that a pilot plant will work, but when we go to a full-scale operation we sometimes find bugs that have to be worked out. So we would be able to perfect the process and to demonstrate its usefulness. It would give us enough material for wide-scale introduction and testing in practical farms all over the country.

A plant that would cost \$13.5 million would have a capacity of, perhaps, 60,000 to 80,000 tons per year, and if the process is going to be advanced, the next step would be to build a demonstration scale plant.

Senator HILL. What would that cost?

Mr. WAGNER. That would cost \$13½ million.

Senator HILL. \$13 million?

Mr. WAGNER. Yes, sir; that is correct.

Senator HILL. Anything else you would like to add?

BEAR CREEK MULTIPURPOSE SYSTEM

Senator ELLENDER. May I ask a question?

Senator HILL. Yes.

Senator ELLENDER. Mr. Wagner, I notice in your Bear Creek multipurpose system the amount required to complete that project will be \$23,744,000, that is your estimate. How much have you spent on that already?

Mr. WAGNER. The construction of this project would be initiated this year. Nothing has been spent yet except for design.

Senator ELLENDER. Design.

Mr. WAGNER. That is right. We have had design funds in our budget for 2 years.

Senator ELLENDER. Yes. Well, as to that project when you say multipurpose, do you contemplate developing electricity from this project?

Mr. WAGNER. No, sir. These are small dams and reservoirs.

OVERALL RESOURCE DEVELOPMENT PROJECT

Senator ELLENDER. How does that compare with our small watershed projects? You are familiar with those, I am sure.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. Is it along that same line?

Mr. WAGNER. The water control part of it is, Senator. But this is a part of an overall resource development project.

We have been working with the people in the Bear Creek watershed for a number of years on a total resource development project, a little TVA, in this important watershed in north Alabama and Mississippi.

The people in this area recognize the fact that they need more employment and more income. Their resource base has been analyzed to see what they have to work with. Their forestry resource has been appraised and they have an active reforestation program going. They are doing considerable testing of direct seeding of tree seeds in the area.

LOCAL COOPERATION

Senator ELLENDER. Well, how much of the entire cost will be borne by the local people?

Mr. WAGNER. It is estimated at this point that about a million and a half dollars would be paid back in cash dollars by the local people. They would also contribute about \$1 million in the relocation and construction of roads.

Senator ELLENDER. You mean of the entire costs?

Mr. WAGNER. Yes, sir; this cost includes some channel clearing, and they would maintain the channels after they are built.

Senator ELLENDER. Well, is there any navigation here?

Mr. WAGNER. No, sir; there is not.

FLOOD CONTROL AND WATER SUPPLY PROJECT

Senator ELLENDER. When you say "multi," what does it mean?

Mr. WAGNER. It is flood control, water supply and other features. This is an area where water supply is a limiting factor now.

PAYMENT FOR WATER SUPPLY

Senator ELLENDER. Well, under the laws that we go by, even where the Corps of Engineers built projects, those who obtain water by virtue of constructing these, pay a part of it. Why—

Mr. WAGNER. A part of the \$1.5 million would come from payment that would be made for water supply by people who use it.

Senator ELLENDER. Such as what, now? What would that be?

Mr. WAGNER. A municipality might take water supply from this area, from one of these reservoirs.

Senator ELLENDER. And the entire payment would be \$1.5 million on a project of \$23 million?

Mr. WAGNER. Over a period of time; yes. That is the current estimate.

Senator ELLENDER. That is another advantage of being in the TVA area, because if you are not a TVA area, the contribution by the municipalities who use waters from any facility that is constructed, would pay a considerable amount more than you pay here.

Mr. WAGNER. The payment for water would be generally comparable with what alternate sources of water supply would cost them. This is not the only feature of the project. The major feature of it is flood control because, as Senator Sparkman indicated, these bottomlands are the only good agricultural lands, and they are subject to flooding just about every year.

Senator ELLENDER. So it is mostly flood control.

Mr. WAGNER. Mostly flood control. But it does have additional benefits for water supply, for recreation, some redevelopment benefit, and general kinds of economic benefits that are calculated in the small watershed programs.

INVESTIGATION OF FUTURE FACILITIES

Senator ELLENDER. I notice here you have an item for investigation of future facilities of \$1,169,000. What do you investigate there? Is it navigation or flood control or is it also envisioned as investigations for the construction of future damsites for the generation of electricity from falling water?

Mr. WAGNER. These are investigations of future multipurpose damsites, navigation projects, and flood control projects. Investigations of future power generating plants are financed from power funds.

Senator ELLENDER. That is why I asked the question, just to separate it. Those investigations would deal solely with projects in which the Federal Government would participate in the construction, and not the TVA through the sale of bonds.

Mr. WAGNER. That is correct.

AREA COVERED BY INVESTIGATIONS

Senator ELLENDER. Now, these investigations are made, of course, entirely within the area known as the TVA area.

Mr. WAGNER. Investigations for water control projects are at sites within the Tennessee River watershed.

Senator ELLENDER. Watershed.

Mr. WAGNER. Yes, sir.

Senator ELLENDER. Which is clearly defined, as I recall, in a document.

Mr. WAGNER. These tributary development projects are actually within the watershed of the Tennessee which is defined by its geography.

The power service area is somewhat larger, and it has been defined in connection with the 1959 bond authorization amendment.

Senator HILL. The 1959 act set it forth.

Mr. WAGNER. Yes, that is correct.

Senator HILL. Any other questions, Senator?

Senator ELLENDER. No, except hereafter I am going to be very careful when we get moneys provided for Alabama and for Tennessee and other parts of States that are included in the TVA. We would like the TVA to carry all of that and leave the Federal Government out of it, let you handle it. [Laughter.]

Senator HILL. Mr. Wagner said we are getting less than the other States; didn't you say that, Mr. Wagner?

Mr. WAGNER. Yes, that is correct.

Senator HILL. We are getting less than the other States. Do you want to increase that for us, so we will get as much as the other States?

Senator ELLENDER. The TVA seems to be in charge of that, I won't say kingdom, but little—

Senator HILL. Territory.

Senator ELLENDER. Territory, Senator; and we have enough areas outside the TVA where we could spend quite a bit of money to help the people, and since TVA has been doing such a good job in providing recreation and providing for reclamation, providing for flood control, we will just leave them wholly the jurisdiction of all of that, and we will spend our money outside of the TVA territory. [Laughter.]

Senator HILL. Why don't you emphasize that recreation; that is why you keep so young. [Laughter.]

Anything else you would like to add, Mr. Wagner?

Mr. WAGNER. Nothing further that I think of.

Senator HILL. Mr. Smith.

UREA AMMONIUM PHOSPHATE PLANTS

Mr. SMITH. Mr. Chairman, in regard to that urea ammonium plant that we discussed earlier—

Senator HILL. Yes.

Mr. SMITH. In view of the commitments that our country has in southeast Asia about the shortage of food in that area and the assistance that obviously is going to be provided in some form, I think it is highly likely that the demonstration of the applicability of this process in that area would, in the long run, save our Government far more than would be involved in the costs here.

Senator HILL. Well, frankly, I am more interested in Louisiana than I am in southeast Asia.

Mr. SMITH. There is no question that we are, too. But, it is just one of the realities of the time.

Senator HILL. I understand it, as a practical proposition.

Mr. SMITH. Yes.

INTRODUCTION OF DON MCBRIDE, DIRECTOR

Senator HILL. Mr. McBride.

Mr. MCBRIDE. Nothing to add.

Senator ELLENDER. He is new, he is just learning.

Mr. MCBRIDE. I am still going to school.

Senator ELLENDER. You will soon graduate and become as strong an advocate of this as they are.

Senator HILL. He knows a good deal about this, Senator. He was with Senator Kerr in those early days.

Senator ELLENDER. That is going to give him an idea to do such a thing as this in Oklahoma. [Laughter.]

FLOOD PLAIN ZONING

Mr. WAGNER. Senator Ellender, you said you were envious of this area. One of the reasons I would like to have the opportunity to show it to you for a couple or 3 days is that I would hope maybe some of the things that you would see there can be used in other areas. In fact, they are being used now. We hope that if we try what may seem to some people to be venturesome new ideas, we would hope that the good ones can be applied in other sections of the country.

FLOOD PLAIN ZONING AND LOCAL FLOOD CONTROL

The President recently sent to the Congress a report on flood plain zoning and local flood-control activities which really is a direct outgrowth of one of these ideas we tried starting some years ago. The basic idea is that some communities are located in areas where it is difficult to find economic justification for physical works to protect them from floods, and that the sensible solution is to engage in zoning the flood plain so that it is used only for, let us say, parking lots, or

parks, or golf courses. Put to such uses the plain can be flooded occasionally without serious damage. The plan calls for local zoning regulations requiring all houses and buildings to be put in areas that are entirely flood free. That was an idea that we started a long time ago, and it is now spreading across the country.

I think there are many others like that in the TVA experience, and I believe you would be pleased with some of the things you found, and that you might find application for them in your area, too.

FEDERAL POWER DEVELOPMENT

Senator ELLENDER. Well, I won't say that I have been critical of the TVA except to the extent that Federal funds were used in the past to firm power from falling water beyond the firming stage. That is when I stopped voting for the program, and I felt that TVA should stand on its own bottom, and that many other areas in the country would certainly like the Federal Government to come in and invest millions of dollars to construct steamplants and attract industry. You know that, that is what I have been complaining about.

My fear is that if we continue such a process it will just be a question of time when the Federal Government will be owning and controlling a lot of the power developed throughout the country, and that is what I believe we ought to guard against.

Senator HILL. You are for the Mississippi River.

Senator ELLENDER. Sure, I am for the Mississippi River and the Arkansas and the Red River. We are for controlling them.

Senator HILL. And for Alabama, too, may I say, sir. A very fine Alabama, too.

PRESERVATION OF LAND AND WATER RESOURCES

Senator ELLENDER. I bow to no man in the Senate in any effort to protect and preserve our two greatest resources, and those are land and water, and I have devoted almost my entire life in that behalf.

Senator HILL. You certainly have. You have been a dedicated servant to land and water.

Anything else you gentlemen would like to add?

Mr. WAGNER. No, sir.

Senator HILL. All right. We want to thank you very much.

STATEMENT OF J. M. LACKEY, PRESIDENT, ASSOCIATION FOR THE PRESERVATION OF THE LITTLE TENNESSEE RIVER; ACCOMPANIED BY ROBERT DENNIS, ASSISTANT CONSERVATION DIRECTOR, IZAAK WALTON LEAGUE OF AMERICA; LOU CLAPPER, ASSISTANT CONSERVATION DIRECTOR, NATIONAL WILDLIFE FEDERATION; AND STEWART M. BRANDBOG, EXECUTIVE DIRECTOR, THE WILDERNESS SOCIETY

TELLICO DAM AND RESERVOIR PROJECT, OPPOSITION

Senator HILL. Mr. J. M. Lackey, president of the Association for the Preservation of the Little Tennessee River.

Mr. LACKEY. Yes, sir.

Senator HILL. Come around, Mr. Lackey.

Mr. Lackey, the Senate meets at 12 o'clock and, as you know, we have an appropriation bill upon Health, Education, and Welfare, for which I have the responsibility. I am chairman of the subcommittee.

Mr. LACKEY. Sir, we appreciate this little time you have given us. Senator HILL. If you will proceed.

Mr. LACKEY. I have with me representatives of three national conservation groups who have supported Tennessee Conservationists in this operation, being in opposition to the Tellico project.

On my left is Mr. Bob Dennis, assistant conservation director for the Izaak Walton League of America; and on my extreme right is Mr. Stewart Brandborg, executive director of the Wilderness Society; and right next to me on the right is Mr. Lou Clapper, assistant conservation director of the National Wildlife Federation.

Senator HILL. We are glad to have you.

Mr. LACKEY. Senator Hill, we are still in opposition, just like we were last year.

I represent about 1,100 farmers on the Little Tennessee River. We are all TVA's friends. We are trying to help TVA see their mistake, as you have heard Senator Ellender state here.

In opposition to this, then we have a list that we have given you here of some 40-odd State organizations that are opposed to this, and about 14 or 15 nationwide organizations opposed to it, and we have other organizations, two others, that were formed in the last 30 days in Tennessee, opposed to it, which I do not have a list of them, but we are just a bunch of farmers, and I am a farmer myself, and we cannot predict things like the Tennessee Valley Authority, but we do have a few statistics we would like you to take into consideration.

POPULATION AND BANK DEPOSITS, INCREASE

We have been called there in this three-county area affected by the Tellico Dam, a dying area we cannot see it. Now, how they see it, I do not know, because in the Blount, Loudon, and Monroe Counties, they had met population increases from 1960 to 1964; and figures from the Tennessee Banking Association reveal that the bank deposits increased in nine banks serving these counties from 1958 through 1964 by 74 percent. That sounds ridiculous, sir.

Senator HILL. From what period, sir?

Mr. LACKEY. 1958 through 1964.

Senator HILL. Yes.

LABOR MARKET

Mr. LACKEY. As far as that is concerned, to me as a farmer, I cannot even get anybody to help me farm, and nobody else in the area. They are talking about people needing jobs, I wish I could hire somebody. I am getting old, I would like to rest just a little bit but I cannot.

Not only that, the economy of the tricounty area had bank deposits 36 percent greater than the State average and over 40 percent above the deposits increase for the entire United States. Still we are suffering, they say.

RETAIL SALES, PAYROLL GAIN, AND PUBLIC WELFARE ASSISTANCE

The percentage gain in retail sales and the payroll gain in the trades and services industry was considerably above the State average for the period 1958 to 1963, and the figures from the Tennessee Department of Public Welfare reveal that the percentage of people in the affected area receiving public welfare assistance is below the State and national average.

TELlico DAM JUSTIFICATION INVALID

We, therefore, conclude that TVA's justification for the construction of Tellico Dam on the basis of industrial development in a distressed and needy area is invalid.

The Knoxville Chamber of Commerce has repeatedly several times made studies and tried to get them to go for the Tellico Dam, and they have refused to endorse. The Tennessee River and Tributaries Association, one of TVA's staunchest supporters, has refused to take any stand; and me, myself, I am a director in the Little Tennessee River and Tributaries Association sponsored by TVA, and we have analyzed this thing, and we have made a study of it, and we voted to let it stand until the dam was either built or either killed. That is what we did.

Now, other economic resources threatened by Tellico Dam include 10,000 acres of productive bottomland yielding over \$3 million a year in agricultural products. Now, gentlemen, the other day I saw a little note in the paper where the President had a meeting with his Cabinet and he stated he was going to have to go to using, the old farmers to use, the hay baling wire. I forgot to bring a piece of hay baling wire, I should have brought it, and it would have been a good place to use it, the Tellico Dam, because TVA does not need it.

TVA has thousands of acres on the Big River already available for industrial siting, and let us let them use that first. Leave us alone. We have had this shadow over us ever since 1942, and we feel, as sure as I am sitting here, that if it had not been for this shadow we would already have had industry using cold water instead of backed up polluted water.

TELlico RIVER FLOOD CONTROL

If there are any questions you gentlemen would like to ask, we would be glad to answer them.

As far as flood control, we have no problem.

Senator ELLENDER. When was the last flood?

Mr. LACKEY. We have not had a flood since Fontana Dam was built. As I stated last year, we do have a little flood problem on the Tellico River, very little.

Senator ELLENDER. What about the land that you say would be inundated and put out of cultivation, how often does that occur?

Mr. LACKEY. It does not even get out on it, on the Little Tennessee River; no, sir; a little on the Tellico.

Senator ELLENDER. If the dam is constructed, you say how many acres would be inundated?

Mr. LACKEY. TVA states, I do not know, 14,400.

Senator ELLENDER. 14,400.

Mr. LACKEY. Yes, sir; would be inundated. I really do not know. That is what I have heard and read in some of the newspapers.

Senator ELLENDER. I wonder, Mr. Wagner, what is the number of acres that would be inundated?

Mr. WAGNER. I believe the figure below the normal pool level is about the figure Mr. Lackey gave. I do not have it precisely in mind. The amount of acreage below the elevation on——

Senator ELLENDER. That land is now in cultivation?

Mr. WAGNER. It is in cultivation, some of it is in cultivation.

Senator ELLENDER. Good cultivable land?

Mr. LACKEY. Yes, sir; it certainly is.

FONTANA DAM FLOOD CONTROL STORAGE

Senator ELLENDER. Are you familiar with what the witness is talking about, there being no floods there since the Fontana Dam was constructed?

Mr. WAGNER. Well, Senator, of course, that is true. We are talking about the area which will be a part of the reservoir. The flood control provided by this dam is for areas downstream from it, and the city of Chattanooga, which is the principal vulnerable area in the Tennessee Valley, lies downstream from this dam, and would be protected by the flood control storage in it.

Senator ELLENDER. To what extent have we had floods in the city of Chattanooga? I never heard of any recently.

Mr. WAGNER. Well, Chattanooga——

Senator ELLENDER. Recent months.

Mr. WAGNER. We have had fairly good protection in Chattanooga since we have had the system in operation.

Senator ELLENDER. That is what I thought.

Mr. WAGNER. But hydrologists forecast floods, and they know that great storms will occur at some time in the future. The present system will not adequately protect Chattanooga from such storms and additional storage would be helpful.

Senator ELLENDER. Since your system has been constructed there, to what extent have you had floods to menace Chattanooga?

Mr. WAGNER. There have been no very damaging floods, nor has there been a storm of proportions that would produce damaging floods. Such storms do however occur and have occurred in areas nearby Chattanooga.

FLOOD CONTROL JUSTIFICATION

Senator ELLENDER. Is it a fact that the justification for the construction of some of these dams when flood control was advanced as the reason, was to protect Chattanooga and other areas south, I mean, downstream the dam?

Mr. WAGNER. That is correct, and it would also be correct as far as this dam is concerned. It also is true that these dams provide flood control on down the lower Ohio and Mississippi Rivers, and we have saved some \$40 million worth of damage in those areas with the system as it now operates. Tellico would add to that flood control capacity.

Senator ELLENDER. You mean that would be in addition to the construction of the dams that have been erected in the past?

Mr. WAGNER. It would be an additional factor, yes, and it would provide additional flood control storage and additional protection.

Senator HILL. You mean down the whole river system.

Mr. WAGNER. That is correct.

Senator HILL. The Ohio and Mississippi.

Mr. WAGNER. All points downstream from the Tellico Dam, including the Mississippi Valley.

Senator ELLENDER. Well, that little amount of water, I do not think can hurt much.

Mr. WAGNER. Every little bit of storage helps prevent floods.

Mr. LACKEY. I am sure you gentlemen are familiar with the historical value of this valley. Even Tennessee got its name from it.

ECONOMIC DEVELOPMENT

Mr. CLAPPER. Senator, in our statement we commented briefly about the trout fishing we have lost. I won't go into details, but we are also concerned about this economical development. There are \$15 million set aside as a proposed benefit from this, based on the assumption that they will sell 5,000 acres of land that they condemn at a profit of almost \$11 million.

Now, there is no indication that we can find from their success on previous reservoirs that they would be able to sell this at that kind of a profit, and if this is not true then the project cannot be justified at the 1.4 to 1 ratio that TVA claims.

Senator ELLENDER. I think I brought that out last year.

Mr. CLAPPER. Very competently last year.

Senator ELLENDER. I brought it out, and I had asked the Corps of Engineers to look into it, but somehow they did not want to butt into the affairs of TVA, and I could not get the desired results.

Mr. CLAPPER. We feel somebody should look into their affairs at this time. They don't need project authorization. They only have to come to get appropriations, and this is the only opportunity we have had to express opposition to this proposition.

Senator ELLENDER. Well, I agreed with you, but now that they have got a foot in the door I do not see how they can pry it out.

Senator HILL. Did you gentlemen appear before the House committee?

Mr. CLAPPER. Yes, sir.

Senator HILL. And many more witnesses?

VALUES OF RIVER AT PRESENT

Mr. BRANDBOG. Mr. Chairman, there is abiding concern by conservationists all over the Nation about Tellico Dam. This is not a local or regional issue; this is a national problem. Local people, conservationists in Tennessee, are united with conservationists all over the Nation, in an effort to protect the wild river values, the stream values, the historic values that are represented in this little stretch of Tennessee River as something that we do not have much of in the Southeastern part of the United States, wild country situated close to agricultural land where optimal recreational use can be made of the resources that are found here.

There is a grave concern that an organization with the fine reputation of the Tennessee Valley Authority should move ahead to seek author-

ization when there are these questions as to the economic feasibility and the overall justification of the project.

Senator HILL. Anything you would like to add, sir?

Mr. DENNIS. Mr. Chairman, I am sorry I do not have a prepared statement. I have been out of town since the beginning of the weekend, but we have two major points here. I think they have both been covered. As far as the Izaak Walton League is concerned, I think we would like to have TVA recognize the fact that as impoundments are constructed on river systems, those little bits of river are untouched, and become more and more valuable, and it is a value that is quite impossible to include in the economic measurements that are made, but it certainly does exist, and here we have the Little Tennessee River, the last 33 miles which, because of Fontana's existence, is a very fine trout stream, and if it were destroyed, why, it would be replaced by just another reservoir.

We believe that in some other areas of the country the people, the States, the Corps of Engineers, and whatnot, have come to recognize this, that as part of overall basin planning there ought to be some of these streams left untouched.

The other point that concerns us is this business of using the increase in land value and Federal sale of that land and Federal profit on the land as a part of the justification for a project.

PROJECT NATURAL RESOURCE MERIT REQUISITE

We believe that natural resources projects ought to be constructed on natural resource merits, and that we are opening a whole Pandora's box if we start to construct these projects on the basis of how much money the Federal Government can make on land sales.

PROJECT JUSTIFICATION PRECEDENT

I noticed that after the hearings last year that Nation's Business, the chamber of commerce magazine, discussed this with TVA, and they ran an article last November and reported there that in the course of their interview, TVA had reported that when Congress authorized the Tellico project this would set a precedent for the Corps of Engineers and other public agencies to use this new dimension as a part of project justification. We are quite concerned about this. I think that in the long run this could mean quite a change in our way of justifying public works projects, and we believe it deserves an awful lot of scrutiny before we go ahead with it.

Senator ELLENDER. Well, this project could not possibly pass the qualifying mark if you used the yardstick now in use by the Corps of Engineers. I pointed that out last year.

Mr. DENNIS. Yes, sir; and you pointed it out then. We are quite concerned, and we recognize the problem that you gentlemen have in the Appropriations Committee. We think if we are going to start this kind of concept, to start to use this kind of concept, it certainly deserves an awful lot of thought by Congress before it is endorsed.

Senator ELLENDER. Well, as I pointed out on many occasions, you have a kind of little empire there within the confines of what is known as the TVA, and we seem to have very little effect in trying to change present processes. They are doing what the Corps of Engineers should

do in many of the areas, and that is why I said awhile ago it appeared facetious but it won't be, because as chairman of the Public Works Subcommittee, I do not expect to have any projects obtain any money for them through the Corps of Engineers that were within the jurisdiction of the TVA. Let them handle it.

TRIBUTARY DEVELOPMENT GROUP

Mr. LACKEY. Gentlemen, in Tennessee we have an organization just formed nationwide that was set up particularly to stop this tributary development group.

Senator ELLENDER. Is your Governor a member of that and your Congressmen and Senators? They are the ones who could help on that.

Mr. LACKEY. You know Senator Gore's stand on this.

Senator ELLENDER. Yes, I know it.

Mr. LACKEY. But I also want you to notice, too, that we had a good deal to do in bringing the downfall of Senator Bass, this conservation group did, and we hope and live to see the day that we might help Mr. Gore along.

Senator ELLENDER. I hope you don't defeat him because of that, because I think he is honest about it. He is sincere.

Mr. LACKEY. I am honest the way I feel. I don't hold that against anybody. The way I feel I don't hold it against anybody. But I just don't like this kind of procedure and I will have to vote against him, Senator Ellender. That is just the way I feel.

Senator HILL. Well, your Congressman evidently favored this project, very likely; otherwise, the House would not have put it in.

Mr. LACKEY. Mr. Chairman, down in Tennessee, if you are against TVA that is a bad word, if you are against TVA in politics, in Tennessee that is a bad word.

The first thing to do is the big papers in Tennessee pick it up and crucify you. I am not going to say what position my Congressman took because it is Congressman Bill Brock's area, and I am not going to say what position he took but we had others that did not and voted for it over the State.

But our trouble has been TVA people are just smarter than we are, I guess.

Senator ELLENDER. They have the money.

Mr. LACKEY. We tried to present our point. I am not sorry for what I have done, and I hope TVA doesn't hold it against me when they go to take my land. There you are.

Senator ELLENDER. All you need to do is not agree to sell it to them, let the courts fix it.

Mr. LACKEY. Well, you cannot take it to the court with them. They have a three-man jury, you cannot take it to a 12-man court and get justice.

Senator ELLENDER. Yes, you can.

Mr. LACKEY. No, you cannot; no, sir.

Senator ELLENDER. Well, that shows you the power of TVA, and we will have to look into that, Senator Hill.

Mr. LACKEY. You cannot take it to a 12-man jury. They have a three-man jury of their own. I am sure they will pay decent price, I think they will. If they do not, I will see if I cannot help them along.

Senator ELLENDER. You mean, that is the land that is located behind this proposed dam?

INDUSTRIAL DEVELOPMENT AND RECREATION AREA

Mr. LACKEY. Yes, sir. You see, they are taking 5,000 additional acres for industrial development, they say between 30,000 and 40,000 acres, I do not know how many; that is what I have heard, but from what I have heard it is taking everything between the Tellico River and the Tennessee River back in there to the Smoky Mountain National Park for a recreation area.

If they leave us alone we will have more recreation on that river and have industrial sites, and still farm it.

Senator ELLENDER. Well, it is a very ambitious set of people.

Mr. LACKEY. The reason why we have not done anything—

Senator ELLENDER. After they acquire all this land between the lakes, it will be quite an attraction out there, I presume.

FISHING

Mr. LACKEY. Oh, man, you don't have to say that. There are 20 lakes within 50 miles of Knoxville, if you want to go fishing.

Senator HILL. Plenty of trout?

Mr. LACKEY. Yes, behind the dams. But the greatest fishing at the present time is in the Little Tennessee River. Of course, now I do not fish, but I like to cook them and eat them. They are delicious.

Senator HILL. You do not like to fish but you like to eat them when they are caught.

Mr. LACKEY. Yes.

Senator HILL. All you gentlemen appeared before the House committee, did you?

Mr. LACKEY. Yes, sir.

Senator HILL. Any further questions, Senator?

Mr. LACKEY. The only reason why I do not have a lot more with us, we could not raise enough money in the valley to send anybody up here but me, and we have been in the papers—stated that we are supposed to be rich, you see, but I had to go get a little money of my own to come up here. But anyway, we are just a group of people trying to save what we have, that is all, and we appreciate your help, if possible.

(Submitted statements and documents follow:)

WHY DAMN THE LITTLE TENNESSEE RIVER?

(By J. M. Lackey, President, Association for the Preservation of The Little Tennessee River)

In 1961, Chairman Vogel of the TVA Board of Directors questioned the feasibility of the Tellico Dam Project by suggesting that State and County help in financing would be necessary in reaching a favorable cost-benefit ratio. When this failed, more than one-third of the project benefits were assigned to a new criterion; "industrial development" and the proposal to condemn an extra 21,000 acres of land for re-sale at a profit of 10.9 million dollars was introduced to justify the project. Obviously, the traditional TVA concepts of flood control, navigation and power production were insufficient to allow capitalized benefits to exceed estimated costs of the project.

The State-Local Waterfront Industrial Site Committee with the TVA and State Planning Commission cooperation has identified thirteen available waterfront industrial sites in the immediate vicinity of proposed Tellico Dam. Tennessee already has 72,000 acres of industrial land on navigable waters. Nearby Melton Hill Lake was largely justified to provide barge transportation to 1,350 acres of industrial land for the Clinton-Oak Ridge area. To date, the one small industry located on a 25 acre site in this complex is *not* a barge user.

The TVA has repeatedly stated that "The key missing element to the industrialization of the Little Tennessee is water transportation." This is an admission that a navigable waterway to an upland, mountain valley is the only important contribution from Tellico Dam. However, no factory owner would deliberately locate 615 miles upstream from the Ohio River and pass up big industrial areas and available waterfront land on the lower river.

Much has been made of the good highway and rail access at Vonore (the area proposed for industry by TVA). What this really means is that this land already has prime industrial potential and existing advantages that would be destroyed by Tellico Dam, including riverfront sites and cold, clean processing water that industries such as food processors and pharmaceutical producers must have. The TVA plan would flood about 12,000 acres of prime farm land in order to acquire 5,000 acres of so-called industrial land in the face of no industrial land shortage. It will take an impressive amount of industry just to recoup the economic losses to be sustained as a consequence of the dam. A few of these losses are the disruption of 300 farm families, a \$3,000,000 annual yield in agricultural products, a \$1,000,000 forest tree nursery and a foreseeable \$5,000,000 float fishing and tourist industry.

Hammer and Company, Associates of Washington, D.C. made an exhaustive economic study of the potential for industrialization tied directly to waterway transportation in the Knoxville Metro area. Some particularly significant statements from this report are:

- (1) Nothing significant in the way of local industry has developed in Knox County based on water shipments either inbound or outbound.
- (2) Generally speaking, Knoxville has offered no competitive cost advantages with its river location.
- (3) In broad view, it now appears that the river is not likely to become a major factor in Knoxville—Knox County's economic development in the future as it relates to transportation.

The Hammer report points out rather emphatically the minor contribution of water transportation in Knoxville's industrial development. The Vonore area on Tellico Lake would have the same disadvantages of delay and expense of moving materials to the head of the Tennessee River system. A further handicap at Vonore is the lack of skilled labor, and all the social and supporting services required for complex industrial activity. An interesting note is that the rapidly expanding industrial cities in Tennessee e.g. Bristol, Morristown, Kingsport, Greeneville, Johnson City and Newport are located far from navigable waters.

The TVA has called the three-county area affected by Tellico Dam a "dying area". They would have it believed that these counties are suffering from an outmigration of their people due to unemployment and a sick economy, but this is refuted by statistical facts. Blount, Loudon and Monroe Counties had net population increases from 1960-1964. Figures from the Tennessee Banking Association reveal that the bank deposit increase in nine banks serving these counties from 1958 through 1964 was 74%. The "failing economy" of the tri-county area had bank deposits 36% greater than the state average and over 40% above the deposits increase for the entire United States. The percentage gain in retail sales and the payroll gain in the trades and services industry was considerably above the state average for the period 1958-1963. Figures from the Tennessee Department of Public Welfare reveal that the percentage of people in the affected area receiving public welfare assistance is below the state and national average. We, therefore, conclude that TVA's justification for constructing Tellico Dam on the basis of "industrial development in a distressed and needy area" is invalid.

The Knoxville Chamber of Commerce has made several studies of the TVA proposal to build Tellico Dam and each time refused to endorse it. The Tennessee River and Tributaries Association, one of TVA's staunchest supporters, has refused to take any stand. The Little Tennessee River Tributary Development Association, sponsored by TVA to analyze the proposal and urge construction of the dam, refused to support the project.

Other economic resources threatened by Tellico Dam include over 10,000 acres of productive bottom land yielding \$3,000,000 a year in agricultural products. The U. S. Census of Agriculture states that the three counties from 1955 to 1960, had a 40% increase in farm products sales. Present forest assets are valued at \$58,000,000 and by liquidating 15,600 acres of forest land from the tax rolls, the total forest wealth would be reduced by \$2,000,000 immediately,

also eliminating 156 forest jobs. Rose Island, a \$1,000,000 investment by Hiwassee Land Company and second largest commercial forest tree nursery in the south, will be destroyed plus nine years of genetic experimentation in breeding superior trees.

The Little Tennessee River Basin is steeped in historic values. Fort Loudoun, (under careful restoration) built 23 years prior to the American Revolution, would lose its historical setting and significance to the rising waters of Tellico Dam. Old Fort Loudoun's visitation rate is reaching a point to qualify it as comparable to a \$100,000 a year industry. The scientific and historical values of other outposts, Cherokee Indian towns and pre-Indian cultures dating back over 8,000 years cannot be measured in dollars and cents. Chota, the governing center of the Overhill Cherokees and sacred city of refuge, would be inundated. Also, Tuskegee Town, birthplace of Sequoyah who formed the Cherokee alphabet and Tennessee Town, which gave the state and two rivers their names. Other threatened village sites are Toqua, Tomotley, Seetacoo and Mialaquo.

Tellico Dam would also inundate an area of strategic importance in the development of Tennessee's tourist industry. The most logical expansion area for development of tourist related accommodations and services adjacent to the Great Smoky Mountains National Park is the upper Little Tennessee Valley. This is consistent with national park planning which would preserve the wilderness character of the Great Smokies by confining visitor facilities and commercial development to peripheral lands along the approaches to the Park. Responsible investors have expressed an interest in the development of service facilities for the more than 8,000,000 visitors already coming to the Great Smokies region.

The metered flow from Fontana Dam has created a unique, productive river habitat in the Little Tennessee with a capacity for trout equal to all the natural trout stream mileage of the state (Great Smoky Park excluded). The Little Tennessee in conjunction with nearby Chilhowee and Calderwood Lakes can provide a trout fishing complex comparable to the White River in Arkansas which contributes over \$5,000,000 to the economy of the Ozark Mountain region. The Foothills Parkway will provide easy access from Gatlinburg to its terminus on the Little Tennessee River and will serve as a new Park entrance.

The recreational claims for Tellico Dam are particularly insignificant because of the 18 major existing reservoirs within a 50 mile radius of the proposed lake. As for adding new warmwater fishing opportunity to the region, fish tagging studies have proved that 80% of our warmwater game fishes are not now being harvested. However, the problem of salvaging a few stretches of unspoiled, scenic riverway in our area is particularly acute because all major streams of any consequence are programmed for impoundment.

To conclude, the project is not necessary for development of water resources or flood control, the power contribution of 200 million kilowatts is particularly insignificant in view of the 73.3 billion kilowatt-hours that TVA produces today, and the 5,000 acres of so-called industrial sites to be created is just plain bad business in view of past performance on TVA reservoirs in the vicinity.

Secretary Udall referred to Tellico as a third rate dam. At this stage of water resources development in Tennessee, a third rate dam below the fifteen already present on the Little Tennessee should be constructed only if a compelling need is proved. This need has yet to be proved, otherwise more than 42 local and 12 national organizations would not be opposed to the project.

TVA APPROPRIATIONS

STATEMENT BY LOUIS S. CLAPPER ON BEHALF OF THE NATIONAL WILDLIFE FEDERATION

Mr. Chairman, the National Wildlife Federation is a private organization which seeks to attain conservation goals through educational means. Our organization has affiliates in 49 States. These affiliates, in turn, are made up of local clubs and individuals who, when combined with associate members and other supporters of the National Wildlife Federation number an estimated 2,000,000 persons.

We appreciate the invitation and opportunity to appear here today.

As we testified earlier, we join the Tennessee Conservation League, the Tennessee Farm Bureau Federation, and a host of other State and national organi-

zations in asking that \$3.2 million in construction funds for the Tellico project be deleted from the Public Works Appropriations Bill, H.R. 17787. We are extremely sorry that the House passed this bill with this feature being included in it. Frankly, we wish the Committee had more time to review this project because we are confident that, under close scrutiny, it is far too risky to warrant funding. It appears to us that the Tennessee Valley Authority is using its unique position of not needing individual project authorization to ram through a project which is unneeded, unjustified, and, to a considerable extent, unwanted. A list of organizations opposing Tellico dam is attached.

We oppose this project for several reasons.

Due to its large size and constant cold temperatures resulting from several upstream impoundments, the section of the Little Tennessee which would be inundated probably can support more trout fishing than any other stream in the area. Existing trout stream mileage in that area is declining at an alarming rate while 18 major reservoirs within a 50-mile radius already offer almost unlimited lake-type fishing opportunities. The Little Tennessee is almost unique as a producer of trout and enough trophy-sized brown trout from this stream already have been entered in national competition to dominate the Eastern Division contest next year.

As the Tennessee Game and Fish Commission accurately points out, this stream is located strategically between the Great Smoky Mountains National Park and the Cherokee National Forest. Access to resort areas in North Carolina is provided by Highway 129, which parallels the Little Tennessee. And, a new entry to the Park is being created right at the Little Tennessee River. Thus, the stream sustains a unique float fishery for trout and associated historical trips which will be more and more popular as time passes.

In our opinion, the justification for this project is exceedingly questionable. TVA claims a 1.4 to 1 benefit-cost ratio for the Tellico project. This is predicated upon navigational benefits of \$11.4 million, flood control benefits of \$13.7 million, and power benefits of \$8 million, with the biggest single alleged benefit listed as \$15 million for "general economic development." This is a total benefit of \$48,100,000.

Against this is a total project cost of \$42.5 million, less a return from land sales or projects of \$10.9 million, for a net cost of \$31.6 million.

It is with respect to TVA's land acquisition plan that we have the greatest concern. To provide for this "general economic development," TVA wants to create a prime industrial site. However, TVA wants to condemn 5,000 more acres of land than it needs for the project. Condemning this land at one price, TVA would sell it at a net profit of \$10.9 million. According to my computations, this is a net profit of \$2,180 per acre—a tidy sum, if realized.

We say, "if realized," because there is little besides TVA's faith and assurances to indicate that industry will be a clamoring buyer for this high-priced land.

It isn't as though other sites are not available. Last year, TVA itself said there were many prime industrial sites already available in the Tennessee Valley. In fact, TVA told the Appropriations Subcommittee that 23,740 acres in 26 areas were available. These are areas accessible already to 9-foot navigation, near a railroad, flood free and otherwise prime sites. In the Valley area comparatively near the proposed Tellico site there are 2,370 acres available on Chickamauga Reservoir, 3,840 acres on Watts Bar Reservoir, 1,600 acres on Fort Loudon Reservoir, and 1,080 acres on Melton Hill Reservoir. TVA itself had 1,732 acres available on these four reservoirs, including 875 acres at Melton Hill where TVA has been able to sell only one 25-acre tract. If there is such a great demand, why haven't these other sites been sold?

As we view it, unless TVA can sell these prospective industrial sites, the \$15 million for "general economic development" benefit is a pipe dream. And, unless TVA also can produce a whopping big profit on the land sale—at the expense of individual landowners—the margin of profit over cost is too small to risk destroying a beautiful valley as a monument to this "Big Brother" brand of bureaucracy. In fact, this has all of the earmarks of an unjustified, "Make Work" project—make work for TVA.

We don't like this scheme. We don't think TVA should be taking private property with the avowed intent of making a profit, particularly to lure industries to that region.

Thank you for the opportunity of making these remarks.

ORGANIZATIONS ACTIVELY OPPOSED TO THE TELLICO DAM PROJECT

The Wilderness Society	Greenback Farmers Cooperative
National Wildlife Federation	Vonore Lions Club
National Audubon Society	Chilhowee Rod and Gun Club
National Parks Association	Chattanooga Trout Association
Wildlife Management Institute	Highland Sportsman's Club
The Nature Conservancy	Cherokee Sportsman's Conservation Association
American Forestry Association	East Tennessee Historical Society, McMinn Chapter
Izaak Walton League of America	East Tennessee Duck Hunters Association
American Pulpwood Association	Sweetwater Valley Feeder Pig Association
Defenders of Wildlife	Knox County Young Republican Club
Trout Unlimited	Southern Field and Creel Club
Citizens Committee on Natural Resources	West Knoxville Sertoma Club
Tennessee Society of the Daughters of the American Revolution	Knoxville Men's Garden Club
Tennessee Game and Fish Commission	Knoxville Retriever Club
Tennessee Conservation League	Cherokee Rifle and Pistol Club, Incorporated
Tennessee Outdoor Press Association	Association for Preservation of Tennessee Antiquities
Tennessee Farm Bureau Federation	Ossoli Circle—Knoxville
Tennessee Livestock Association	Middle Tennessee Conservancy Council
Tennessee Federation of Garden Clubs	Scout Troop 3057
Southeastern Outdoor Writers Association	Y-Indian Guides
Association for Preservation of the Little Tennessee River	Appalachian Anglers
The Eastern Band of Cherokee Indians	Society of American Foresters, Kentucky-Tennessee Section
Cherokee Nation, Tribe of Oklahoma	James White Chapter, DAR, Knoxville
Fort Loudoun Association	Chamber of Commerce, Athens, Tennessee
Monroe County Farm Bureau	Outdoorsmen, Inc.—Kingsport
Monroe County Farmers Cooperative	
Monroe County Livestock Association	
McMinn County Farm Bureau	
Blount County Livestock Association	

TELLICO DAM FACT SHEET

The following list of 56 documented facts has been prepared to show some of the substantial and valid reasons why Tellico Dam is unfeasible and destructive:

1. TVA, unable to justify Tellico Dam on the traditional basis of navigation, flood control and power production, has added a new criterion, namely *industrial development*.
2. TVA will flood more than 14,000 acres of land behind Tellico Dam and acquire *all* the shoreline lands for a total of more than 30,000 acres.
3. The total industrial acreage TVA will "create" is a mere 5000 acres.
4. The present river has this same 5000 acres adjacent to it now, plus thousands of additional acres suitable for industrial use, which will be inundated.
5. TVA will have complete control of *all* shoreline properties, putting the federal government in direct competition with private property owners and developers.

6. The river today has the unusual advantage of extremely cold water, vital to specialized high-wage industries, available nowhere else in the area.
7. The reservoir will permanently raise the temperature of the waters, thus destroying the river's most unique industrial advantage.
8. The river is exceptionally clean and clear, an advantage to industry, municipalities and recreational interests.
9. The reservoir will be connected by a wide canal to Fort Loudoun Lake, the most heavily polluted in the TVA system, bringing heavy pollution into the presently fresh, pure Little Tennessee waters.
10. The need for barge sites on the Little Tennessee has never been demonstrated; the 13 major sites on the immediately adjacent Fort Loudon and Watts Bar navigable waterways have gone begging; and the two reservoirs have attracted but one small barge-using manufacturing industry in more than 20 years.
11. An authoritative study shows that in Tennessee there are 53 major navigable waterway sites totaling 72,000 acres, all with good rail and highway access, which can be bought for a total of from \$40,000,000 to \$50,000,000; the Tellico project will cost more than \$42,000,000 and will provide but 5000 acres.
12. The upstream distance of Tellico Reservoir from the Ohio and Mississippi Rivers and other major waterways greatly reduces its likelihood of use for significant amounts of barge transportation.
13. Tellico Reservoir is planned for a relatively remote area which has no commodities known to be suitable for barge shipment.
14. TVA will use the powers of condemnation to acquire all Tellico shoreline lands, then resell them for a profit, controlling both the buyer and seller markets.
15. More than 300 families will be displaced by the Tellico project, leaving them homeless and some without jobs.
16. Under TVA land acquisition policies, no landowner whose property is affected can obtain a trial by jury as redress.
17. The three affected counties will lose real property tax monies from the lands TVA will acquire, since TVA's in-lieu-of-tax payments remain fixed even though tax rates may rise; private property owners must pay higher taxes while the federal government does not.
18. The resource development efficiency of TVA in the more than 30 years the agency has operated is questionable; a total of 103 of the 210 TVA counties are included in the Appalachia poverty area.
19. The Tellico project will put TVA directly into industrial development activity, in competition with the more than 20,000 private community industrial development groups in the nation today.
20. The federal government will be in the position of dictating where industry may locate.
21. A precedent will be set which could enable TVA to gain ultimate control of the Tennessee Valley's industrial and commercial development.
22. Industries for the Tellico industrial sites will be solicited from other locations, taking away factories and jobs from other states through government subsidy at taxpayers' expense.
23. The three counties directly affected by the Tellico project are not losing industry, do not have a shortage of sites and two of them have navigable waterways already.
24. Other counties in the TVA area show marked population declines, drastic need for industry and severe industrial site shortages but are not receiving TVA assistance.
25. Only one of the three counties affected by the Tellico project showed a loss in population between the 1950 and 1960 federal censuses, despite a nationwide trend of population shifts from rural to urban areas; two of them showed population gains.
26. The possibility that TVA might build a dam on the Little Tennessee has for more than 20 years prevented any influx of industry to its riverfront sites due to the threat of inundation.
27. Uncertainty about plans for the dam have kept private investors from developing the recreational, residential, commercial and industrial potential of the river.
28. Flood control benefits from the dam would be minor; the Little Tennessee itself is already flood-free.

29. Downstream flood control would also be slight; Tellico Reservoir would add only 126,000 acre-feet of useful flood control storage to the existing 14,500,000 acre-feet of present TVA reservoirs.
30. The additional 200,000,000 kilowatt hours of electricity from Tellico Reservoir is insignificant compared to TVA's total output of 73,368,000,000 KWH.
31. Most of the power generated by TVA today is from steam plants instead of dams; the capacity of TVA steam plants in operation and under construction is 56,536,000,000 kilowatt hours, while the hydro capacity is only 16,832,000,000 KWH—including 28 TVA dams, 12 dams of the *Aluminum Company of America* and even five *U.S. Corps of Engineer dams* on the *Cumberland River* which is not even in the Tennessee Valley or the TVA system.
32. Valuable farmlands, woodlands, industrial sites, campsites, hunting areas, scenic roads and historic landmarks will be forever inundated by Tellico Dam.
33. Tellico Dam will adversely affect the dairy industry of East Tennessee; it will displace annual milk production valued at \$1,250,000.
34. Hiwassee Land Company's \$1,000,000 Rose Island Nursery and Seed Orchards, Tennessee's only industrial tree nursery, with a capacity to produce 30,000,000 seedlings a year—and eight years of experimental tree culture of significance to pulp, paper and wood industries throughout the nation—would be completely covered by water.
35. Twenty-two impoundments already surround the Little Tennessee in a 50-mile radius; the Little Tennessee itself is regulated by seven major dams, and no real need for another dam has ever been shown.
36. Tellico Dam will inundate the last free-running portion of the river, more than 33 miles long.
37. The dam will also impound 20 miles of a famous Little Tennessee tributary, the Tellico River.
38. The Little Tennessee can be developed as a recreation stream, as has been done in other states, which would attract millions of dollars in private developments, such as docks, motels, restaurants, tourist attractions and service facilities.
39. The stream provides unique opportunities for canoeing, fishing, nature study, archaeology, photography, camping, historical studies and scientific facilities.
40. As a trout fishery, the Little Tennessee has the best potential of any comparable stream in the eastern United States, with nearly ideal habitat conditions including food supply, water quality and living space.
41. The float fishing provided now by the river is distinctive, providing miles of trout fishing in the upper portions and a great variety of other sport fish species in the downstream sections.
42. No other stream in a six-state area surrounding the Little Tennessee provides the same float-fishing opportunities; no other major float streams exist at all in East Tennessee, due to earlier TVA impoundments.
43. Float fishing on the Little Tennessee enables the aged, crippled and handicapped who cannot wade and climb mountain streams, to enjoy trout fishing which is otherwise totally unavailable to them.
44. Because it is still a river, the Little Tennessee is an asset to the Great Smoky Mountains National Park—Cherokee National Forest—TVA lakes vacation complex, and through its special attractions complements the recreation resources of the entire region.
45. The Little Tennessee section to be inundated by Tellico Reservoir is the site of the principal villages of the original Cherokee Indian nation, including the sacred capital city, Chota; the birthplace of Sequoyah, inventor of the Cherokee alphabet and for whom the famous California tree species was named; and Tennessee, from which the state of Tennessee derived its name.
46. The river is the site also of prehistoric Indian cultures, of historic Tellico Blockhouse, white men's early forts and the original pathway of pioneers and soldiers of many nations.
47. The archaeological sites, which have tourist potential as well as scientific value, would be permanently lost; most of the state's other significant archaeological sites have already been destroyed by reservoirs.

48. Fort Loudoun, built 23 years prior to the American Revolution and laboriously restored over a period of many years, would be left on an island, partly diked, accessible only by boat or bridge, completely out of its historical and meaningful context, deprived of the whole significance of its present location.
49. TVA has stated repeatedly it would not build the dam "unless the people want it," yet the great majority of business and professional leaders, city councils, county governments, civic clubs and property owners specifically requested by TVA to endorse the project have refused to do so.
50. One of TVA's most ardent supporters, the Tennessee River and Tributaries Association, has failed to endorse the dam.
51. Opposition to the dam is from responsible citizens and respected organizations, diversified in nature, local and state-wide in scope.
52. The local organization set up by TVA to analyze the potential of the river, the Little Tennessee River Valley Development Association, has refused to support Tellico Dam.
53. Former TVA Chairman Herbert D. Vogel questioned the feasibility in 1961 of Tellico Dam, suggesting that state and local financial assistance might be called for if the dam were built.
54. Contrary to testimony given in subcommittee hearings by pro-dam spokesmen, the intent of the Bureau of the Budget originally was to disallow funds for the controversial Tellico Dam. This was accomplished on December 11, 1964. An emergency trip to Washington by Chairman Wagner was successful in getting money restored to begin the project.
55. The Department of Interior tried unsuccessfully to intervene with an impartial and objective study of the very important recreational, historical and esthetic resources of the Little Tennessee River valley which would have yielded the information needed by your committee for a fair and equitable appraisal of the project. Again, tremendous pressures forced the summary cancellation of the field investigation just as it was initiated.
56. The TVA is widely advertized as a conservation agency, yet every major national conservation organization is actively opposed to this unnecessary loss of irreplaceable natural resources. The strategic location of the upper valley as an expansion area for visitor accommodations and services to complement and preserve the Great Smoky Mountains National Park is sufficient to qualify the river for preservation until a proven need for Tellico Dam can be established.

COMPROMISE PLAN MEETING ALL OF THE MAJOR OBJECTIVES OF THE TVA TELLICO PROJECT

Public statements by Tennessee Valley Authority officials have documented the fact that traditional project objectives e.g. flood control and power generation have no national significance in justifying the proposed Tellico Dam project. Another reservoir for recreational purposes in a location which already has 22 lakes in a 50-mile radius is particularly insignificant. This leaves the development of a navigable waterway to the Vonore area and the reservation of potential industrial sites near Vonore as the primary justification for the dam.

Certainly, a 14,400 acre reservoir, thirty-three miles long, an expenditure of 41 million dollars and the acquisition of 30,900 acres of land is not necessary just to bring barge traffic to Vonore, which is near the midpoint of the proposed reservoir. A smaller dam at the mouth of the Little Tennessee River, with a lock, could provide the same navigable waterway to the Vonore area. This plan would have the advantage of preserving many level riverfront industrial sites, the Rose Island tree nursery, all of the important archaeological and historical sites, thousands of acres of rich farmland and the most scenic and productive portion of the river from a trout fishery development standpoint. The 38% allocation to recreational benefits could justifiably be retained because of the important function of the dam as a barrier to upstream migration of rough fishes.

A regional planning program to identify and reserve lands best suited to industrial, residential, agricultural and recreational purposes should have the highest priority. This can best be accomplished by a zoning authority which would allow full interplay of the free enterprise system and guarantee landowners full purchase value for their lands instead of a forced disposal through an inter-

mediary such as TVA. This would also preserve lands for the orderly development of a service area for visitors entering the Great Smoky Mountains National Park via the Foothills Parkway from Highway 129 and those attracted to intensively managed trout fisheries in Chilhowee Lake and the Little Tennessee River as well as transients enroute to the Fontana Lake resort area. The proposed Cherokee Crest Scenic Highway will terminate a short distance downstream on the opposite bank of the river and logically a bridge will be constructed to connect the Cherokee National Forest and the National Park. The Crest Highway will provide the most direct access from the north to the Tellico Wildlife Management Area.

The TVA as a demonstration agency has properly encouraged local planning and development organizations to lead out in all phases of industrial and resource enhancement in the Tennessee River Valley. We have here an outstanding opportunity for channeling the intense public interest both for and against the Tellico Project into a cooperative effort to realize the long delayed potential for economic and recreational development in the lower Little Tennessee Valley.

TENNESSEE GAME AND FISH COMMISSION,
Nashville, Tenn., September 26, 1966.

Senator LISTER HILL,
Chairman, TVA-AEC Appropriation Subcommittee.

DEAR SENATOR HILL: With the proliferation of governmental impoundments in Tennessee, we feel that opportunities for reservoir based recreational pursuits are adequately met. However, every stream with float fishing potential is programmed for or has been destroyed by impoundment.

Preservation of a few miles of the Little Tennessee River will (1) enhance public investment in adjacent federal lands by creating a favorable balance between lake and stream oriented recreational opportunity and (2) provide the most logical expansion area for overtaxed Smoky Mountain National Park facilities.

We appreciate the awakening interest of governmental and conservation agencies in the preservation of unique and scenic free-flowing streams. With the final destruction of this remnant of the Little Tennessee River, the opportunity for combining existing trout fishery, historical, agricultural, forest and scenic resources into an important regional asset will be lost.

Attached are nine important reasons for preserving the river as a recreational waterway.

Sincerely,

FRED W. STANBERRY, *Director.*

REASONS FOR PRESERVING THE LITTLE TENNESSEE RIVER AS A RECREATIONAL WATERWAY

(1) Because of the unique combination of factors creating nearly ideal habitat conditions for trout, the Little Tennessee River is possibly the most unique fisheries resource in the state.

(2) The artificiality normally associated with hatchery releases is minimized since fingerling rainbow mature under natural conditions and grow at nearly the same rate as hatchery produced trout. The TVA fisheries evaluation report makes reference to this.

(3) The productive capacity of the river for raising small trout to adult size is comparable to all the natural trout stream mileage of the Tennessee Appalachian range combined.

(4) The recreational claims for Tellico Dam are particularly insignificant because of the 18 major existing reservoirs within a 50 mile radius of the proposed lake. Planning studies show that most of the visitors to a new lake are attracted away from other lakes nearby, to the detriment of established businesses there. As for adding new warmwater fishing opportunity to the region, fish tagging studies have proved that 80% of our game fishes are not now being harvested.

(5) The system of governmental impoundments in Tennessee no longer provide the same attraction for non-resident visitors because of the proliferation of reservoir construction throughout the southeast and more recently in the midwestern states. This trend is confirmed in the steady decline of non-resident fishing licenses sold in recent years.

(6) Trout stream mileage is decreasing at an alarming rate in the east which puts a premium on the few remaining quality streams. Tennessee is a long narrow state soon to be traversed by two north-south interstate highways. The uniqueness and appeal of good trout fishing can provide an important attraction for diverting a larger portion of the tourist flow from the interstate highways and help the state to remain competitive in the tourist travel business.

(7) The Little Tennessee in conjunction with nearby Chilhowee and Calderwood Lakes can provide a trout fishing complex comparable to the White River in Arkansas which contributes over \$5,000,000 to the economy of the north-central Ozark Mountain region.

(8) The Tennessee Valley Authority has always been alert to possibilities for further development of fringe benefits and opportunities resulting from their primary responsibility of power production, navigation, and flood control. Examples are their pioneering efforts in fishery research on large impoundments and forest restoration in the Tennessee Valley. However, the recreational potential for cold-water fisheries development in tailwater rivers has been completely ignored.

(9) With the new Department of Interior emphasis on the preservation of unique and scenic free-flowing rivers, and the impetus given recreational development by the Bureau of Outdoor Recreation and the Appalachian Regional Commission this would seem to be an opportune time for a review of the potential of our remaining natural rivers.

Submitted by:

TENNESSEE GAME AND FISH COMMISSION,
FRED W. STANBERRY, *Director*.

EASTERN BAND OF CHEROKEE INDIANS CHARTERED AS A CORPORATION BY THE STATE
OF NORTH CAROLINA, QUALLA BOUNDARY CHEROKEE, NORTH CAROLINA

The Eastern Band of Cherokee Indians will suffer the final desecration of their ancient homelands if Tellico Dam is built. Lost forever will be seven of the original town places where the Cherokees developed an advanced civilization. The valley of the Little Tennessee River was the homeland of the Cherokees from the early 1500's until the Hiwassee Purchase of 1819-20. It was called the Overhill Cherokee County because of the numerous mountain ranges enclosing the Little Tennessee River basin like a horseshoe.

In a great bend of the river was *Chota*, called "Beloved and Sacred City" and "City of Refuge", by the Cherokees, where no man could be taken in violence within its precincts and where every man was accorded by the principal chiefs in the Counsel House. Leaders from all the Cherokee settlements gathered at *Chota* to decide matters of war, peace and trade.

To the northwest of the "Beloved Town" lies *Seetacoa*, called *Citico* in the late 1800's. *Ostenaco*, or *Judd's Friend* was principal chief here. In 1762, he and two Cherokee Chiefs accompanied Lieutenant Henry Timberlake to London. *Judd's Friend* was a welcome visitor at the home of Peter Jefferson, father of the great statesman, Thomas Jefferson who once wrote his father of a scholarly address given by *Ostenaco* at William and Mary College. When this Cherokee visited London, Sir Joshua Reynolds painted his portrait and Oliver Goldsmith, a notable English poet, became his friend. George II presented the Cherokee Chiefs with silver medallions bearing the Arms of England and the King's imprint.

From *Seetacoa* came many of the Cherokees who marched with Colonel Gideon Morgan, a Cherokee leader of 1812, who organized a Cherokee regiment to join Andrew Jackson's forces at the Battle of the Horseshoe Bend, and insure the U.S. forces victory over the Creek Indians.

Several miles below *Chota* was an even more ancient town of the Cherokees, *Tenassee Town*. The state of Tennessee and two rivers take their names from this once important site where Cherokee people lived.

Further down the Little Tennessee is *Toqua Town*. There a single Indian mound remains. An English map of 1762 shows three in this location. Others were here when the Cherokees first occupied the valley of the Little Tennessee. This ceremonial or burial mound would also be covered by Tellico Dam waters.

Below this town is the site of *Tomotley Town*. English troops were welcomed to bivouac here in September 1756. William Gerard DeBrahm, Surveyor-General in His Majesty King George II's service was permitted to establish his headquarters in *Tomotley* while Fort Loudoun was under construction.

Tuskegee Town adjoins the site of Fort Loudoun, built on a 700 acre grant from the Cherokees to the English King. Tuskegee was the birthplace of *Sequoyah* who formed a set of characters to express the sense and sound of the Cherokee language. This alphabet enabled the Cherokees to become a literary nation and to publish papers and books in their own language.

Mialaquo or *Great Island*, the sentinel island of the Overhill country, stands astride the Little Tennessee River about 17 miles above the mouth of the stream. Atta-Kulla-Kulla, the Little Carpenter, was Principal Chief here. He was the statesman and leader in the Cherokee tribes. In 1730 he visited England whose civilization and power made a lasting impression. He was a loyal and faithful friend to the English. *Mialaquo*, the home of many Cherokee leaders will be covered by the waters from the Dam.

At the time of the Hiwassee Purchase of 1819, U.S. Government agents were appointed to record claims for improvements on the lands to be ceded by the Cherokees. These Claim Records reveal the advance of the Cherokee peoples in civilization in 150 years.

They had substantial log and plank houses. One claimant of TOQUA lists three such dwellings on his lands, all with "chimneys and good roofs; 15 large apple trees all bearing, 30 peach trees, 18 acres of cleared land in one field under good fence and 4 acres of corn."

Sally Guess (Gist), wife of Sequoyah, lists personal property "table chairs, 1 large spinning wheel and 1 treadle, 1 pair cotton cards for use in spinning and weaving, ploughs and a set of harness."

Many of the Cherokees in the valley of the Little Tennessee were substantial farmers, owners of beef and milk cattle, raisers of large corn crops for which this rich river valley was famous for several centuries.

Many claims were filed by the Cherokees in 1820. These have never been satisfied.

The Cherokees have petitioned that the place of their forebears be preserved as a part of their rightful heritage.

CORRESPONDENCE SUBMITTED BY NATIONAL AUDUBON SOCIETY

NEW YORK, N.Y., April 22, 1966.

HON. ALLEN J. ELLENDER,

Chairman, Senate Subcommittee on Public Works Appropriations, U.S. Capitol, Washington, D.C.

DEAR SENATOR ELLENDER: In lieu of a personal appearance or oral testimony during the current hearings of your subcommittee, with respect to appropriations for the Tennessee Valley Authority, the National Audubon Society wishes to be on the record as strongly opposed to the Tellico Dam project on the Little Tennessee River.

If there is one thing that is non-essential to the program and objectives of TVA, it is another hydroelectric project. The Little Tennessee River is a stream of exceptional beauty and recreational value in its natural, free-flowing state. It is the only such stream as yet undammed or otherwise unspoiled in the region.

We respectfully urge the subcommittee to deny any funds for the initiation of the Tellico Dam project. We further hope that in the denial of the requested funds, the subcommittee will be emphatic enough in its report that the TVA will not be coming back next year with a repetition of the same request, in another attempt to build the same undesirable project.

Will you please make this letter a part of the record of your hearings on TVA appropriations.

Sincerely yours,

CHARLES H. CALLISON,
Assistant to the President.

CORRESPONDENCE SUBMITTED BY WILDLIFE MANAGEMENT INSTITUTE

WASHINGTON, D.C., April 27, 1966.

HON. ALLEN J. ELLENDER,
*Chairman, Subcommittee on Public Works, Senate Committee on Appropriations,
 Senate Office Building, Washington, D.C.*

DEAR SENATOR ELLENDER: The Institute joins with conservationists throughout the country in urging the committee to disallow funds again this year for the Tellico Dam Project of the Tennessee Valley Authority. We wish to reiterate our opinion that the passage of time has not made the project any less objectionable.

As the committee has been advised by the Tennessee Game and Fish Commission and many others, the Tellico Dam would destroy a river valley famed for its irreplaceable sport fishing, historical, scenic, and scientific values. Conservationists see little logic in permanently flooding some 15,000 acres of productive private land simply to obtain 5,000 acres or less of industrial sites. It is hoped that the \$2.9 million appropriation will not be allowed.

I would appreciate having this letter made a part of the hearing record.

Sincerely,

C. R. GUTERMUTH, *Vice President.*

TENNESSEE SCENIC RIVER ASSOCIATION,
Nashville, Tenn., September 26, 1966.

Senator LISTER HILL,
*Chairman, Senate TVA-AEC Appropriations Subcommittee on Public Works,
 New Senate Office Building, Washington, D.C.*

DEAR SENATOR HILL: The Tennessee Scenic Rivers Association strongly urges that you and your fellow committee members consider deleting funds for the Tellico Dam project from the impending Public Works Appropriation Bill.

The scenic rivers in our state are fast diminishing, and once lost, they can never be restored. Future generations are depending on our stewardship to leave them at least a vestige of the natural greatness that made America the nation it is today.

Respectfully,

ROBERT A. MILLER, *President.*

BELTSVILLE, MD., September 28, 1966.

Senator CARL HAYDEN,
*Senate Appropriations Committee,
 Senate Office Building, Washington, D.C.*

DEAR SENATOR HAYDEN: I hope and pray that your committee will save a rare gem, a clear, rugged trout stream, the Little Tennessee River from becoming just another TVA pond. Natural streams are becoming increasingly scarce; surely we are now mature enough to understand and cherish such natural beauty.

Hundreds of homes, a forest nursery, archaeological treasures, and recently restored Fort Loudon would be flooded by this unnecessary impoundment.

Sincerely,

NELLIE G. COOLEY.

SUBCOMMITTEE RECESS

Senator HILL. Well, thank you, gentlemen, very much. The subcommittee will now stand in recess until 2 o'clock this afternoon.

(Whereupon, at 12:20 p.m., the subcommittee recessed to convene at 2 p.m., the same date.)

(AFTERNOON SESSION, 2:10 O'CLOCK, TUESDAY, SEPTEMBER 27, 1966)

ATOMIC ENERGY COMMISSION

STATEMENT OF GERALD F. TAPE, COMMISSIONER; ACCOMPANIED BY E. J. BLOCH, DEPUTY GENERAL MANAGER; JOHN P. ABBADESSA, CONTROLLER; PAUL W. McDANIEL, DIRECTOR, DIVISION OF RESEARCH; ANDREW JACKSON, DIVISION OF SPACE NUCLEAR SYSTEMS; JOHN A. DERRY, DIRECTOR, DIVISION OF CONSTRUCTION; BERTRAM H. SCHUR, ASSOCIATE GENERAL COUNSEL; DAVID B. ANTHONY, ASSISTANT DIRECTOR, DIVISION OF MILITARY APPLICATION; A. GIAMBUSSO, ASSISTANT DIRECTOR, DIVISION OF REACTOR DEVELOPMENT AND TECHNOLOGY; WILLIAM A. WILLIAMS, DIVISION OF REACTOR DEVELOPMENT AND TECHNOLOGY; VICTOR CORSO, ASSISTANT CONTROLLER FOR BUDGETS; AND ROBERT H. BAUER, DEPUTY ASSISTANT CONTROLLER FOR BUDGETS

BUDGET REQUEST—HOUSE ACTION—PROPOSED AMENDMENT

Senator PASTORE. The subcommittee will kindly come to order. I should like to make an announcement before we proceed.

I have a letter here addressed to Mr. Carl Hayden, who is the chairman of the committee, from Mr. Hollingsworth, and I will ask at this time that it be placed in the record, and together with all the data with reference to the items.

(The letter and amendments follow:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., September 22, 1966.

HON. CARL HAYDEN,
*Chairman, Committee on Appropriations,
U.S. Senate.*

DEAR SENATOR HAYDEN: The House of Representatives on September 21, 1966, passed H.R. 17787, 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, 1967, 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 an amendment thereto for consideration by your committee.

Enclosed are 15 copies of the amendment proposed by the Atomic Energy Commission to H.R. 17787, together with the reasons therefor.

Sincerely yours,

R. E. HOLLINGSWORTH,
General Manager.

PROPOSED AMENDMENT TO THE PUBLIC WORKS APPROPRIATION BILL, 1967, ATOMIC ENERGY COMMISSION (H.R. 17787), (AS PASSED BY THE HOUSE OF REPRESENTATIVES)

Estimate submitted to the House:

Operating expenses-----	\$1,985,000,000
Plant and capital equipment-----	278,200,000
Total -----	<u>2,263,200,000</u>

Bill as passed by the House:

Operating expenses-----	1,923,000,000
Plant and capital equipment-----	276,030,000
Total -----	<u>2,199,030,000</u>

Change by House:

Operating expenses-----	-62,000,000
Plant and capital equipment-----	-2,170,000
Total -----	<u>-64,170,000</u>

PROPOSED AMENDMENT TO BILL

(1) Page 24, line 6, strike out "\$1,923,000,000" and insert in lieu thereof "\$1,938,000,000".

HOUSE REPORT No. 2044, PUBLIC WORKS APPROPRIATION BILL, 1967, ATOMIC ENERGY COMMISSION, OPERATING EXPENSES

Appropriation, 1966-----	\$2,121,900,000
Budget estimate, 1967-----	1,985,000,000
Recommended, 1967-----	1,923,000,000
Comparison:	
Appropriations, 1966-----	-198,900,000
Budget estimate, 1967-----	-62,000,000

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

Program	Appropriation, 1966	Budget estimate 1967	Recommended in bill	Change from budget estimate
Raw materials.....	\$210,000,000	\$163,015,000	\$163,015,000	-----
Special nuclear materials.....	376,000,000	354,228,000	354,228,000	-----
Weapons:				
Development, production, and storage of atomic weapons.....	491,291,000	459,100,000	454,100,000	-\$5,000,000
Testing of atomic weapons.....	195,727,000	174,700,000	209,700,000	35,000,000
Special test detection activities.....	5,382,000	5,200,000	5,200,000	-----
Total weapons.....	692,400,000	639,000,000	669,000,000	30,000,000
Reactor development:				
Civilian power reactors.....	81,800,000	94,480,000	93,480,000	-1,000,000
Cooperative power.....	21,300,000	22,724,000	22,724,000	-----
Euratom.....	5,500,000	2,000,000	2,000,000	-----
Merchant ship reactors.....	500,000	500,000	250,000	-250,000
Army power reactors.....	2,700,000	900,000	700,000	-200,000
Naval propulsion reactors.....	90,550,000	97,400,000	97,400,000	-----
Space propulsion systems.....	84,400,000	79,100,000	78,800,000	-300,000
Satellite and small power sources.....	52,800,000	45,350,000	45,350,000	-----
General reactor technology.....	58,000,000	59,100,000	59,100,000	-----
Advanced systems research and development.....	29,300,000	23,700,000	23,700,000	-----
Nuclear safety.....	34,450,000	38,365,000	37,000,000	-1,365,000
Operational services.....	6,750,000	4,792,000	4,792,000	-----
Total reactor development.....	468,050,000	468,411,000	465,296,000	-3,115,000
Physical research:				
High energy physics.....	97,850,000	109,800,000	107,850,000	-1,950,000
Medium energy physics.....	9,310,000	11,000,000	11,000,000	-----
Low energy physics.....	26,810,000	28,800,000	28,310,000	-490,000
Mathematics and computer re- search.....	5,900,000	6,400,000	6,400,000	-----
Chemistry research.....	49,850,000	53,500,000	52,850,000	-650,000
Metallurgy and materials research.....	24,780,000	26,800,000	26,280,000	-520,000
Controlled thermonuclear research.....	21,500,000	22,600,000	22,600,000	-----
Total physical research.....	236,000,000	258,900,000	255,290,000	-3,610,000
Biology and medicine.....	83,000,000	87,500,000	86,000,000	-1,500,000
Training, education, and information.....	15,838,000	17,300,000	16,100,000	-1,200,000
Isotopes development.....	11,600,000	14,780,000	14,370,000	-410,000
Civilian application of nuclear explo- sives.....	15,375,000	16,200,000	16,200,000	-----
Community.....	8,927,000	10,137,000	10,137,000	-----
Program direction and administration.....	83,371,000	86,547,000	86,547,000	-----
Security investigations.....	5,700,000	5,600,000	5,600,000	-----
Cost of work for others.....	12,200,000	16,740,000	16,740,000	-----
Change in selected resources.....	49,904,000	-27,088,000	-28,888,000	-1,800,000
Gross obligations.....	2,268,365,000	2,111,270,000	2,129,635,000	18,365,000
Revenues applied.....	-60,825,000	-58,000,000	-58,000,000	-----
Net obligations.....	2,207,540,000	2,053,270,000	2,071,635,000	18,365,000
Unobligated balances.....	-85,640,000	-68,270,000	-148,635,000	-80,365,000
Appropriation.....	2,121,900,000	1,985,000,000	1,923,000,000	-62,000,000

The total reduction of \$62,000,000 in the budget estimate recommended by the Committee includes a net reduction of \$14,692,000 made by the Joint Committee on Atomic Energy in its action on the legislation authorizing appropriations for the Atomic Energy Commission for fiscal year 1967 (Public Law 89-428, approved May 21, 1966). The additional net reduction of \$47,308,000 made in the Bill includes a decrease of \$56,848,000 due to the availability of actual carryover balances from fiscal year 1966 in addition to those contemplated at the time the Authorization Bill was passed. The new fund requirements for fiscal year 1967 can therefore be reduced accordingly.

Weapons program.—The net increase of \$30,000,000 provided over the budget includes an increase of \$35,000,000 for the underground weapons testing program and a decrease of \$5,000,000 in the development, production, and storage of atomic weapons based on the history of under-runs in expenditures. The \$35,000,000 increase for weapons testing consists of \$10,000,000 carried in the Authorization Bill in addition to the original budget request and a reprogramming of \$25,000,000

within available funds requested by the Atomic Energy Commission and approved by the Joint Committee on Atomic Energy subsequent to passage of the Authorization Bill.

Reactor development program.—The Committee has recommended a total of \$465,296,000 for the reactor development program, a decrease of \$3,115,000 in the budget estimate, including a net reduction of \$365,000 made in the Authorization Bill.

Civilian power reactors.—The allowance includes \$11,000,000, an increase of \$1,400,000 in the 1966 amount and a decrease of \$1,000,000 in the budget estimate, for the Heavy water, organic cooled reactor. The Commission has experienced a number of adverse developments in the Piqua organic cooled and moderated reactor and the Committee agrees with the Joint Committee which cautioned AEC in its report "to continue to maintain the closest surveillance and direction of this work and to eliminate effort not directly required to establish the technical feasibility of using this concept for the competitive generation of power."

Merchant ship reactors.—The Committee has approved a total of \$250,000 for this program, a decrease of \$250,000 in the budget estimate. As the AEC and the Maritime Administration have not yet completed their evaluation of this application of nuclear power, the Committee agrees with the Joint Committee that the research and development effort cannot be supported at this time. The \$250,000 allowed should be adequate for the conduct of further studies in connection with the program.

Army power reactors.—The Committee has approved the \$700,000 budgeted for improvements to existing portable medium power plants. It has deleted, however, the \$200,000 requested for study of the advanced reactor concepts which it is believed should be financed out of general research and development funds.

Space propulsion systems.—The Committee has allowed \$300,000, the same as the fiscal year 1966 level and a reduction of \$300,000 in the budget request, for the Isotopic thruster technology project. The amount allowed should be adequate to continue this new effort in fiscal year 1967 considering the big investment being made in larger systems.

Advanced systems research and development.—The Joint Committee authorized \$4,400,000, instead of the budget request of \$3,400,000, for direct conversion research and development to provide an effective generator of electricity for use in space applications. The Committee has approved this increase in the level of funding but believes that it can be financed readily by reprogramming within the \$465,296,000 that will be available under the reactor development program.

Nuclear safety.—The Bill includes \$37,000,000, an increase of \$2,550,000 for the nuclear safety program in fiscal year 1967. The decrease of \$1,365,000 made in the budget estimate is in accordance with the action taken by the Joint Committee in the Authorization Bill.

Physical research.—The Committee has allowed a total of \$255,290,000 for the physical research program, an increase of \$19,290,000 in the 1966 appropriations, and a decrease of \$3,610,000 in the budget estimate.

For the high energy physics program, the Committee recommends \$107,850,000, an increase of \$10,000,000 in the 1966 amount and a reduction of \$1,950,000 in the budget request. The Committee believes that the 10 percent increase allowed in the level of funding for this program should provide for essential requirements in fiscal year 1967. A similar increase was provided for fiscal year 1966.

As noted in the table above, the Committee has recommended minor decreases in the budget requests for the low energy physics, chemistry research, and metallurgy and materials research programs. In each instance, the Committee has allowed increases totaling about 6 percent which should provide for essential expansions in these fields of research considering the large increases which have been granted in recent years.

Biology and medicine.—The Committee has allowed \$86,000,000 for this program, the same as the amount contained in the Authorization Bill. This will provide an increase of \$3,000,000 in the 1966 appropriation and represents a reduction of \$1,500,000 in the budget estimate.

Training, education and information program.—The Committee recommends \$16,100,000, an increase of \$262,000 in the 1966 amount and a reduction of \$1,200,000 in the budget estimate, including \$700,000 made in the Authorization Bill. The committee is in agreement with the action of the Joint Committee which stated in its report that AEC should "review its overall training, education, and information programs with a view to determining if the overall directives are being achieved in the most efficient and economical manner."

Isotopes development.—The Committee recommends \$14,370,000, an increase of \$2,770,000 in the 1966 amount and a decrease of \$410,000 in the budget estimate.

The decrease consists of \$110,000 budgeted for process radiation development which was deleted in the Authorization Bill and \$300,000 for thermal applications of radioisotopes. For the latter item, the Committee has allowed \$700,000, an increase of \$300,000, which should provide for adequate expansion of this work in fiscal year 1967.

Civilian application of nuclear explosives (Plowshare).—The Committee has allowed the full budget request of \$16,200,000 for continuing this program, an increase of \$825,000 in the 1966 amount. The Authorization Bill included provision for an additional budgeted amount of \$1,500,000 to initiate Project Gasbuggy to demonstrate the feasibility of stimulating the production of natural gas by means of nuclear explosion. The Committee has approved this item but believes that it can be financed readily within the amount provided considering the delays being experienced in the Plowshare program.

Changes in selected resources.—The reduction in this item, \$1,800,000, is based on the reductions recommended by the Committee in the above programs.

Unobligated balances.—The additional general reduction recommended of \$80,365,000 is based on the carryover fund situation at the end of fiscal year 1966 including \$23,517,000 reflected in the Authorization Bill, and an additional \$56,848,000 based on the actual available unobligated balances as of June 30, 1966.

Plant and capital equipment

Appropriation, 1966.....	\$243, 995, 000
Budget estimate, 1967.....	278, 200, 000
Recommended, 1967.....	276, 030, 000
Comparison:	
Appropriation, 1966.....	32, 035, 000
Budget estimate, 1967.....	-2, 170, 000

The reduction in this item includes \$170,000 made in the Authorization Bill deleting the plant and capital equipment item related to the proposed cooperative demonstration project for the manufacture of radiation processed wood plastics deleted above under the Operating expenses appropriation. In addition, the Committee has deleted the \$2,000,000 included in the budget estimate for advanced design work on the prototype heavy water organic cooled reactor pending further study because of the difficulties experienced at the Piqua reactor as outlined above under the related Operating expenses item.

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

Project	Construction project	Allocation
67-1-a.....	Isotopes process development laboratory, Savannah River, S.C.....	\$2, 000, 000
67-2-a.....	Diagnostic chemistry building addition, Lawrence Radiation Laboratory, Livermore, Calif.	1, 600, 000
67-2-b.....	Weapons production, development and test installations.....	10, 000, 000
67-3-a.....	Fast flux test facility (AE only).....	7, 500, 000
67-3-b.....	Modifications and addition to SIW reactor facility, National Reactor Testing Station, Idaho.	10, 000, 000
67-3-c.....	Research and development test plants, Project Rover, Los Alamos Scientific Laboratory, N.Mex., and Nevada Test Site, Nev.	2, 000, 000
67-3-d.....	Fast neutron generator, Argonne National Laboratory, Ill.....	1, 900, 000
67-3-f.....	Modifications to reactors.....	3, 000, 000
67-4-a.....	Low energy accelerator improvements, Argonne National Laboratory, Ill.	400, 000
67-4-b.....	Accelerator improvements, zero gradient synchrotron, Argonne National Laboratory, Ill.	2, 000, 000
67-4-c.....	Accelerator and reactor additions and modifications, Brookhaven National Laboratory, N.Y.	800, 000
67-4-d.....	Accelerator improvements, Lawrence Radiation Laboratory, Berkeley, Calif.	1, 550, 000
67-4-e.....	Accelerator improvements, Cambridge and Princeton accelerators.....	1, 850, 000
67-4-f.....	Accelerator improvements, Stanford Linear Accelerator Center, Calif.....	400, 000
67-5-a.....	Biology laboratory, Pacific Northwest Laboratory, Richland, Wash.	5, 000, 000
67-6-a.....	Alpha fuels environmental test facility, Mound Laboratory, Miamisburg, Ohio.	3, 000, 000
67-7.....	General plant projects.....	39, 325, 000
67-8.....	Construction planning and design.....	2, 000, 000
66-5-e.....	Increase for Alternating gradient synchrotron conversion, Brookhaven National Laboratory, N.Y.	45, 800, 000
66-5-h.....	Increase for Meson physics facility, Los Alamos Scientific Laboratory, N. Mex. (AE only).	3, 000, 000
	Total, construction.....	143, 125, 000
	Capital equipment not related to construction.....	150, 205, 000
	Adjustments to fiscal year 1967 obligations (net).....	-300, 000
	Carryover funds from prior year's appropriation.....	-17, 000, 000
	Total appropriation.....	276, 030, 000

Amendment (1): increase of \$15,000,000 in the appropriation for operating expenses

The Commission requests restoration of \$15,000,000 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.....	\$163,015,000	-----	-----
Special nuclear materials.....	354,228,000	-----	-----
Weapons.....	1,639,000,000	\$30,000,000	-----
Reactor development.....	408,411,000	-3,115,000	-----
Physical research.....	258,900,000	-3,610,000	-----
Biology and medicine.....	87,500,000	-1,500,000	-----
Training, education, and information.....	17,300,000	-1,200,000	-----
Isotopes development.....	14,780,000	-410,000	-----
Civilian applications of nuclear explosives.....	16,200,000	-----	-----
Communities.....	10,137,000	-----	-----
Program direction and administration.....	86,547,000	-----	-----
Security investigations.....	5,600,000	-----	-----
Cost of work for others.....	16,740,000	-----	-----
Change in selected resources.....	-27,088,000	-1,800,000	\$15,000,000
Revenues and reimbursements from non-Federal sources.....	-58,000,000	-----	-----
Unobligated balance brought forward.....	-68,270,000	-80,365,000	-----
Total.....	1,985,000,000	-62,000,000	15,000,000

¹ Excludes \$25,000,000 of funds for supplemental test site requested in letter to Senator Hayden of Aug. 10, 1966, from Acting Chairman W. E. Johnson and \$10,000,000 additional weapons test costs added by Congress in fiscal year 1967 Authorization Act, both amounts approved by House action.

The reasons for the requested restoration are given below :

SELECTED RESOURCES

The Commission recommends that \$15,000,000 be provided under this heading to permit AEC to enter into a cooperative arrangement, in association with the Department of Interior, with the Metropolitan Water District of Southern California for a large combination nuclear power-desalting project. The Congress is presently considering authorization for this project. In our earlier submission of the authorization request, it was proposed that FY 1966 unobligated balances in the amount of \$15,000,000 be applied to this project and, therefore, no corresponding increase in appropriations would have been necessary. The House action, however, applies the free-unobligated balances carrying over from FY 1966 to the FY 1967 program without recognizing the need for obligational authority for the MWD project, since this project was requested after the House Appropriations Committee had completed its review of the AEC budget.

The MWD project contemplates two light water reactors of approximately 3,000 MWt capacity each and a net electric generating capacity of approximately 1,600 megawatts. The project would also include a desalting plant with an ultimate capacity of 150,000,000 gallons of water a day. It is expected that the principal arrangement would be between the Government as represented by the Department of Interior and Atomic Energy Commission and the Metropolitan Water District of Southern California. It is presently estimated that the total project costs, exclusive of power transmissions, would be \$400,500,000 of which \$153,700,000 would be attributable to the site and the desalting plant with its associated facilities. The AEC assistance would pertain to research and development; to design; to testing; or to first-of-a-kind or specialized features or components of the site and structure of the project.

In the absence of authorization, these funds would, of course, not be used.

CARRYOVER FROM UNOBLIGATED FUNDS

Senator PASTORE. Mr. Tape is here to represent the Atomic Energy Commission. He has a written statement.

You may proceed.

As I understand this bill, the cut recommended by the House was \$64,170,000.

Dr. TAPE. That is correct.

Senator PASTORE. Of that amount I understand that there was a \$56 million carryover from unobligated funds, is that correct?

Mr. ABBADESSA. That is correct.

UNAUTHORIZED BUDGET REQUEST

Senator PASTORE. And you are asking restoration of \$15 million of that?

Mr. ABBADESSA. We are not asking for any restoration of the items making up the \$64 million. We are asking for \$15 million for the MWD, which is an item that came up after the House considered our appropriation request.

Senator PASTORE. I would hope, Mr. Tape, you would go into quite some detail as to the essentiality of that project.

Dr. TAPE. We will cover that.

Senator PASTORE. I understand that has not been authorized.

Dr. TAPE. That is correct.

PREPARED STATEMENT

Senator PASTORE. Which raises a rather unusual procedure but we will hear the discussion on it and then determine how to handle it, whether it will be handled here or in a supplemental if it comes up, you see, and because it isn't authorized as yet. So you may proceed.

Kindly insert your prepared statement and justifications in the record at this point.

(The statement and justifications follow:)

PREPARED STATEMENT OF COMMISSIONER TAPE

Mr. Chairman and Members of the Committee, I am pleased to appear before your Committee to discuss the AEC's program and budget estimates for fiscal year 1967. Dr. Seaborg has requested that I express his regrets at his inability to appear personally today. As you know, he has not yet returned from a meeting of the International Atomic Energy Agency in Vienna. It is because of this long standing commitment that he is unable to present our budget to you this year.

The AEC budget submitted to the Congress in January requested appropriations of \$2,263.2 million of which \$1,985.0 million is for operating expenses and \$278.2 million for plant and capital equipment. The requested appropriation is \$102.7 million less than the amount appropriated for fiscal year 1966.

Authorizing legislation signed on May 21 would provide for 1967 appropriations of \$2,248.3 million, or \$14.9 million less than the amount requested.

The appropriation bill as passed by the House of Representatives on September 21 provides total appropriations of \$2,199 million, including \$1,923 million for operating expenses and \$276 million for plant and capital equipment. This represents a total reduction of \$64.2 million from our appropriation request—\$62.0 million for operating expenses and \$2.2 million for plant.

The Commission is not seeking restoration of any of the reductions made by the House. This was a most difficult decision for the Commission to make because inherent in this decision is a high risk to our ability to effectively discharge our responsibilities under the Atomic Energy Act. For this reason the Commission strongly believes that the Congress should give it flexibility within its overall appropriation to shift funds among its major operating programs. The Commission's decision that it would accept the House reductions was made in view of the expenditure demands of the Vietnam situation and the need for all of us to do our share in maintaining the stability of our national economy. The Commission believes that its decision is responsive to the President's message to the Congress of September 8, setting forth his program of action to reduce Federal expenditures.

With respect to the decision not to seek restoration of any of the reductions made by the House, the Commission would like to emphasize two points:

1. Under less stringent economic conditions than those that prevail today, we would, as a minimum, have appealed the House reductions in the weapons program (\$5.0 million), in the heavy water organic cooled civilian power reactors activity (\$1.0 million), in the physical research program (\$3.6 million), and in the training and education program (\$0.5 million). Each one of these areas is closely identified with major objectives of the Atomic Energy Commission and we do not consider that any of these reductions are low priority items. I am sure the Committee is familiar with the dedication to which the AEC has applied itself in meeting its weapons responsibilities, in developing economical civilian power reactors and the improvement of utilization of nuclear resources, in undertaking the basic research which provides the foundation supporting all of our technological advances, and with the need to encourage the education of our young scientists and engineers in the nuclear field. Therefore, I am equally sure that that this Committee and the Congress as a whole will appreciate that it is only in the interest of a larger National need that we are not seeking restoration of reductions made by the House in these areas.

2. As this Committee knows, the Commission administers its budget in strict accordance with the amounts the Congress has appropriated for its major programs. Because the House reductions, which we are not appealing, involve major programmatic areas and because our experience alerts us to the fact that presently unforeseen requirements may arise in our programs, the Commission believes that this year, more than ever, it is important that it have the flexibility to make budgetary adjustments among our programs to meet priority requirements that may develop. I would earnestly hope that this Committee in acting on our appropriation request will state in its report that it endorses the Commission having flexibility within its overall appropriation to make adjustments among program amounts in consideration of the fiscal restraint we are exercising in the effort to minimize Federal expenditures.

We are, however, proposing an amendment to the appropriation as passed by the House to provide \$15,000,000 for AEC participation in association with the Department of Interior, in a cooperative arrangement with the Metropolitan Water District of Southern California (MWD) involving the use of a nuclear reactor for the production of electric power and the desalting of sea water. Authorization for this arrangement, presently being considered by Congress, was requested after the House Appropriation Committee had completed its review of our budget, thus, this item was not considered by that Committee. Our use of these funds in FY 1967 would, of course, be subject to Congressional authorization of the proposed arrangement.

The MWD project consists of the development, design, construction and operation of a desalting plant, back pressure turbine, and nuclear power plant for the generation of electric energy. The project contemplates two light water reactors of approximately 3,000 MWt capacity each and a net electric generating capacity of approximately 1,600 megawatts. The project would also include a desalting plant with an ultimate capacity of 150,000,000 gallons of water a day. It is expected that the principal arrangement would be between the Government as represented by the Department of Interior and Atomic Energy Commission and the Metropolitan Water District of Southern California. It is presently estimated that the total project costs, exclusive of power transmissions, would be \$400,500,000 of which \$153,700,000 would be attributable to the site and the desalting plant with its associated facilities.

The AEC participation in this project will consist of assistance pertaining to the dual purpose aspect of the project, the siting and related design of the plants, the coupling of the desalting plant, the back pressure turbine and the nuclear power plants as well as to other aspects of the project involving the relationship of nuclear power and desalting. This assistance would generally apply to research and development, design, testing, or to first-of-a-kind or specialized features or components of the site, the structures, or components of the project. These areas of AEC participation are such as to require initiation of research and development early in the project and therefore the Commission desires to start work as soon as possible after appropriate authorization. The estimate for this assistance amounts to \$15,000,000 and our budget request in this amount would be included under the Changes in Selected Resources category of our operating expenses appropriation.

By letter of September 22, 1966 to Senator Hayden, we submitted the amendment to the House Appropriations Bill which would increase by \$15,000,000 the operating expenses appropriation approved by the House to provide funds for this project.

I would now like to talk briefly about each of our major programs for which funds are requested in the FY 1967 budget.

RAW MATERIALS PROGRAM

The budget request includes \$163.0 million in operating costs to provide for the procurement of 10,062 tons of uranium concentrates and oxides in FY 1967. This is a reduction of \$47.0 million in costs and 2,613 tons from the FY 1966 estimate.

The contracts for deliveries from foreign producers will expire at the end of Calendar Year 1966. The contract modifications for the domestic stretch-out program have been completed. Under 11 stretchout contracts, producers have agreed to postpone deliveries of about 15,000 tons from the 1963-66 period into 1967 and 1968. The Commission has agreed to purchase at reduced prices in 1969 and 1970 an amount equal to the quantities deferred.

SPECIAL NUCLEAR MATERIALS

Operating costs for the special nuclear materials program in FY 1967 are estimated at \$354.2 million, about \$21.8 million below the 1966 level. Most of this reduction is related to the curtailment in production of uranium enriched in the isotope U-235 and reflects Commission action taken a few years ago to reduce purchases of electric power. The estimate includes funds for the procurement of reactor products from domestic power reactor operators, as well as costs to be incurred for processing of spent reactor fuels in the first commercial processing plant built in this country. The estimates also include costs for developing or improving production processes, both to meet present program requirements, and to meet anticipated increased demands for new products. This latter effort is assuming increasing importance as the production program emphasis continues to shift from the production of weapons material to the production of a variety of different products for non-military purposes.

WEAPONS PROGRAM

The weapons program budget provides for the production of nuclear weapons required to meet the stockpile objectives as approved by the President, the conduct of a vigorous research and development program, conduct of the underground test program, maintenance of a readiness capability for atmospheric testing, and cooperation with the Department of Defense in special test detection activities. The FY 1967 budget submitted to Congress included \$639 million in operating expenses for these activities. Public Law 89-428, approved May 21, 1966, authorized an additional \$10 million for the underground weapons testing program. The Joint Committee on Atomic Energy in recommending this increase stated that they believed it essential to assure that sufficient funds were available in the AEC's weapons program to carry out all necessary test activities in FY 1967 and to conduct the long lead time preparatory work so that continued underground testing in FY 1968 will be able to proceed without delay.

On August 10, 1966, we requested approval by the JCAE and the House and Senate Appropriations Committees to increase the weapons program total operating costs by another \$20 million, for a total of \$669 million. This increase, as well as a \$5.0 million increase in obligational authority under the selected resources program, is required because of additional needs of the underground weapons testing program. We are pleased that the House action has provided the additional \$25 million for this purpose.

A decrease in the requirements for the production of new weapons, coupled with a decrease in funds required for the atmospheric test readiness program, permits a decrease in the overall weapons program operating fund estimates.

The budget request will permit the maintenance of the limited test ban treaty safeguards. We have and will continue to maintain modern and progressive laboratories. The state of atmospheric test readiness attained on January 1, 1965 will be retained, and the budget provides for the continuation of underground testing needed to maintain our progress in weapons technology and to carry out development and proof testing of new and stockpiled weapons.

The weapons program budget for plant and capital equipment is \$78.2 million. This includes \$51.6 million required for capital equipment for the laboratories, test and production complex and \$26.6 million for new construction.

REACTOR DEVELOPMENT

The fiscal year 1967 operating costs of the reactor development program are estimated at \$468.4 million at about the same level as the 1966 budget. These estimates provide for a wide range of activities related to development of nuclear reactors and devices, including development of economical central station power plants, propulsion reactors for Naval vessels and space vehicles, development of compact power sources for space and terrestrial applications, research in general reactor technology and the exploration of advanced reactor concepts.

Research and development costs for central station fast breeder power reactors will increase from \$24 million in 1965 and \$34 million in 1966 to \$45.7 million in 1967. A most important element of this increase is our program to bring qualified industrial firms and laboratories with special areas of competence into the development effort. This is being done to insure maximum possible industrial contribution in the development problem areas of fuels and materials, physics, sodium technology and component engineering and proof testing. To provide the necessary test facilities for the fast breeder reactor program, we are proposing design funds of \$7.5 million for a fast flux test facility. Increased emphasis is also being given to our heavy water organic cooled reactor program. Increased program effort is also planned for Naval propulsion reactors, SNAP radioisotope power systems, nuclear safety research and development, and for our desalting program.

These increased efforts have been funded without increasing the total reactor development program budget through Commission assessment of its developmental priorities resulting in curtailment or termination of some activities. Our FY 1967 estimates reflect the termination of our work on the experimental gas cooled reactor project (EGCR), the fast reactor test facility (FARET), the medium power reactor experiment (MPRE), and the tungsten work on our nuclear rocket development program (ROVER). While I would not wish to leave the impression that work we have terminated or are about to terminate was without merit, we believe that we have a responsibility to support high priority items even though it means the curtailment of other activities.

PHYSICAL RESEARCH

Our support of basic research in the physical sciences is provided through the physical research program. Our objective is the reduction of different phenomena to fundamental principles through which known facts are understood and from which new principles may be predicted. As you know, investigations are undertaken in the fields of high energy physics, medium energy physics, low energy physics, mathematics and computer, chemistry, metallurgy and materials, and controlled thermonuclear research. We are requesting \$258.9 million for FY 1967 operating costs, an increase of \$22.9 million or about 10% over the 1966 estimate of \$236.0 million.

Approximately one-half of the \$22.9 million increase in cost proposed for FY 1967 is related to the high energy physics program. While our current dollar projections and construction schedules have slipped somewhat from those included in the document "Plan for National Action in the Field of High Energy Physics" this document still serves as the basis for our planning in this area of research. The budget provides for increases necessary to make effective use of presently operating machines and to initiate research operations (about 5 shifts/week) with the Stanford Linear Electron Accelerator. We are also increasing our effort and studies of advanced accelerator concepts with the aim of improving the characteristics of existing machines and defining the parameters of new areas which will extend the frontiers of energy and intensity.

In the field of medium energy physics, over one-half of the requested increase of \$1,690,000 is required to continue R&D associated with the Los Alamos Meson Physics Facility.

Other increases are proposed for work in low energy physics, mathematics and computer, chemistry and the materials sciences.

In the controlled thermonuclear program, progress has continued to be encouraging. World effort is now focusing on the last major roadblock: plasma stability. One important class of instabilities has already been suppressed in straight systems and the outlook for controlling the remaining classes is steadily improving. The detailed review of the CTR program which was undertaken at the request of the JCAE, has now been concluded. The resulting policy and

action paper, which has now been formally adopted by the AEC will serve as a guide to the future development of this program.

BIOLOGY AND MEDICINE

The proposed budget of \$87.5 million, an increase of \$4.5 million over the 1966 level, provides for research on the effects of radiation on living organisms and on the environment, protection against the injurious effects of radiation, and development of methods for using radioactive materials in the diagnosis, treatment, and understanding of human diseases.

The increase of \$4.5 million is the net result of a number of program changes. Limited program growth is proposed in work on somatic effects of radiation, radiation genetics, molecular and cellular studies and radiological and health physics and instrumentation. To help provide for this growth, we are planning reductions in a number of research activities. Among these, are reductions in the stratospheric sampling portion of the atmospheric radioactivity and fallout program, aerial radiological monitoring research in the nuclear energy civilian effects program and studies of the biological and environmental consequences of nuclear war.

TRAINING, EDUCATION, AND INFORMATION

Our operating budget for training, education and information activities for fiscal year 1967 totals \$17.3 million. 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 equipment grants, faculty training institutes and cooperative programs between universities and AEC laboratories; operation of the Puerto Rico Nuclear Center; the furnishing of international advisory and consultant services; and special assistance to the states for training in radiation control.

This program also includes the activities conducted to fulfill the Atomic Energy Commission's responsibilities for effective dissemination of the continuously increasing volume of scientific and technical information. In this connection, we provide information services and materials throughout the AEC complex, its contractors, private industry and the general public. This includes information having non-nuclear applications developed by AEC contractors during the course of nuclear oriented work. We plan also to continue our domestic and overseas exhibit program and our support for topical scientific and technical conferences related to nuclear energy science.

Plant and capital equipment obligations in the amount of \$879,000 for the training, education and information program are budgeted for fiscal year 1967. This amount includes \$200,000 for general plant projects and \$679,000 for capital equipment not related to construction.

ISOTOPES DEVELOPEMENT

Our operating budget for the isotopes development program is \$14.8 million—\$3.2 million over FY 1966. As the Committee may be aware, this program plays an important role in the Commission's development of radioisotopic fuels for use in space missions—such as the SNAP 27 for APOLLO—as well as in developing radioisotopic power and heat sources for other programs in the terrestrial and underseas environment. The budget increase for this program is concentrated almost entirely in this fuels area, which includes development work on plutonium 238, polonium 210, curium 244, and promethium 147, the radioisotopes we believe will be most in demand to support various DOD and NASA missions.

Work will also continue on developing other uses for radioisotopes and radiation, one example of which is our program on radiation pasteurization of foods—a program with which I am sure the Committee is familiar.

The plant and capital equipment obligations for this program are estimated at \$6.3 million, and include provision for a \$2.5 million alpha fuels environmental test facility to be located at Mound Laboratory at Miamisburg, Ohio. The balance of the requirement—\$3.8 million—representing equipment needed to support this program's development activities, primarily the isotopic power and heat source fuels work I have just mentioned.

PLOWSHARE

Our 1967 operating budget of \$16.2 million for the development of civilian applications of nuclear explosives is approximately \$0.8 million above the 1966 program level.

The primary program emphasis continues to be on the development of nuclear excavation technology. All of the cratering experiments necessary to the development of this technology are being designed to meet the requirements of the limited nuclear weapon test ban treaty. Also, the excavation program is oriented so as to support the requirements of the Atlantic-Pacific Interoceanic Canal Study Commission.

We will also continue both our scientific investigations using the very intense neutron pulses which are available only from nuclear explosions and our studies of possible industrial applications for nuclear explosives in the natural resources field.

During the course of its review Congress authorized, and the House of Representatives provided \$1.5 million for an additional Plowshare experiment known as Gasbuggy, an experiment in New Mexico to study whether the effects of a nuclear explosive will stimulate the production of natural gas. We believe this experiment would be a valuable technical contribution to the development of the technology for the peaceful application of nuclear explosives.

Capital equipment obligations in support of Plowshare activities in 1967 are estimated at \$505,000, or about the same as the 1966 estimate.

COMMUNITY PROGRAM

The FY 1967 estimate of \$10.1 million for the community program provides for assistance payments to the former AEC communities of Oak Ridge and Richland, and provides for the operation of the Los Alamos, New Mexico community, and assistance payments to the hospital and school system at Los Alamos. Government ownership of the town of Los Alamos will be terminated over the next few years. The hospital was transferred to the Lutheran Hospitals and Homes Society of America, Inc. on January 1, 1964. The school system was transferred to the Los Alamos Board of Educational Trustees at the beginning of this fiscal year, and housing sales are in process.

PROGRAM DIRECTION AND ADMINISTRATION

The salaries and other costs of the Federal employees engaged in the management and technical direction of AEC operations and conduct of the Commission's regulatory functions are included under this program. The 1967 estimate of \$86.6 million is \$3.2 million above the 1966 estimate. The budget provides for an end-strength at 6/30/67 of 5,628 regular full-time employees, an increase of 88 above the 6/30/66 level of 5,540.

Mr. Chairman, Members of the Committee, this concludes my prepared statement. The details in support of these amounts have been provided to the Committee in the budget justification material submitted earlier in the year. I would be pleased, together with the Commission's staff, to answer any questions you may have on our programs and budget estimates.

GENERAL STATEMENT FOR OPERATING EXPENSES

Estimate of appropriation

The budget estimates for Operating Expenses for fiscal year 1967 provide for total obligations of \$2,111,270,000 to be funded by (1) a new appropriation of \$1,985,000,000, (2) the utilization of an unobligated balance of \$68,270,000 estimated to be available at the end of fiscal year 1966, and (3) an estimated \$58,000,000 to be received as revenues from non-Federal sources during the fiscal year.

Estimates of costs and obligations

The budget estimates for this appropriation are stated in terms of accrued costs for each of the AEC's operating programs. "Accrued costs" denotes the actual application of labor, materials and services to the program during the year, but excludes depreciation of facilities used in the operations. The AEC does, however, maintain accounts for depreciation for the purpose of determining total costs of production and for use in establishing prices for services rendered or products sold to others.

The costs of operation are reconciled to the total obligations to be incurred during the year by estimating the build-up or decrease during the year of the resources that are to be applied to future years' operations. These estimates are included in the section titled, "Increase or Decrease in Selected Resources" and include inventories and undelivered orders.

From total obligations are deducted the revenues estimated to be obtained from non-Federal sources in order to arrive at the amount of appropriations required. These revenues are obtained from AEC-owned community and housing operations, from the sale of products, from services performed for others, and from other miscellaneous sources. These revenues are identified and summarized under the tab "Revenues Applied".

The following table summarizes the accrued costs for each program, and the total obligations for 1965, 1966, and 1967. The detailed justifications present the programs in the same order as they appear on this summary table.

Summary of accrued operating costs by program reconciled to net obligations

	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
Accrued costs by program:			
Raw materials.....	\$260,967,957	\$210,000,000	\$163,015,000
Special nuclear materials.....	392,984,507	376,000,000	354,228,000
Weapons.....	706,968,451	692,400,000	639,000,000
Reactor development.....	477,538,890	468,050,000	468,411,000
Physical research.....	212,561,290	236,000,000	258,900,000
Biology and medicine.....	77,151,510	83,000,000	87,500,000
Training, education, and information.....	15,464,826	15,838,000	17,300,000
Isotopes development.....	8,832,125	11,600,000	14,780,000
Civilian applications of nuclear explosives.....	10,677,714	15,375,000	16,200,000
Community.....	8,179,434	8,927,000	10,137,000
Program direction and administration.....	77,894,602	83,371,000	86,547,000
Security investigations.....	5,285,622	5,700,000	5,600,000
Cost of work for others.....	12,371,679	12,200,000	16,740,000
Adjustment to prior year costs.....	28,058,936		
Total accrued program costs.....	2,294,937,543	2,218,461,000	2,138,358,000
Increase or decrease in selected resources.....	-82,254,272	49,903,778	-27,088,000
Total obligations for operating expenses.....	2,212,683,271	2,268,364,778	2,111,270,000
Less revenues applied.....	-47,022,968	-60,825,000	-58,000,000
Net obligations (financed by appropriated funds).....	2,165,660,303	2,207,539,778	2,053,270,000

Financing of obligations

The financing of the estimated total obligations of \$2,111,270,000 proposed in the budget estimates for 1967, together with comparable data for 1965 and 1966, is summarized in the following table:

Summary of financing

	Actual, Fiscal year 1965	Estimate, Fiscal year 1966	Estimate, Fiscal year 1967
Funds available for obligations:			
Unobligated balance, beginning of year.....	\$58,017,589	\$153,912,014	\$68,270,000
Appropriation.....	2,261,573,000	2,121,900,000	1,985,000,000
Transfer to "Operating Expenses, Public Building Services," General Services Administration (78 Stat. 655 and 79 Stat. 531).....	-18,272	-2,236	
Revenues received from non-Federal sources.....	47,022,968	60,825,000	58,000,000
Total funds available for obligation.....	2,366,595,285	2,336,634,778	2,111,270,000
Less unobligated balance, end of year.....	153,912,014	68,270,000	
Total obligations incurred.....	2,212,683,271	2,268,364,778	2,111,270,000

Expenditures for operating expenses

Expenditures from the Operating Expenses Appropriation for 1967 are estimated at \$1,995,000,000. The estimated amounts available for expenditure in 1965, 1966, and 1967, the expenditures for each year, and the remaining unexpended balances are shown in the following table:

Expenditure analysis

	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
Funds available for expenditure:			
Unexpended balance, beginning of year:			
Obligated.....	\$961,303,986	\$872,495,740	\$1,030,035,518
Unobligated balance.....	58,017,589	153,912,014	68,270,000
New appropriation.....	2,261,573,000	2,121,900,000	1,985,000,000
Transfer to "Operating expenses, Public Building Services," General Services Administration (78 Stat. 655 and 79 Stat. 531).....	-18,272	-2,236	-----
Total funds available for expenditure.....	3,280,876,303	3,148,305,518	3,083,305,518
Less expenditures.....	2,254,468,549	2,050,000,000	1,995,000,000
Unexpended balance, end of year:			
Obligated.....	872,495,740	1,030,035,518	1,088,305,518
Unobligated balance.....	153,912,014	68,270,000	-----
Unexpended balance, end of year.....	1,026,407,754	1,098,305,518	1,088,305,518

HIGHLIGHTS OF OPERATING PROGRAMS

There follows a brief description of each of the programs set forth in the summary on page 93.

1. *Raw Materials Program.*—Operating costs for the raw materials program are estimated at \$163.0 million in 1967, compared with 1966 estimated costs of \$210.0 million and 1965 actual costs of \$261.0 million. The raw materials program provides for procurement of uranium concentrates from foreign and domestic sources. Procurement of uranium concentrates decreases in 1967 principally as a result of (a) expiration of the contracts with Canada and South Africa on December 31, 1966 and (b) expiration of certain domestic contracts as of December 31, 1966, as a result of the contractors determination not to participate in the stretchout program.

2. *Special Nuclear Materials Program.*—Operating costs for the special nuclear materials program are estimated at \$354.2 million in 1967, compared with 1966 estimated costs of \$376.0 million and 1965 actual costs of \$393.0 million. Special nuclear materials are produced to meet weapons production schedules and requirements for other programs. Uranium concentrates are processed into feed materials from which plutonium and other products are produced in the reactors at Richland, Washington, and Savannah River, South Carolina, and the isotope uranium 235 is extracted in plants at Oak Ridge, Tennessee, Paducah, Kentucky, and Portsmouth, Ohio. Production of uranium 235 will continue to decrease in 1967 as a result of reductions in cascade power. Work will continue on process improvements to assure continuity and safety of operation, more economical methods of production, and more timely development of new production processes as requirements for new products develop.

3. *Weapons Program.*—Operating costs for the weapons program are estimated at \$639.0 million in 1967 compared with 1966 estimated costs of \$692.4 million and 1965 actual costs of \$707.0 million. The weapons program encompasses the production of atomic weapons; the maintenance of stockpiled weapons in a state of constant readiness; the design, development and underground testing of new weapons types; maintenance of a readiness capability to resume atmospheric testing; and participation with the Department of Defense in the development of test detection methods.

4. *Reactor Development Program.*—Operating costs for the reactor development program are estimated at \$468.4 million in 1967 compared with 1966 estimated costs of \$468.0 million and 1965 actual costs of \$477.5 million. Emphasis will continue to be placed on advancing power reactor technology in order to achieve large scale generation of economic electrical energy from atomic reactors. In particular, the development program on fast breeder reactors will increase substantially to support the plan leading to an economic fast breeder nuclear power plant. Special attention will be given also to the timely development and use of nuclear energy for desalting sea water. Cooperative endeavors will be continued between the Commission and industrial groups, as well as with the European Atomic Energy Community (EURATOM) and Canada.

The estimates provide for research and development in advanced systems and technology, and in nuclear safety with particular emphasis directed towards engineered safeguards.

Development of nuclear reactors for propulsion of naval vessels and for propulsion rockets for space applications (Rover Program) will be continued. Reactors are also being developed to meet power requirements for remote areas, and to provide electric power and heat for satellites. Radioisotope power sources development will also be continued.

Operation of test facilities and experimental reactors will be continued at the National Reactor Testing Station in Idaho, and at other locations.

5. *Physical Research Program.*—Operating costs for the physical research program are estimated at \$258.9 million in 1967 compared with 1966 estimated costs of \$236.0 million and 1965 actual costs of \$212.6 million. The physical research program consists of theoretical and experimental investigations required to support the Commission's immediate and long-range objectives for utilizing nuclear energy. Advances achieved in the past can be traced back to similar laboratory investigations. In the atomic energy program, research plays a relatively more important role than in other industrial operations of comparable size. The phenomena dealt with are at the forward boundaries of scientific knowledge. Unusual materials are employed and their nuclear, as well as their chemical and physical properties, must be determined. The temperatures and radiation densities at which these materials are used are outside the range of previous experience in industrial technology. Also included in the estimates for this program are funds for the Enrico Fermi awards, \$50,000, and for the Ernest O. Lawrence awards, \$25,000.

6. *Biology and Medicine Program.*—Operating costs for the biology and medicine program are estimated at \$87.5 million for 1967, compared with estimated costs of \$83.0 million in 1966 and actual costs of \$77.1 million in 1965. Primary emphasis will continue to be placed on research directed toward the protection of the health and safety of atomic energy plant workers and the general populace from the hazards of atomic energy operations. Research on radioactive fallout will be reduced. Related research in the biological hazards of radiation will be expanded with increasing attention being given to large scale studies of chronic effects of radiation. There will be a continuing research effort in beneficial applications of radiation and radioisotopes in medicine and agriculture, and in cancer research. Close liaison will continue to be maintained with other agencies performing functions interrelated with AEC biomedical interests. Research is carried on by AEC laboratories, universities and other independent institutions.

7. *Training, Education and Information.*—Operating costs for the training, education and information program are estimated at \$17.3 million in 1967 compared to 1966 estimated costs of \$15.8 million and 1965 actual costs of \$15.4 million. Primary program emphasis will be placed on broadening the base of nuclear technology. Program efforts are directed toward provision of assistance to colleges and universities in establishing nuclear curricula; provision of assistance to states for training in radiation control: operation of the Puerto Rico Nuclear Center; conduct of specialized courses; administration of cooperative programs between universities and AEC laboratories; offering of graduate fellowships in the nuclear energy field, including a traineeship program; assisting in scientific and technical conferences and presenting nuclear science demonstrations and exhibits; and development and dissemination of technical information.

8. *Isotopes Development.*—Operating costs for the isotopes development program are estimated at \$14.8 million in 1967 compared to 1966 estimated costs of \$11.6 million and 1965 actual costs of \$8.8 million. The program consists of research and development activities required to accelerate realization of the potentially vast uses of radioisotopes and radiation technology. The program includes research and development on application of high level or massive radiation, large scale economic uses of fission product wastes, and methods and technology for preservation of foods by irradiation. An increasingly important area is the development of isotopic power and heat sources for space and terrestrial needs. Much of this work is carried out in cooperation with industry and other government agencies.

9. *Civilian Applications of Nuclear Explosives.*—Operating costs for the civilian applications of nuclear explosives program (PLOWSHARE) are estimated at

\$16.2 million for 1967 compared to estimated costs of \$15.4 million in 1966 and actual costs of \$10.7 million in 1965. The program provides for the investigation and development of peaceful uses for nuclear explosives. Continued emphasis is being placed on the development and testing of "clean" devices for use in large scale excavation projects.

Activities planned for 1967 include effort on the development of explosives and technology for nuclear excavation and continuation of promising work on explosives capable of producing heavy elements.

10. *Community.*—Operating costs for the community program are estimated at \$10.1 million in 1967 compared to 1966 estimated costs of \$8.9 million and 1965 actual costs of \$8.2 million. In accordance with previously enacted legislation, the AEC in 1967 will continue to gradually shift operation of the Los Alamos Community to the County. The gross program estimate of \$10.1 million includes \$7.7 million for the Los Alamos Community of which \$50 thousand is for assistance payments to the hospital, \$2.9 million is for assistance payments to schools, and \$4.7 million is for operation of the town. The remaining \$2.4 million is for assistance payments to the former AEC Communities of Oak Ridge, Tennessee, and Richland, Washington, in accordance with the Atomic Energy Community Act of 1955, as amended. Operating revenues for Los Alamos (budgeted under Revenues Applied) are estimated at \$3.8 million.

11. *Program Direction and Administration.*—Operating costs for program direction and administration are estimated at \$86.6 million in 1967 compared to 1966 estimated costs of \$83.4 million and 1965 actual costs of \$77.9 million. An increase in staff of 88 employees is budgeted for 1967 under this program. Estimates for program direction and administration cover the salary costs and other expenses of Commission personnel engaged in general management, executive direction, and technical supervision of program operations; the negotiation and administration of contracts; other related administrative activities; and the discharge of regulatory functions.

12. *Security Investigations.*—Costs of investigations performed by the Civil Service Commission and the Federal Bureau of Investigation, at the request of the Commission, of persons to be employed on work involving access to restricted data, under the provisions of the Atomic Energy Act of 1954, as amended, in 1967 are estimated at \$5.6 million compared with 1966 estimated costs of \$5.7 million and 1965 actual costs of \$5.3 million.

13. *Cost of Work for Others.*—Cost of work for others is estimated to be \$16.8 million in 1967, compared to 1966 estimated costs of \$12.2 million and actual costs of \$12.4 million in 1965. This program includes costs incurred by the Commission in furnishing materials and services to industrial organizations and other private parties apart from those which it provides normally for its own basic program. The costs are incurred only upon the request of others. Charges are made for these materials and services and the revenues derived are included under "Revenues Applied."

14. *Increase or Decrease in Selected Resources.*—This program covers changes in inventory stocks held by AEC and its contractors, collateral funds, and goods and services on order under contract. The appropriation requirements for these items are based on the changes in balances from the previous fiscal year. Balances at end of 1967 are estimated at \$874.1 million as compared with \$901.2 million at the end of 1966, or a decrease of \$27.1 million in 1967. Balances at the end of 1965 were \$851.4 million.

15. *Revenues Applied.*—This program includes income from sale and lease of products and from services rendered, revenues from communities, and other miscellaneous income items. These revenues are applied against Atomic Energy Commission appropriation requirements. Revenues are estimated at \$58.0 million for 1967, compared to an estimate of \$60.8 million for 1966 and actual revenues in 1965 of \$47.0 million.

EXPLANATION OF PROPOSED LANGUAGE CHANGES—OPERATING EXPENSES

The proposed change in language is indicated as follows: language enclosed in brackets [] indicates proposed deletion; language *in italic* indicates proposed insertion.

1. "\$[2,121,900,000] *\$1,985,000,000*, and any moneys (except sums received from disposal of property under the Atomic Energy Community Act of 1955, as

amended (42 U.S.C. 2301)) received by the Commission, notwithstanding the provisions of section 3617 of the Revised Statutes (31 U.S.C. 484), to remain available until expended."

This change reflects the FY 1967 appropriation amount.

EXPLANATION OF PROPOSED LANGUAGE CHANGES—GENERAL PROVISIONS

The proposed changes in the language for the administrative provisions are described below. Language enclosed in brackets [] indicates proposed deletions; language in italic indicates proposed insertions.

1. "Any appropriation available to the Atomic Energy Commission may initially be used subject to limitations in this Act during the *current* fiscal year [1966] to finance the procurement of materials, services, or other costs which are a part of work or activities for which funds have been provided in any other appropriation available to the Commission: . . ."

This change makes the provision applicable to the current fiscal year.

2. "Not to exceed 5 per centum of appropriations made available for the *current* fiscal year [1966] for 'Operating expenses' and 'Plant and capital equipment' may be transferred between such appropriations, but neither such appropriation, except as otherwise provided herein, shall be increased by more than 5 per centum by any such transfers, and any such transfers shall be reported promptly to the Appropriations Committees of the House and Senate."

This change makes the provision applicable to the current fiscal year.

GENERAL STATEMENT FOR PLANT AND CAPITAL EQUIPMENT

Summary of Requirements for FY 1967

The budget estimates for the appropriation "Plant and Capital Equipment" for 1967 provide for estimated obligations of \$295,200,000 to be funded by (1) a new appropriation of \$278,200,000 and (2) the utilization of an unobligated balance of \$17,000,000 estimated to be available at the end of 1966. Of the estimated total obligations, \$95,825,000 is required for new construction projects for which authorization is being requested in the 1967 authorization bill; \$48,300,000 is required for FY 1966 projects for which additional authorization is being requested in FY 1967; \$700,000 is required for a previously authorized community disposal project; and \$150,375,000 is required for capital equipment not related to construction.

Summarization of estimated 1967 obligations by program follows:

Summary of fiscal year 1967 obligations

	Funding for projects authorized in prior years	Funding for projects included in the 1967 Authorization Act	Capital equipment not related to construction	Total
Raw materials.....		\$25,000	\$65,000	\$90,000
Special nuclear materials.....		10,000,000	15,330,000	25,330,000
Weapons.....		26,600,000	51,600,000	78,200,000
Reactor development.....		38,400,000	29,420,000	67,820,000
Physical research.....		¹ 57,800,000	40,080,000	97,880,000
Biology and medicine.....		6,000,000	6,600,000	12,600,000
Training, education, and information.....		200,000	679,000	879,000
Isotopes development.....		2,500,000	3,800,000	6,300,000
Civilian applications of nuclear explosives.....			505,000	505,000
Community.....	\$700,000	500,000	250,000	1,450,000
Administrative.....		100,000	2,046,000	2,146,000
Construction planning and design.....		2,000,000		2,000,000
Total obligations.....	700,000	144,125,000	150,375,000	295,200,000

¹ Includes \$48,300,000 for fiscal year 1966 projects for which additional authorization is being requested in fiscal year 1967.

Summary of obligations

The following table summarizes the total obligations for each of the programs for 1965, 1966 and 1967. The detailed justifications present the programs in the same order as they appear on this summary table.

Summary of obligations by program

	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
Raw materials.....	\$54,905	\$60,000	\$90,000
Special nuclear materials.....	34,884,108	50,330,000	25,330,000
Weapons.....	120,407,678	122,155,000	78,200,000
Reactor development.....	110,036,899	103,117,438	67,820,000
Physical research.....	96,685,743	143,270,000	97,880,000
Biology and medicine.....	8,610,634	12,955,000	12,600,000
Training, education, and information.....	715,131	943,000	879,000
Isotopes development.....	1,881,109	1,841,000	6,300,000
Civilian applications of nuclear explosives.....	391,455	500,000	505,000
Community.....	3,711,278	6,809,000	1,450,000
Administrative.....	634,633	587,000	2,146,000
Construction planning and design.....	1,313,506	3,772,000	2,000,000
Total obligations.....	379,327,079	446,339,438	295,200,000

Financing of obligations

The financing of the estimated total obligations of \$295,200,000 proposed in the budget estimates for 1967, together with comparable data for 1965 and 1966, is summarized in the following table:

Summary of financing

	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
Funds available:			
Unobligated balance at beginning of year.....	\$232,910,517	\$218,724,438	\$17,000,000
Recovery of prior year obligations.....	2,141,000	620,000	-----
Appropriation.....	363,000,000	243,995,000	278,200,000
Net amount available for obligation.....	598,051,517	463,339,438	295,200,000
Unobligated balance at end of year.....	218,724,438	17,000,000	-----
Total obligations.....	379,327,079	446,339,438	295,200,000

Expenditures for plant and capital equipment

Expenditures from the "Plant and Capital Equipment" appropriation for 1967 are estimated to be \$305,000,000. The estimated amounts available for expenditure in 1965, 1966, and 1967, the expenditures for each year, and the remaining unexpended balances are shown in the following table:

Expenditure analysis

	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
Funds available for expenditure:			
Unexpended balance, beginning of year.....	\$568,684,059	\$566,828,018	\$470,823,018
Appropriation.....	363,000,000	243,995,000	278,200,000
Total funds available for expenditure.....	931,684,059	810,823,018	749,023,018
Less: Expenditures.....	364,856,041	340,000,000	305,000,000
Unexpended balance, end of year.....	566,828,018	470,823,018	444,023,018

HIGHLIGHTS OF PLANT AND CAPITAL EQUIPMENT

There follows a brief description of each of the programs set forth in the summary on page 97.

1. *Raw Materials.*—Obligations for raw materials plant and capital equipment in 1967 are estimated at \$90 thousand. This includes \$25 thousand for minor modifications and improvements to existing plant or installations, and \$65 thousand for capital equipment not related to construction.

2. *Special Nuclear Materials.*—Obligations for special nuclear materials plant and capital equipment in 1967 are estimated at \$25.3 million of which \$10.0 million is necessary to provide for new construction projects proposed for authorization, and \$15.3 million is estimated for capital equipment not related to construction. The \$10.0 million proposed for new construction projects includes \$2.0 million for an isotopes process development laboratory at Savannah River, South Carolina, and \$8.0 million for general plant projects.

3. *Weapons.*—Obligations for weapons plant and capital equipment in 1967 are estimated at \$78.2 million of which \$26.6 million is necessary to provide for new construction projects proposed for authorization and \$51.6 million is estimated for capital equipment not related to construction. The new construction projects include \$11.6 million for additional production, development, and supporting facilities, and \$15.0 million for general plant projects.

4. *Reactor Development.*—Obligations for reactor development plant and capital equipment in 1967 are estimated at \$67.8 million of which \$38.4 million will provide for new construction projects proposed for authorization, and \$29.4 million is estimated for capital equipment not related to construction. The new construction projects include \$7.5 million for AE on the fast flux test facility; \$10.0 million for modifications and addition to S1W reactor facility; \$2.0 million for AE on a heavy water organic cooled reactor; \$3.0 million for a support project for modifications to reactors; \$2.0 million for a support project for Project Rover; \$1.9 million for a fast neutron generator at Argonne National Laboratory; and \$12.0 million for general plant projects.

5. *Physical Research.*—Obligations for physical research plant and capital equipment in 1967 are estimated at \$97.9 million of which \$57.8 million is for construction projects requiring authorization and \$40.1 million is for capital equipment not related to construction. The construction projects include \$45.3 million for the alternating gradient synchrotron conversion; \$3.0 million for AE on the Los Alamos meson facility; \$7.0 million for accelerator improvements at various sites; and \$2.5 million for general plant projects.

6. *Biology and Medicine.*—Obligations for biology and medicine plant and capital equipment in 1967 are estimated at \$12.6 million of which \$6.0 million is for new projects to be authorized, and \$6.6 million is for capital equipment not related to construction. The new projects include \$5.0 million for a new biology laboratory at Pacific Northwest Laboratory and \$1.0 million for general plant projects.

7. *Training, Education and Information.*—Obligations for training, education and information plant and capital equipment in 1967 are estimated at \$0.9 million. This includes \$0.2 million for general plant projects at the Puerto Rico Nuclear Center and \$0.7 million for capital equipment not related to construction.

8. *Isotopes Development.*—Obligations for isotopes development plant and capital equipment are estimated at \$6.3 million of which \$2.5 million is for construction of an alpha fuels environmental test facility at Mound Laboratory, and \$3.8 million for capital equipment not related to construction.

9. *Civilian Applications of Nuclear Explosives.*—Obligations for civilian applications of nuclear explosives are estimated at \$505 thousand for capital equipment not related to construction.

10. *Community.*—Obligations for Los Alamos community plant and capital equipment in 1967 are estimated at \$1.5 million. This includes \$0.5 million for general plant projects proposed for authorization in 1967; \$700 thousand for additional funding of a previously authorized community disposal project; and \$250 thousand for capital equipment not related to construction.

11. *Administrative.*—Obligations for improvements and modifications of administrative facilities at the Commission Headquarters in Germantown, Maryland, and for procurement of capital equipment to support the operating program in 1967 are estimated at \$2.1 million. This includes \$100 thousand for new general plant projects and \$2.0 million for capital equipment not related to construction.

12. *Construction Planning and Design.*—Obligations for engineering and design for complex construction prior to proposing projects for authorization are estimated at \$2.0 million in 1967.

EXPLANATION OF PROPOSED LANGUAGE CHANGES—PLANT AND CAPITAL EQUIPMENT

Proposed changes in language are indicated as follows: language enclosed in brackets [] indicates proposed deletions, and *italic* indicates proposed insertion of new language.

1. “* * * purchase of not to exceed [five hundred and fifty-nine] *four hundred and fifty-one*, [of which four hundred and twenty-three are] for replacement only, *of which six for police-type use may exceed by \$300 each the general purchase price limitation for the current fiscal year*, and hire of passenger motor vehicles; and purchase of [three] *one* aircraft;”

This change provides for authorization to procure 451 passenger vehicles in fiscal year 1967 all of which are for replacement. The change also provides for authorization to acquire 1 additional aircraft.

All vehicles to be replaced will meet or exceed the GSA replacement standards. The 6 sedans for police-type use are for police patrol activities within plant areas, including the enforcement of state motor vehicle laws and the execution of security duties. Constructors are assigned passenger motor vehicles as Government-furnished equipment and operate them in carrying out the Commission's program. With a planned reduction of 34 vehicles in fiscal year 1967, the passenger vehicle fleet will number 2,496 at the end of FY 1967.

The additional aircraft is one currently being leased (with purchase option) for radiological measurement surveys in support of the Weapons program. The primary function of this aircraft and its 2,000 pound electronic package is to monitor all on-site and off-site radioactive releases, and assist in a thorough compilation and analysis of various data resulting from Nevada Test Site weapons activities.

2. “[\$243,995,000] \$278,200,000, to remain available until expended.”

This change provides for deletion of the amount appropriated in FY 1966 and insertion of the amount of the FY 1967 appropriation request.

CIVILIAN APPLICATIONS OF NUCLEAR EXPLOSIVES (PLOWSHARE) PROGRAM—OPERATING COSTS

Program statement

Estimate fiscal year 1967-----	\$16,200,000
Estimate fiscal year 1966-----	15,375,000
Increase-----	825,000

The Plowshare program includes the research, development, and experimental testing necessary to develop peaceful uses for nuclear explosives. A substantial, continuing effort is devoted to the development and testing of the special nuclear explosives needed for these purposes. All of the nuclear experiments proposed in fiscal year 1967 are being designed to meet the requirements of the limited nuclear weapon test ban treaty.

Primary effort in the program is devoted to the development of nuclear excavation technology. This requires both explosive device development and cratering experiments. When acquired, the technology will allow projects of the magnitude of a sea-level canal across the American Isthmus to be undertaken. Concurrently, another major program objective—that of using contained nuclear explosions for valuable scientific and engineering projects, including the development and management of natural resources—will be pursued. Applications which show promise include those in natural gas recovery and storage, mining, waste disposal, water management, and basic heavy element and physics research.

The proposed fiscal year 1967 program will allow continuation, at a slightly reduced level of effort, of laboratory research and development and work with industry. The estimates for both the scientific and excavation experiments increase slightly in FY 1967 as compared with FY 1966.

Summary of estimates by category

Category	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
1. Research and development.....	\$5,373,012	\$6,225,000	\$6,185,000
2. Excavation experiments.....	3,025,722	8,525,000	9,315,000
3. Scientific experiments.....	2,278,980	625,000	700,000
Total civilian applications of nuclear explosives program.....	10,677,714	15,375,000	16,200,000

JUSTIFICATION OF CATEGORIES

1. Research and development, \$6,185,000

These funds will be used to continue scientific and technical activities aimed at a fundamental understanding of nuclear explosive design and explosion phenomenology and of the application of the energy released by a nuclear explosion to engineering and industrial purposes. This work is conducted primarily at the Lawrence Radiation Laboratory at Livermore, California (LRL), although work is also underway at the Oak Ridge National Laboratory (ORNL), the Savannah River Laboratory (SRL), the Sandia Laboratory, the laboratories of several other Government agencies such as the U.S. Bureau of Mines and the U.S. Geological Survey, and various private contractors.

A substantial and fairly constant level of effort is maintained by LRL in theoretical and experimental studies to develop special nuclear explosives for Plowshare purposes. Emphasis continues to be put on the development of explosives which produce less radioactivity for use in cratering experiments and for future utilitarian nuclear excavation projects.

The funds requested under this category are largely for scientific and technical studies to increase theoretical understanding of the effects of nuclear explosions in various environments, to perform safety and feasibility studies of potential peaceful nuclear explosives applications, and to meet related informational and educational objectives.

Some effort will be required to support research in the field at the sites of past nuclear explosions or to support participation in tests sponsored by other programs.

As in the past, effort also will be devoted to investigating the preliminary feasibility of proposals by industry for applications of nuclear explosions. Some funds might be used to initiate any promising joint projects to demonstrate the feasibility of a specific nuclear application and provide useful data. Participation by private industry in cooperative projects provides an excellent means of informing industry of the new technology and also results in valuable technical assistance to the Government. In the case of joint projects, experiments important to overall technological development might be carried out at substantial savings to the Government by enlisting private funds to defray some of the costs of the project.

2. Excavation experiments, \$9,315,000

The excavation experiments planned for FY 1967 are part of a continuing program to develop nuclear excavation techniques so that the excavation needed for engineering projects, such as canals, aqueducts, harbors, and passes through mountains for highways and railroads, which would be too costly or impractical using conventional methods, can be accomplished. In FY 1967, the Plowshare excavation effort will continue to include both explosive device development and cratering experiments. As discussed below, plans include four cratering experiments and at least two excavation device development tests.

In addition to the broad objectives of this program, the FY 1967 activities are designed to support the needs of the Atlantic-Pacific Interoceanic Canal Study Commission. This Commission, appointed by the President under Public Law 88-609, is responsible for studying the feasibility of excavating a sea-level canal, by conventional or nuclear means, and is required to submit its findings to the President by June 30, 1968. The activities possible within the above funding level are the minimum necessary to furnish the information to the Canal Commission needed to make a sound judgment on the feasibility and costs of nuclear excavation for its recommendations to the President and Congress.

(a) Excavation Device Testing:

Fiscal year 1965.....	\$602, 795
Fiscal year 1966.....	3, 825, 000
Fiscal year 1967.....	3, 040, 000

For nuclear excavation projects, it is important to have a minimum of radioactive debris produced, to limit its distribution, and to isolate it from the biosphere to the greatest practicable extent. The objectives of this program are to extend the yield of thermonuclear explosives with low fission yield to the megaton range, reduce the total amount of radioactivity (fission and induced) that may be released to the atmosphere during cratering, and reduce the complexity and cost of the explosives.

At least two events are planned for FY 1967. Their yields are expected to range from low to intermediate. As now planned, each event will require an emplacement hole and about three satellite holes drilled to explosion depth for instrumentation and post-shot sample recovery. These emplacement and satellite holes account for most of the cost for each event.

(b) Project Cabriolet:

Fiscal year 1965.....	0
Fiscal year 1966.....	\$1, 680, 000
Fiscal year 1967.....	0

Project Cabriolet is a low yield cratering experiment scheduled for execution during FY 1966 at the Nevada Test Site. It was developed during FY 1966 as an alternative experiment to Schooner because of the results from the Palanquin experiment; the need to better understand Palanquin's behavior; and the limited funds available for Schooner in FY 1966.

(c) Tens of KT to 100 KT Point-Charge (e.g. Project Schooner):

Fiscal year 1965.....	0
Fiscal year 1966.....	\$300, 000
Fiscal year 1967.....	3, 375, 000

The reduction of FY 1966 funds for Project Schooner and the results from the Palanquin experiment in FY 1965 have delayed the final design and execution of the Schooner experiment as proposed for FY 1966. Assuming certain critical information is acquired from experiments in FY 1966, an experiment is now planned for execution during FY 1967 in the Bruneau River area in southwestern Idaho. As now planned, it would involve the detonation of a point charge in hard rock. The experiment would include studies of cratering dynamics effects, ground shock transmission, pressure and velocity measurements and radiological distribution studies. It is planned to begin preliminary site preparations for this experiment in FY 1966.

(d) Low Yield Point Charges:

100 Ton Point Charge:	
Fiscal year 1965.....	0
Fiscal year 1966.....	\$700, 000
Fiscal year 1967.....	0
100 Ton Point Charge:	
Fiscal year 1965.....	0
Fiscal year 1966.....	0
Fiscal year 1967.....	\$700, 000
100 Ton Point Charge:	
Fiscal year 1965.....	0
Fiscal year 1966.....	0
Fiscal year 1967.....	\$700, 000

Recent progress in predictive capability in which computer code calculations are used in predicting the effects of nuclear cratering has led to plans for three 100 ton (0.1 KT) nuclear cratering experiments, one in FY 1966 and two in FY 1967. Previously, predictions of crater dimension were based on empirical models which appear to be of only moderate utility in predicting nuclear cratering because of the large variations which occur in rock properties. If computer codes are successfully developed which can include, in the predictions, the important variable properties of rock which affect crater dimensions, a major step in nuclear excavation technology will have been accomplished.

The objective of the three 100-ton experiments is to provide sufficient experimental data to refine the codes, to test the reliability of the predictions, and to extend their range.

(e) Low-Yield Row-Charge (e.g. Project Buggy) :

Fiscal year 1965	-----	0
Fiscal year 1966	-----	\$1, 000, 000
Fiscal year 1967	-----	1, 500, 000

The funds would support the first nuclear row-charge experiment. Execution is planned for FY 1967. The present technical concept for the experiment contemplates emplacing five low-yield nuclear explosives in a row and detonating them simultaneously to determine such ditching characteristics as depth, width, and smoothness that result from such nuclear detonations in relatively flat terrain. Emplacement holes and certain other preliminary preparations for this experiment will begin in FY 1966.

(f) Project Palanquin :

Fiscal year 1965	-----	\$1, 487, 994
Fiscal year 1966	-----	1, 020, 000
Fiscal year 1967	-----	0

Post-shot effort undertaken in FY 1966 is expected to be completed and no further expenditure is expected in connection with Palanquin.

(g) Project Sulky :

Fiscal year 1965	-----	\$934, 933
Fiscal year 1966	-----	0
Fiscal year 1967	-----	0

Project Sulky was a small-scale excavation experiment carried out in FY 1965.

3. Scientific experiments, \$700,000

The phenomena available from a nuclear explosion make it a uniquely valuable tool for conducting scientific research. One of these phenomena, the intense neutron flux, is the basis for the work planned in FY 1967. This neutron flux, which is unobtainable by any other means, can be used to create new isotopes, and possibly, new elements; and it can be used to conduct physics experiments to obtain basic scientific data of broad usefulness.

(a) Device Testing :

Fiscal year 1965	-----	\$1, 386, 162
Fiscal year 1966	-----	400, 000
Fiscal year 1967	-----	700, 000

In pursuit of isotopes with mass numbers greater than 270 and atomic numbers greater than 103, work has been proceeding on a step-by-step basis from the Par event, a successful scientific experiment conducted in October, 1964, to develop the necessary special nuclear explosive devices. The funds requested provide for continuing this work through FY 1967 by means of add-on experiments to appropriate device development events. The AEC believes it desirable to continue doing add-on experiments until the major variables in heavy element production explosives are better understood. A full-scale test of the explosive with the objective of producing heavy elements would then be appropriate.

Funds are also requested to permit the Los Alamos Scientific Laboratory (LASL), to conduct Plowshare oriented basic physics experiments using the intense neutron pulse from a nuclear explosion, for extending cross section and fission process measurements and using time-of-flight energy resolved neutrons for neutron spectroscopy. These investigations will be conducted as add-on experiments, when practical, to appropriate FY 1967 events.

(b) Project Handcar :

Fiscal year 1965	-----	\$892, 818
Fiscal year 1966	-----	225, 000
Fiscal year 1967	-----	0

Project Handcar was executed in FY 1965 and was a basic phenomenological experiment in carbonate rock. Further re-entry drilling effort is necessary in FY 1966 to obtain important information such as chimney height, chimney void space, temperature and radiation distribution, and the nature of rock in the arch above the chimney.

CIVILIAN APPLICATIONS OF NUCLEAR EXPLOSIVES (PLOWSHARE) PROGRAM—PLANT
AND CAPITAL EQUIPMENT OBLIGATIONS

Program statement

	Actual, fiscal year 1965	Estimate, fiscal year 1966	Estimate, fiscal year 1967
A. Obligations for construction projects.....	0	0	0
B. Obligations for capital equipment not related to construction.....	\$391,455	\$500,000	\$505,000
Total obligations for plant and capital equipment.....	391,455	500,000	505,000
Sec. A—Fiscal year 1967 obligations for construction projects.....	None	None	None
Sec. B—Obligations for capital equipment not related to construction: Activity, capital equipment.....	391,455	500,000	505,000
Total Plowshare capital equipment not related to construction.....	391,455	500,000	505,000

JUSTIFICATION

The requested funds are required for equipment to support research, development and field projects in the Plowshare program. Plowshare's equipment requirements generally fall into two principal categories. First is the equipment required for laboratory use; second is that peculiar to the support of Plowshare's field operations. All of the equipment will be used to collect data to further the research and development effort, leading to a better understanding of the phenomena and effects of nuclear explosions. It should be noted that these funds do not reflect the total amount of equipment needed for the program during FY 1967. As in prior years, in the interest of economy and to the extent feasible, much of the equipment needed for the proposed FY 1967 program will be borrowed from other programs.

The types of equipment that may be purchased in support of laboratory effort generally consists of specialized, precision instruments, recording systems, cameras, oscilloscopes, and electronic measuring devices. Most of this type of equipment would be acquired by LRL. The types of equipment needed for Plowshare's field operations include mobile communication systems, recording and sensing equipment for various field diagnostics, emplacement rigs to handle Plowshare devices, fallout analysis equipment, and trailers necessary to house equipment in the field.

PROGRAM AND BUDGET REQUEST

Dr. TAPE. Mr. Chairman, I am pleased to appear before your committee to discuss the AEC's program and budget estimates for fiscal year 1967.

Dr. Seaborg has requested that I express his regrets at his inability to appear personally today. As you know, he has not yet returned from a meeting of the International Atomic Energy Agency in Vienna. It is because of this longstanding commitment that he is unable to present our budget to you this year.

The AEC budget submitted to the Congress in January requested appropriations of \$2,263.2 million of which \$1,985.0 million is for operating expenses and \$278.2 million for plant and capital equipment. The requested appropriation is \$102.7 million less than the amount appropriated for fiscal year 1966.

Authorizing legislation signed on May 21 would provide for 1967 appropriations of \$2,248.3 million, or \$14.9 million less than the amount requested.

Senator PASTORE. That is included in the cut of the \$64 million?

HOUSE ACTION

Dr. TAPE. That is included.

The appropriation bill as passed by the House of Representatives on September 21 provides total appropriations of \$2,199 million, including \$1,923 million for operating expenses and \$276 million for plant and capital equipment. This represents a total reduction of \$64.2 million from our appropriation request—\$62.0 million for operating expenses and \$2.2 million for plant.

FLEXIBILITY IN SHIFTING OPERATING PROGRAMS FUNDS

The Commission is not seeking restoration of any of the reductions made by the House. This was a most difficult decision for the Commission to make because inherent in this decision is a high risk to our ability to effectively discharge our responsibilities under the Atomic Energy Act. For this reason the Commission strongly believes that the Congress should give it flexibility within its overall appropriation to shift funds among its major operating programs. The Commission's decision that it would accept the House reductions was made in view of the expenditure demands of the Vietnam situation and the need for all of us to do our share in maintaining the stability of our national economy. The Commission believes that its decision is responsive to the President's message to the Congress of September 8, setting forth his program of action to reduce Federal expenditures.

HIGH PRIORITY NONAPPEALED PROJECTS

With respect to the decision not to seek restoration of any of the reductions made by the House, the Commission would like to emphasize two points:

1. Under less stringent economic conditions than those that prevail today, we would, as a minimum, have appealed the House reductions in the weapons program (\$5 million), in the heavy water organic cooled civilian power reactors activity (\$1 million), in the physical research program (\$3.6 million), and in the training and education program (\$.5 million).

Each one of these areas is closely identified with major objectives of the Atomic Energy Commission and we do not consider that any of these reductions is a low priority item. I am sure the committee is familiar with the dedication to which the AEC has applied itself in meeting its weapons responsibilities, in developing economical civilian power reactors and the improvement of utilization of nuclear resources, in undertaking the basic research which provides the foundation supporting all of our technological advances, and with the need to encourage the education of our young scientists and engineers in the nuclear field. Therefore, I am equally sure that this committee and the Congress as a whole will appreciate that it is only in the interest of a larger national need that we are not seeking restoration of reductions made by the House in these areas.

CIVILIAN POWER REACTOR PROGRESS

Senator PASTORE. May I interrupt at this point, Dr. Tape? I was wondering if it would be convenient for you to have inserted in the

record a detailed account of what progress we have made in economical civilian power reactors. I mean this is very well known by the members of the Joint Committee and fortunately enough I happen to belong to both committees. But I wonder sometimes if this glamorous story shouldn't be brought to the attention of the whole Congress, and I think this would be a good place to insert it if it is available.

Is it available?

Mr. ABBADESSA. Yes, sir; we can put in the record the significant additions of nuclear power plant capacities that the private utilities have announced in 1965 and 1966 that they will install, and a list of specific facilities that have been announced.

Senator PASTORE. Wonderful. I think it is a fantastic story and I think it should be inserted.

Dr. TAPE. Mr. Chairman, as you know, this is moving rapidly day by day and we would like to have the opportunity, as you suggest, to put in a bit of history and what the situation is today. We will supply that for the record.

Senator PASTORE. Will you furnish it to the committee so we can put it in the record.

(The information follows:)

HISTORY OF DEVELOPMENT AND CURRENT STATUS OF CIVILIAN NUCLEAR POWER

In accordance with the authority and direction of the Atomic Energy Acts of 1946 and 1954, the Atomic Energy Commission for over fifteen years has engaged in the development of nuclear energy as an economical civilian power source to supplement and extend national reserves of fossil fuels.

This development has been undertaken in the national laboratories, by industrial organizations under contract to the Commission, and through Commission partnerships with utility and manufacturing firms which have contributed resources of manpower, funds and facilities to joint projects. Concurrently, private industry has performed extensive additional nuclear power development independent of Commission participation or direction.

The sequence of development steps progressed from initial physics, chemistry, metallurgy, etc., investigations through basic critical experiments to experimental reactors and then to the construction and operation of prototype power plants to demonstrate economics and operational feasibility.

This evolutionary development has been undertaken for a variety of reactor concepts. For technical or economic reasons some are no longer pursued. Others are still in process of development. However, one category of power reactors, (cooled and moderated by light water—either pressurized or boiling), has progressed to the stage of widespread utility planned use for new generating plants.

In 1965 electric power companies announced decisions to install nine large light water reactor nuclear power plants totalling about 5,600,000 kilowatts of capacity. In comparison, announcements in 1965 of intent to install fossil-fuel-fired plants totalled about 16,000,000 kilowatts. By the end of August in 1966 twenty additional light water reactor plants had been announced with a combined capacity of 15,700,000 kilowatts as compared with 15,200,000 kilowatts of fossil-fuel plant announcements in 1966.

The nuclear power announcements in 1966 through the end of August were as follows:

Name of project	Owner	Size of generating unit (megawatts electrical, initial net)
H. B. Robinson Southeast Plant, unit No. 2	Maine Yankee Atomic Power Corp.....	700
Dresden nuclear power station, unit No. 3	Carolina Power & Light Co.....	663
Palisades nuclear power station	Commonwealth Edison Co.....	715
Point Beach nuclear plant, unit No. 1	Consumers Power Co. of Michigan.....	700
Quad-Cities station, unit No. 1	Wisconsin Michigan Power Co.....	454
	Commonwealth Edison and Iowa-Illinois Gas & Electric.	715
Quad-Cities station, unit No. 2	do.....	715
Monticello nuclear generating plant	Northern States Power Co.....	472
Unit No. 1	Philadelphia Electric Co., P.S.E. & G.C., A.C.E.C., and D.P. and L.C.	1,065
Unit No. 2	do.....	1,065
Brown's Ferry nuclear power plant, unit No. 1	Public Service Electric & Gas Co., P.E.C., A.C.E.C., and D.P. and L.C. ¹	933
	Tennessee Valley Authority.....	1,065
Brown's Ferry nuclear power plant, unit No. 2	Tennessee Valley Authority.....	1,065
	Virginia Electric & Power Co.....	750
	Consumers Public Power District and Iowa Power & Light Co.	800
Fort Calhoun plant	Omaha Public Power District.....	400
Unit No. 1	Duke Power Co.....	822
Unit No. 2	do.....	822
Metropolitan water district power and desalting plant.	City of Los Angeles, Department of Water and Power.	900
Do.....	Southern California Edison Co. and San Diego Gas & Electric Co.	900

¹ P.S.E. & G.C. has option for 2d unit.

The capital investment represented by the 1965 and 1966 nuclear power announcements will be approximately 2½ billion dollars. The cost to the utilities of fuel for the lifetime of these plants is expected to total between five and six billion dollars.

Current Commission development efforts are directed to reactor concepts which not only have the potential of still further lowering power costs but will also be more efficient in the use of nuclear fuel material than are the currently popular light water reactors. The advanced reactors being investigated include those that generate, in the course of operation, nearly as much fissionable material as they consume and those that generate more fissionable material (breeder reactors). Development of these reactors, in particular the breeder reactors, to the stage of commercial acceptance will require long-term and extensive efforts.

BUDGET ADMINISTRATION

Dr. TAPE. Secondly, as this committee knows, the Commission administers its budget in strict accordance with the amounts the Congress has appropriated for its major programs. Because the House reductions, which we are not appealing, involve major programmatic areas and because our experience alerts us to the fact that presently unforeseen requirements may arise in our programs, the Commission believes that this year, more than ever, it is important that it have the flexibility to make budgetary adjustments among our programs to meet priority requirements that may develop. I would earnestly hope that this committee in acting on our appropriation request will state in its report that it endorses the Commission having flexibility within its overall appropriation to make adjustments among program amounts in consideration of the fiscal restraint we are exercising in the effort to minimize Federal expenditures.

Senator PASTORE. You can do that under the law.

Dr. TAPE. I will let the Controller answer this one.

Mr. ABBADESSA. Because we receive a one figure authorization and appropriation for operating expenses, Mr. Chairman, legally we could do this. But as a practical matter, because of relationships with the Congress we have always been very careful to stay within the individual program amounts that the Congress has approved.

What we are here trying to do is to establish a legislative record which would allow us to make shifts between these major programs which normally we would not do, but still within our total appropriation.

Senator PASTORE. Of course you know, the Congress itself has never been amenable to that practice.

Mr. ABBADESSA. This is correct, sir.

Senator PASTORE. Because it can be very easily abused, you know that, gentlemen. You can come in here and make one presentation or any department, and then go ahead and use the money for a wholly different program without the knowledge of Congress.

Now, are you talking about entire programs or are you talking about fractions here?

Are you talking about percentages?

REPROGRAMMING ARRANGEMENTS WITH JCAE

Mr. ABBADESSA. I should point out here, Mr. Chairman, we are talking about the type of thing that we have already testified to before the Joint Committee. In isotopic power, for instance, we have a major requirement for development of plutonium 238 and polonium 210 space generators which came up essentially after our budget was prepared and of which we advised the JCAE.

This involves a need for greater funds in the isotopes program, and to the extent we can get funds from lower priority activities we would like the Commission to have permission to transfer between programs.

I should also point out, Mr. Chairman, that we would still intend to follow the reprogramming arrangements we have with the Joint Committee, under which the Commission would advise the Joint Committee of any shifts that we would make prior to making them.

Senator PASTORE. Have you discussed this with the Budget Bureau?

Dr. TAPE. We have indicated to the Budget Bureau, Mr. Chairman, the need for this type of flexibility, and it is my impression that the Budget Bureau would be amenable to this type of consideration.

Senator PASTORE. I would suggest before the markup takes place so that the committee will have the opportunity to consider it in view of the presentation you make here, you get some kind of a statement from the Budget Bureau within whatever restrictions they want and submit it to our committee and we will take a good look at it, but I think we ought to do that as a matter of procedure.

Dr. TAPE. I would like to expand on this point for one moment, Mr. Chairman.

As the Controller has indicated the law does not legally prevent us from doing this. Under the procedures which we have followed in the

past we have taken into consideration the budget figures which have been presented to the various committees of the Congress and the reports of those individual committees with respect to individual program actions; these program actions have been the guidance which we have used in implementing our program.

Senator PASTORE. I realize that, and I know the Joint Committee goes into these matters rather meticulously and it might be well, too, if that practice ever comes about, should it be decided so, that the chances are that the same thing ought to be done with the Appropriations Committees as well.

Dr. TAPE. The situation this year to which I will talk a little more in a few moments is that in accepting these reductions which have been indicated in the House bill, we recognize that in certain areas we are taking some risk and that we may find that those levels then cannot be met and we would want to make certain adjustments. What we have asked is the indulgence that we make these adjustments out of other programs as the year develops rather than having to live within the figures as absolute ceilings.

Senator PASTORE. Are you emphasizing here the military or the civilian aspect of your appropriations?

Dr. TAPE. You will note that as I proceed through the testimony that this is actually a mixture. It is military and civilian, both.

Senator PASTORE. I can see the necessity in the military aspect of it much more so than I can in the civilian.

Dr. TAPE. You will note that one item is an item in weapons production.

Senator PASTORE. That is right.

Dr. TAPE. And as the production develops one has little choice but to meet the requirements.

Senator PASTORE. That is the reason why I suggested you take it up with the Budget Bureau and see if we can't get some guidelines that make some sense.

Dr. TAPE. OK; will do.

Mr. ABBADESSA. OK.

PROPOSED AMENDMENT

Dr. TAPE. We are, however, proposing an amendment to the appropriations passed by the House to provide \$15 million for AEC participation in association with the Department of the Interior, in a cooperative arrangement with the Metropolitan Water District of Southern California (MWD) involving the use of nuclear reactors for the production of electric power and the desalting of sea water. Authorization for this arrangement, presently being considered by Congress, was requested after the House Appropriations Committee had completed its review of our budget, thus, this item was not considered by that committee. Our use of these funds in fiscal year 1967 would, of course, be subject to congressional authorization of the proposed arrangement.

Senator ELLENDER. Mr. Chairman, may I ask a question?

Senator PASTORE. Yes.

DESALTING TECHNOLOGY

Senator ELLENDER. What about the desalting proposal you refer to here. Is that different from the method that we have been trying to evolve over the past 10 or 15 years?

Dr. TAPE. The desalting technology is not unlike that which has been developed, the so-called distillation process. What we are doing by this particular project is extending the technology from what had been roughly million-gallon-per-day plants of the past into extremely large plants that could handle large requirements.

The metropolitan water district project which we are talking about here will have an ultimate capacity of 150 million gallons per day. The initial phase would involve a unit which will produce 50 million gallons per day.

I think you can see from this that we are extending the technology of size, we are extending the technology with respect to coupling large heat sources and in this case two nuclear reactors, to such a system.

DEPARTMENT OF THE INTERIOR ROLE

The Interior Department which carries the larger part of the Government's support will be carrying the desalting technology aspects, the new work there. The Atomic Energy Commission is interested in the facets of the siting of this particular complex which has been proposed for an island site off the California coast, south of Los Angeles. We are concerned with the coupling of large nuclear powerplants to a desalting plant in which one is taking lots of heat energy from one to the other, the interaction of the desalting plant on the nuclear plants, and we are interested in the first of a kind technology that derives from such advanced projects.

COST OF MWD PROJECT

Senator ELLENDER. Well, what will be the cost of a project of this character in order to make it desalt water?

Dr. TAPE. I will have to break it down for you.

Senator ELLENDER. The reason why I am asking you is, and the next question would be—what proportion of that cost is paid by those who will use this water?

Dr. TAPE. I think it might be best, Senator, if I could supply for the record a breakdown of these costs for you, but let me give you some summary figures in order that you get the perspective here.

The first phase, which has to do with the 50-million-gallon-per-day-sized plant, has a total cost of the order of \$334 million. This covers the two nuclear powerplants which will generate 750 megawatts each for the electrical load.

Senator ELLENDER. You mean to be used in the desalting of this water?

Dr. TAPE. Not in the desalting. If I may for the moment—

(The breakdown of costs follows:)

ESTIMATED PROJECT CAPITAL COSTS

[In millions]

	Water plant capacity			
	Through phase I 50,000,000 gallons per day		Through phase II 100,000,000 gallons per day increment	
	MWD	Utilities	MWD	Utilities
Nuclear powerplants and related facilities (site, reactors, turbine generators, etc.).....	\$46.3	\$213.1	\$46.3	\$213.1
Desalting plant (evaporators, etc.).....	42.4	-----	107.4	-----
Water conveyance system.....	32.1	-----	33.7	-----
Subtotal.....	¹ 120.8	² 213.1	¹ 187.4	² 213.1
Total project capital cost.....	333.9		400.5	

¹ Includes AEC and Department of the Interior assistance of \$49,200,000 for phase I, and an additional amount of \$11,500,000 for phase II for an aggregate of \$60,700,000 to the total project. The above does not include Department of the Interior assistance to the costs of operation of up to \$11,500,000.

² Does not include utilities' investment for power transmission facilities reported to be about \$44,000,000 additional.

DUAL PURPOSE PROJECT—POWER AND DESALTING

Senator ELLENDER. What will the electricity be used for?

Dr. TAPE. It will be used to supply the electrical needs of the California area in which these two companies will supply power.

Let me back up. These are dual-purpose plants in which they will supply electrical energy to meet electrical requirements of the area and will supply heat for desalting to supply the water requirements of the area. Therefore, it is dual purpose installation.

Thus the utility organizations which will build the nuclear powerplants, will each market on their own grids the 750 megawatts each which they will supply. They will jointly provide to the metropolitan water district heat energy which will be in the form of steam to operate the desalting equipment, which will then let the metropolitan water district generate, if you will, first 50 million and then 150 million gallons per day of distilled water. I was giving you the first phase of the total without regard to who pays for it, in other words, what the breakdown is; namely, of the 334 million.

Including the second phase this amounts to something like \$400 million for the total project.

Senator ELLENDER. Well, now, who is going to pay for that? How will the cost of this be paid?

Dr. TAPE. First of all, the utilities themselves.

Senator ELLENDER. Are they privately owned utilities?

Dr. TAPE. They are a mixture of privately and publicly owned utilities. The utilities themselves will pay for the nuclear plants, and their investments will be something over \$200 million. The Metropolitan Water District will have an investment in the desalting plant, which will be of the order of slightly over \$120 million.

Senator ELLENDER. Now, who is going to put up that money for those?

Dr. TAPE. These will be either the financiers, the bondholders, if you will, of the individual utilities, or the Metropolitan Water District.

Senator ELLENDER. The Federal Government won't put up the money?

Dr. TAPE. I am not talking yet about the Government's input to this.

Senator ELLENDER. That is what I am interested in, what the Government is putting up.

Dr. TAPE. So you have got the utilities investment which is slightly over half, the Metropolitan Water District which is \$120 million-plus, and finally the Government contribution which will be by both the Interior Department and the Atomic Energy Commission, which will be about \$72 million.

Mr. ABBADESSA. \$72.2.

Dr. TAPE. \$72.2 total for the two phases.

Senator ELLENDER. How can you justify the Government putting up that money? Why should they?

AEC PARTICIPATION IN MWD

Dr. TAPE. Let me talk to the AEC side which we are talking about here.

We are very much interested in the utilization of nuclear power for applications beyond or in addition to electrical energy. As the Chairman was mentioning here a few minutes ago, during the early part of the hearing, the progress which nuclear power has made in meeting a number of the electrical requirements of this country has been quite striking. The cost of nuclear power has come down significantly in recent years, and private utilities are selecting nuclear power plants in an ever-increasing number. Of the new plants which have been ordered in this present year something over 50 percent of the large plants selected by utilities have been nuclear plants.

We are interested in the dual purpose type of plant, that is one which will be used not only for supplying electrical loads, but would also supply process steam which then could be used for other applications, that is, desalting or other applications requiring process heat, perhaps chemical applications, and so on.

The one which is of extreme importance to us today is the desalting application, because of the great need for water as well as for power.

If we then couple a nuclear power plant or any steam generating power plant for that matter, to a desalting plant while that plant is also supplying electrical load, we must be very careful and must understand the problems of coupling different loads to the power producing plant. With a nuclear plant, the transient effect of load changes back on the nuclear system is something which we in the Commission feel very strongly we should know. We feel assistance to those who first undertake this should be given by the Government.

INFORMATION FROM THE MWD PROJECT

It is the type of information which will be useful across the board to all such plants.

So the coupling of these nuclear power plants to desalting plants is one in which the Government should participate.

Senator ELLENDER. You mean obtain information?

Dr. TAPE. Obtain information which is information in a first of a kind situation and then will be available to other plants that follow in the future.

Senator ELLENDER. Well, how does that conflict with the vast sums that we have already provided in order to develop the use of sea water, and a means of taking out the minerals and the salt?

Dr. TAPE. This does not conflict at all with the work that has been devoted to desalting. That has assumed a heat source in the first place, be it from coal or oil or gas or whatever it might be. We are here talking about a nuclear-powered plant as a heat source.

Senator ELLENDER. I understand that. But it is for the same purpose, that is to desalt, take minerals out of water so that it can be potable.

PROBLEM OF COUPLING POWER AND DESALTING

Dr. TAPE. That is right, sir. But the point I am trying to make is that in coupling these two plants together, we have an additional technical problem which goes beyond what I would call a power source for desalting only. It is at the heart of the dual-purpose type of application, and this is where I am trying to emphasize the Commission's specific interest in this particular plant. The Commission is not putting money into the desalting process here. The contributions that go to this plant on the desalting side will be under the cognizance of the Interior Department.

Senator ELLENDER. Well, of this \$72,200,000, how much of it is AEC providing?

Dr. TAPE. \$15 million.

Senator ELLENDER. \$15 million, and the Interior the rest of it; is that it?

Dr. TAPE. The Interior is providing the balance, which is \$57.2 million.

Senator ELLENDER. From your standpoint it is more or less experimental money.

Dr. TAPE. This would be a cooperative project, first of a kind, in which we are getting experimental information out of the first coupled plant.

OTHER CONSIDERATIONS OF MWD

There are other aspects of the MWD project which are of extreme interest to us. This particular plant is now being proposed for location on an island site, a man-made island. We in the Commission—

Senator ELLENDER. Where—off of the coast of California?

Dr. TAPE. Off the coast of California.

Senator ELLENDER. What big cities will be the beneficiaries of this electricity as well as the—

Dr. TAPE. Principally the Los Angeles area, the Greater Los Angeles area.

The island siting presents new opportunities, we think, in connection with reactor siting. There may be problems associated with this, and we would like to be able to examine the seismicity questions related to the California situation, what this may mean with respect to island

siting and other safety problems which may be connected. Part of the \$15 million we are talking about would be applied to that kind of question as well.

POWER PRODUCTION FROM MWD

Senator ELLENDER. Now, what size powerplant did you say was going to be finally constructed here?

Dr. TAPE. If you think of the total power output it is about the equivalent of 1,800 megawatts, and let me break that down for you in the following way:

Each of the two reactors that will be built is the equivalent of about a 900-megawatt electrical plant. However, only 750 megawatts of each of the 900 megawatts will be utilized by the utility for the electrical portion of its load. The remaining 150 megawatts is the equivalent of the heat which will be fed to the desalting side and will be allocated to that part of the project. I am doing it in equivalent electrical terms just to try to give you a feel that roughly 750 megawatts is electrical, 150 megawatts toward the desalting side and then multiply that by 2 since there are two such power units.

ADVANTAGES OF DUAL PURPOSE PLANT

Senator PASTORE. Will you explain then, Dr. Tape, what is the essential advantage of having a dual-purpose plant as against a single purpose?

Dr. TAPE. The dual-purpose plant has a number of advantages. The first I would like to emphasize is the advantage of size.

Senator ELLENDER. Of what?

Dr. TAPE. Size, scale, that is how large the plant is. The larger the nuclear plant the more economic is that plant; as we go to larger and larger size in nuclear plants the unit energy cost goes down.

Therefore, if we can combine the electrical needs of the community, with the water needs of the community in a single heat source, we have a much larger plant and in that case each could benefit by this factor of scale.

Senator ELLENDER. Off the record.

(Discussion off the record.)

POWER NEEDS

Senator ELLENDER. Did you folks determine how this will tie in with the huge sum that is now being asked by the Interior Department to bring electricity from the Northwest to the Southwest, through this huge line that is going to be constructed so as to have an exchange of electricity from the Northwest to the Southwest and vice versa?

Dr. TAPE. The individual utilities in the California area have analyzed their power needs and have forecast these needs over periods of time. I think you will find from analyses that most of them are in the position of having to add to their grids plants of roughly this size, like 700 to 1,000 megawatts, almost every year, and if, for example, they can bring power in from the Northwest or otherwise to the grids this then is factored into their projection of demand-and-supply requirements for the future. They then have to look at what plants they can install locally so that they do not necessarily depend on trans-

mitted power. But these are all factored into the requirements and each utility I should say, is looking at this problem in terms of its own requirements. So I do not see a conflict here.

Senator ELLENDER. Well, there would be so much electricity though in the Northwest, where you have at times more than can be used. Large companies are developing the Libby Dam and we are putting up millions of dollars to construct dams in Canada that will assist in developing a lot more electricity in the Northwest than we now have. I am just wondering if this thing has been thought through and also wondering why it is that the Government keeps on putting up this huge sum. When I say "the Government," I mean AEC as well as the Interior, because these dams are constructed, as you know, at Government expense, and the price of the electricity has not been increased although everything else has increased. I am just wondering the extent to which the Government is going to keep on supplying funds for this purpose in order to assist those areas that ought to be able to assist themselves.

Dr. TAPE. Senator, two points I would like to make and then I would like to have Mr. Williams expand on this if he would.

UTILITY PARTICIPATION IN METROPOLITAN WATER DISTRICT

First, we are talking just about the electrical power component here, and the electrical utilities component is receiving no Government assistance in this particular project. The utilities which are putting in those reactors are putting them in on the basis of what it would have cost them for a full 750-megawatt installation. In other words, for the electrical component only, we are not planning any Government assistance.

So this, in effect, is a private decision, if you will, in terms of the electrical side only.

What those companies are doing is to build a larger plant than they would otherwise have built for their own needs in order to be able to provide to the metropolitan water district the incremental heat energy to operate the desalting side. So I think this is an important point with respect to the Government's participation.

The second point relates to cost of electrical energy. We are very much gratified that insofar as the contribution of nuclear plants is concerned this perhaps has had a greater contribution to the stabilization or reduction of electrical energy costs over the past few years that we have seen anywhere. I think you probably are quite well aware of the fact that there has been this tremendous upsurge in selection by utilities of nuclear plants.

Bill, do you have anything to say?

Senator ELLENDER. If that is true, why should we put up anything?

NEED FOR GOVERNMENT PARTICIPATION

Dr. TAPE. Because we want to get this benefit tied over into the dual-purpose application of these various large plants, and from the Commission's point of view we think that \$15 million is a very sound contribution to the whole \$400 million project which will give the Government the benefit of the practical experience in a project of this size.

Senator ELLENDER. Of course, you can't speak for Interior, but they are going to put up \$57 million.

Dr. TAPE. This they will do, Senator, on the desalting side for which they have the obligation to move from the present technology of about a million gallons per day to ever higher desalting technology capacities.

Senator PASTORE. Well, these things are astounding and amazing, Mr. Ellender, but frankly, I think one of the biggest problems confronting future generations in this country is going to be the lack of water.

Senator ELLENDER. I don't deny that, but I just wonder—

Senator PASTORE. The big thing here, if you can make these reactors big enough and large enough you reduce the cost per unit. More than that, you may be able to desalt this water at a very, very cheap price, and that is what they are striving for. This is a combination of benefits.

Now, insofar as those who take advantage of the electricity is concerned, they will be paying dollar for dollar for everything they get without any Government subsidy. But by adding this other capacity to the 750 in every one of these two reactors you get into an area where you can transmit that back over to the desalting process, that is the reason for it.

Senator ELLENDER. I know that.

Senator PASTORE. That is the reason for it. You have got to realize that these companies really have a stake in this when they are putting up on one side \$200 million, and then \$120 million as against the overall investment of \$400 million.

This is a very interesting picture, and I have asked them to put this in the record.

NEW ELECTRIC GENERATION PLANTS

Let me ask you this question: How many new electric generation plants are they going to build in this year 1967? Do we have those figures in the country now? I am talking about our country.

Senator PASTORE. We have one in Massachusetts working beautifully. It only constitutes about 3 percent of the entire grid but they are building another atomic plant in Connecticut. Let's take the new orders for 1966.

Mr. ABBADESSA. I have a partial list here that names six very large plants, Mr. Chairman, totaling 3,766 megawatts electrical in 1966 and we can correct that for the record.

Dr. TAPE. We need to correct this, Mr. Chairman, because I know that the total number of megawatts contracted for thus far this fiscal year is between 11,000 and 12,000 megawatts this year.

Senator PASTORE. Eleven and twelve thousand. How many will be conventional and how many nuclear?

Dr. TAPE. Those are all nuclear, those are 11,000 megawatts nuclear. The conventional portion is less than that, because more than half of the total capacity contracted for has been nuclear.

NOTE.—Fifteen nuclear powerplants totaling 11,757 megawatts electrical have been placed under contract in 1966.

Senator ELLENDER. And of all of those plants that will be constructed without any subsidy whatever from the Government?

Dr. TAPE. That is correct.

Senator PASTORE. That is correct. And if it hadn't been for the Government that showed the way and did the experimental work you wouldn't have that.

Senator ELLENDER. I realize that.

Senator PASTORE. I realize this is an expensive area.

I understand the gentleman wanted to say something on this question.

Mr. WILLIAMS. I think there are a couple of points that might be of interest to the committee.

PARTICIPATION BY UTILITIES

First of all, the utilities on their own volition offered to participate, proposed to participate, in this joint project on the basis that they would contribute toward the power generating portions of the project, that amount which they would have otherwise required to build their own single-purpose electrical plants.

In the case of the privately owned utility, Southern California Edison Co., in combination with the San Diego Gas & Electric Co., the capacity that they will receive from this plant represents only about 1 year's growth in their system capacity. In the case of Los Angeles, I think it is something slightly over 1-year growth in their capacity or need for new generating equipment.

In the testimony before the Joint Committee the representatives from the city of Los Angeles indicated that the nuclear powerplant in no way conflicted with the hydropower which might be coming into the area, but rather it complemented it. From their standpoint they noted that nuclear plants are generally considered to be baseload units whereas hydropower is used more for peaking purposes and they felt that the combination balanced their system.

Senator ELLENDER. Well, I do hope that this plant, as well as this huge transmission line that will be constructed from the Northwest to the Southwest, will be repaid to the Government with at least the going rate of interest because, usually, the Government holds the bag. I am very hopeful that the entire cost of this, as well as other projects, will be borne by those who receive the benefits from the use of electricity.

I am pleased to see this, of course. I am not objecting to it. I simply desire to find out whether there was any conflict, because I happen to serve on a committee wherein we are providing millions of dollars to develop electricity by falling water. It is very expensive, and, of course, it is going to be paid in the future but up to now are finding out that the returns on the investment are not what we expected and notwithstanding that fact here we are constructing or helping to construct huge facilities for the Southwest. Providing also a way and means of bringing electricity or transmitting electricity from the Northwest to the Southwest, is a huge expense. I am just wondering how it will all come out.

PRIOR STUDIES OF MWD

I hope you folks have studied it through and come to the conclusion that the Government will not be holding the bag.

Dr. TAPE. I think, Senator, that there is no question but what this has been thoroughly studied. The study within the Government has been done both by the AEC and the Interior Department, and I think

that those on the Commission who have participated with the companies realize full well they are dealing with some thoroughly practical and hardheaded individuals with respect to how they can best go about meeting their needs.

I was before the Senate Interior Committee last week at their hearings on this project, and Secretary Udall and Assistant Secretary Di Luzio made very strong points as to where this very practical project would help them significantly in making the steps to the larger and larger plants. By going this route they would be spending less money in developing the technology than they would if they were trying to do it as a sort of in-house project. Furthermore when they are all through they will have a practical plant with the benefits of water distribution to the public.

NUCLEAR FUEL FOR MWD

Senator ELLENDER. Now, will you tell us in the development of all of these new plants, where will the material come from? Who is going to furnish it to these plants, the materials necessary to generate this power?

Dr. TAPE. If I may speak to the nuclear plant, if you are speaking of the energy source for the plant—

Senator ELLENDER. Right.

Dr. TAPE. The uranium is the fuel source, this is where the energy comes from.

Senator ELLENDER. Yes.

Dr. TAPE. As the program is now developed the present law of the land, if you will, provides for private ownership. This is a change in the legislation of a few years back, so that uranium will be mined, milled, supplied on a private basis. The Government will have one element in the chain of the fuel supply; namely, the enrichment of uranium, enrichment of the uranium 235 isotope. These particular reactor systems require a fuel which is a few percent enriched in uranium 235 whereas as it comes from nature it is 0.7 percent.

Senator ELLENDER. So they will have to depend somewhat—

Dr. TAPE. On the Government.

Senator ELLENDER (continuing). On the AEC, the Government?

Dr. TAPE. For this one element of enrichment.

Senator ELLENDER. Yes.

FULL COST RECOVERY POLICY

Dr. TAPE. May I interject, though, the AEC will operate the enrichment plants on what is called a service basis in which the fuel suppliers, those who will be buying raw material and having it enriched and so on, will be paying the Government on a full cost recovery basis, so the Government will receive the full costs for this enrichment service from—

Senator ELLENDER. Just full costs and no profit?

Dr. TAPE. The full cost aspect here is one in which we want to achieve full cost to the Government over a period of years, and I cannot say that in any one short period of time you might not find that our costs were less than our actual charge, but over the period of time we would like to have a stable price which would represent the full cost to the Government.

Senator ELLENDER. Will that cost cover depreciation, and all money we are investing now?

Dr. TAPE. I would like to have the Controller talk to that point.

Senator ELLENDER. To construct those plants. In other words, we are providing here, each year, ever since I have been on the committee, between two and two and a half billion dollars each year. That is quite a big sum of money, and I am wondering the extent to which we will recover any part of this through the sale of the products that are made by you.

Mr. ABADESSA. Senator Ellender, the Atomic Energy Commission has a very strong full cost recovery policy. In pricing we include our direct costs plus our indirect costs, which come directly from our accounting system. The Atomic Energy Commission's accounting system is one of the few that has been approved by the General Accounting Office. So we include all out-of-pocket costs.

In addition, we charge in depreciation. Our accounting system provides for depreciation on a commercial basis. Also, in addition to that, we impute the interest for the Government's investment, using the long-term borrowing rate of the Government and then we add 1 percent for any intangible factors we might have missed in coming up with this computation.

It is truly a full cost recovery policy.

Now, we use this for all of our services. Specific to this particular activity, though, I should note one thing. Our gaseous diffusion plants to which we are looking for this enriching purpose were initially built for purposes of national defense. The Commission is keeping sight of the eventuality of private industry picking up the entire enriching service. We are trying to establish a price which will balance between full recovery to the Government and also a price that would allow industry to recover not only their costs but also a profit if they built new plants or took over one of the Government's plants.

The Joint Committee on Atomic Energy has gone over this very carefully. We have announced that for enriching services we propose to set a ceiling price of \$30 per unit of separative work, for a 30-year period on a straight business-type arrangement. This price and how it was arrived at was reviewed by an independent group from industry who endorsed the price; saying it was fair and did not include any subsidy from the Government.

The price structure was reviewed by the Bureau of the Budget who also signed off on it.

The Joint Committee on Atomic Energy had the General Accounting Office make an independent audit and they also signed off that the \$30 price was a reasonable price.

Senator ELLENDER. And that same price would prevail 30 years hence?

Mr. ABADESSA. It is a \$30 ceiling price. It is subject to escalation for material and labor which are the two major items of cost.

Senator ELLENDER. So that your fixed price—

Mr. ABADESSA. I should correct that. The items escalated are power and labor.

Senator ELLENDER. So that your fixed price will be, say, \$30, and that price may go up higher depending on the cost of the material that is used in the meantime; is that it?

Mr. ABBADESSA. That is correct. The major element of costs in this price are electric power and labor, and the price will go up in accordance with the indexes for labor and power.

Now, if we find out during the 30-year period that in fact our costs are less, we could reduce the price because the \$30 is ceiling. The Joint Committee reviews this activity very carefully, and we work very closely with the Joint Committee in establishing this price, sir.

Senator ELLENDER. That is where my friend, the chairman, has the advantage of me. I ask these questions because I don't serve on the Atomic Energy Committee.

Mr. ABBADESSA. The questions are always proper.

Senator PASTORE. Your questions are always proper and penetrating, and I am glad to get it on the record because these are the questions to be asked on the floor.

Dr. TAPE. To complete the picture, from the enriching plants it goes to the fabricator.

AUTHORIZATION OF MWD PROJECT

Senator PASTORE. Has the Interior Department authorized their share of this?

Dr. TAPE. I understand the Senate Interior Committee authorized this on last—

Mr. WILLIAMS. The hearing was held before the Senate Interior Committee last Monday of last week. They reported the bill out on Tuesday, and I understand that it passed the Senate on Wednesday of last week.

Senator PASTORE. How about the House?

Dr. TAPE. The House has not yet had hearings on the bill, that is on the Interior bill.

Senator PASTORE. Now this is supposed to be a joint move; is it not?

Dr. TAPE. That is correct.

Senator PASTORE. In other words, there will be no contract signed here unless the authorization and appropriations are completed on the Interior phase of this.

Mr. ABBADESSA. This is correct, Mr. Chairman. The reason we are seeking appropriations, Mr. Chairman, subject to authorization, is for this reason: It appears now that this will not be authorized until the House committee, Mr. Aspinall's committee, holds hearings which probably will not be during this session of Congress. But in addition to authorization, we also need appropriations. If we can get the appropriation subject to authorization, we would not move, and the record is clear on this, until we had a signed contract and we could not sign it until it was authorized. The problem here is that the work we are trying to do on the site preparation is longlead time work, and is required earlier than the assistance that the Interior Department intends to give. The Interior does not anticipate the need to spend any money in 1967 for their assistance. We feel that we will have to and if we could get the appropriation subject to authorization—while we could not start until we have the authorization—as soon as we got the authorization we could go forward with our portion of the work and not have to wait.

Senator PASTORE. All right. But you are not going to spend \$15 million in 1967.

Mr. ABBADESSA. That is correct.

Senator PASTORE. How much are you going to spend in 1967?

Mr. ABBADESSA. Our estimate at the present time is about \$2 million.

Senator PASTORE. Why do you not ask for \$2 million?

Senator ELLENDER. I do not see how you can spend 2 cents unless you get authorization.

Senator PASTORE. No, no. I mean even if it is authorized the fact still remains that it depends upon the authorization of the Interior phase of this.

Mr. ABBADESSA. The reason we are requesting the \$15 million, Mr. Chairman, is that after authorization we would sign a contract and we would need the entire obligational authority of \$15 million. It would be phased over several years. We actually would not spend all of it during 1967. Our best estimate right now is about \$2 million in fiscal year 1967.

Senator PASTORE. Will the authorization bills not do that for you without the appropriation?

Dr. TAPE. No. We would like to go forward with the metropolitan water district; they will be the ones carrying out the work because this is the project under their jurisdiction. Our role in that case will be to support them for the AEC portion.

Senator PASTORE. But you do not get my point. What if the Interior Committee meets in January and they do not authorize this?

Senator ELLENDER. There is a new Congress coming, too, Mr. Chairman. Do not forget that.

Senator PASTORE. Then where are we?

Mr. ABBADESSA. If the committee chooses to appropriate this subject to authorization—

Senator PASTORE. Subject to what authorization?

Mr. ABBADESSA. Subject to authorization by the Joint Committee.

Senator PASTORE. No, no. I realize that. Let us assume you do get your authorization—

Mr. ABBADESSA. All right, sir.

Senator PASTORE (continuing). As to the AEC phase of this, but you do not get the authorization ever with reference to the Interior. Then where are we?

Mr. ABBADESSA. Then we could not sign a contract, and we would not be able to spend the money, and it would come back to the Congress.

Senator PASTORE. Well, you are putting us in a rather awkward position here.

Senator ELLENDER. Very awkward, very unusual.

Senator PASTORE. Very awkward. You are asking the Congress to do something which it has always resisted, you see. I mean this is a very difficult proposition. This is not alone the authorization insofar as the Joint Committee is concerned. I do not think there is going to be any trouble with that at all. But your big problem is that insofar as the procedure that is involved here, you are asking us to appropriate money on an authorization of half the phase when you have not had a hearing on the authorization of the remainder of the phase.

Mr. ABBADESSA. Could I make a suggestion here, Mr. Chairman?

Senator PASTORE. I mean how do you do that? How do you do that?

Dr. TAPE. Mr. Chairman, we understand the timing problem here completely and part of the problem—

Senator PASTORE. I do not want to get myself into a position where we begin to lose prestige on the floor of the Senate. The Congress of the United States has always been very, very respectful to the Joint Committee. I dare say that no matter who is the chairman, the statement of the chairman has always been considered as the gospel truth when it hits the floor of the Senate. We have never had to meet challenges. Now we are coming here with a proposition that is pretty far fetched. Here you are, you are telling me now that Mr. Aspinall does not expect to hold hearings on this until the next session of the Congress. Now why can this not come up on a supplemental bill?

Dr. TAPE. Mr. Chairman—

Senator PASTORE. I mean this is going to give me an awful job on the floor, an awful job on the floor. There are so many "if's" and "but's" connected with this thing. I believe in this program, I would like to see it go through, but if it is so important then why has not the Interior Committee of the House held hearings on it?

Dr. TAPE. This I cannot answer, Mr. Chairman.

Senator PASTORE. Of course you cannot answer, and I cannot answer it either when they ask me the question.

Senator ELLENDER. And you cannot proceed unless the Interior acts.

Dr. TAPE. As we stated earlier, we would be subject to the total congressional authorization both on the Interior side and on the Joint Committee side.

Senator PASTORE. The Congress is always reluctant to appropriate any money unless you have a firmed-up situation, and this is half in suspense. You have a new Congress coming in.

Senator ELLENDER. Unless it is authorized, and this money, as you say, cannot be used unless the authorization also comes from Interior. So I think the chairman is right.

Senator PASTORE. I really think, unless you can give me a reason why this should be done now, I realize there is a lot of preparation that has to take place here, and the thing that bothers me is not that the money has not been appropriated for the Interior phase of this, is because it has not been authorized. I mean, how do you justify the fact we are gambling here. You say you cannot spend a nickel of this money until such time as there is an authorization and appropriation of the Interior phases, am I correct?

Mr. ABBADESSA. This is correct, sir.

Senator PASTORE. Am I right or wrong now? Listen very carefully to what I say. You cannot spend 5 cents of this until you get an authorization and an appropriation of the Interior phase. Is that correct?

Mr. ABBADESSA. Could I make this suggestion? I think if the committee goes along with this, the justification for going along with it, Mr. Pastore, is the fact that before the AEC can act, they need an authorization and an appropriation.

Senator PASTORE. That is right.

Mr. ABBADESSA. To put the AEC in a position to move as quickly as possible in doing this preliminary work after authorization, the committee is appropriating the \$15 million subject to authorization. Then in the Senate report, your own report, make it clear that the

AEC cannot spend any of this money until such time as the arrangement has been authorized by both committees and there is a contract signed with all three parties. This would give the Congress full protection. The fact that we could not spend a nickel until it has been authorized on both sides and there is a contract would be clear. It would also put the AEC in a position that we would not have to wait once it is approved by Congress.

Senator PASTORE. Yes, but look what you are doing. You come in here and you say you are going along with the House figure, and while there are priorities you are taking into account the Vietnam situation. Now the Senate dislikes very much to raise the amount of the House bill. There is a certain amount of rivalry, a certain amount of jealousy, there is a certain amount of pride and a certain amount of politics. Now you are asking the Senate to raise \$15 million of this House bill, you see, which will be emphasized if there is an increase, and yet all of this is to be held in abeyance if and when and but. That is how tough it is.

Mr. ABBADESSA. And that is essentially the situation.

Senator PASTORE. And that is essentially the situation, which makes it very difficult. Now you can sell that to me because I have lived with these programs. But you go and try to sell it on the floor.

Dr. TAPE. The timing though here, Senator, was such that we did not have an opportunity to present this to the House Appropriations Committee at the time of our appropriations.

Senator PASTORE. But that is not what is bothering me. What is bothering me here is the activity of the Interior Committee. That is what is bothering me. There is your ambiguity here, you see. If this involved, if this were subject to, an authorization, that has been done before, but this is subject to an authorization of another committee, not of our committee, of another committee that may take a different view of this thing entirely. Now it just so happens that Mr. Aspinall happens to also be a member of the Joint Committee and maybe will go along with it. But the fact still remains that a new Congress will have to consider the authorization of the Interior phase of this project, which bothers me. You know how far I will get with this on the floor of the Senate.

Senator ELLENDER. You will not get to the floor of the Senate at all, you will get your trouble with the committee.

Senator PASTORE. You notice how Mr. Cooper is shaking his head. Well, go ahead, all right.

Dr. TAPE. May I ask Mr. Williams if he would like to say something.

Senator PASTORE. Yes.

Mr. WILLIAMS. The scheduling of events as we see them right now is that we would proceed in good faith to negotiate with the Metropolitan Water District the terms of a contract we would hope to execute probably in January or early next year at least. I am not sure in my own mind whether or not the Interior Department, because of the scheduling of their work, would need appropriations at that time. However, because of the work that the AEC intends to support comes immediately in connection with the island, we would need appropriations at that time.

Senator PASTORE. All right, then you could put it on your first supplemental bill that comes up here immediately after we convene in January.

Senator ELLENDER. You can move ahead the moment the Interior passes on this authorization.

Senator PASTORE. I do not think you are going to have much trouble with that. I chair the supplemental bill, too.

Senator ELLENDER. Mr. Chairman, I would like to pursue this question I was asking.

Senator PASTORE. All I am saying here, gentlemen, is that this is going to be a little difficult to do, and I tell you very frankly it is really unorthodox.

Dr. TAPE. Mr. Chairman, I want to make sure you said after January. We should not be speaking for Congressman Aspinall.

Senator PASTORE. You know he is not going to hold a meeting between now and October 15.

Dr. TAPE. We assume it would not be early and so all we could do would be to assume it would—

(Discussion off the record.)

Senator PASTORE. Did you hear what I said?

Mr. ABADESSA. Yes, sir; Senator Pastore. I think it might help, if Mr. Williams would comment.

Mr. WILLIAMS. Perhaps it would be better off the record.

(Discussion off the record.)

PROJECT COSTS

Senator ELLENDER. I would like to pursue a little further these costs. Now, there is no doubt that since quite a few reactors are being constructed throughout the country and you have shown that here a while ago. Do you know to what extent—if this keeps on increasing, the production of power from atomic energy—

Dr. TAPE. Yes.

Senator ELLENDER (continuing). Will that mean an increase in the plan or do you foresee in the future a good deal of this being transferred to private enterprise?

Dr. TAPE. The work that we have been discussing on the power side is all in the private sector now with the exception of this one element of the enrichment services.

Senator ELLENDER. What is the cost of that, let us say, for a plant like you are going to construct near Los Angeles? We have been talking about it. What will be the amount of material that will have to be furnished by you to enrich it? In other words, I would just like to get an idea of what that is.

Dr. TAPE. We do not have that now, Senator.

Senator ELLENDER. All right, let us take it on plants you now have that you are furnishing. What do your receipts amount to?

Dr. TAPE. We have not furnished extensive amounts of this service yet. The point that we are trying to make here is that the plant that is going into construction now is one which will go on line in the early seventies, for example, and so these materials that will be processed through our plants will actually come later, a few years down the stream, a few years before they actually go into operation.

(The following was subsequently submitted:)

The total core loading of each of the two reactors involved in the MWD project would be in the range of 110 to 150 metric tons of uranium enriched to about 2-3% in uranium 235. These ranges of fuel loading and enrichments are based on the core characteristics of the two types of reactors being considered for the project (i.e. pressurized water, PWR, and boiling water, BWR, reactors). The costs associated with enriching the fuel for the core loadings of the two reactors would be about \$20-25 million depending on the reactor type.

DIFFUSION PLANT CAPACITY

Senator ELLENDER. Will this be additional work that you are going to do for those people or can you do it with your present facilities?

Dr. TAPE. It will be done with the present facilities, but it will also be additional work. Let me explain that. At the peak of our military production for enriched uranium we were operating all three of our diffusion plants at full capacity.

Senator ELLENDER. Yes.

Dr. TAPE. We have met many of the needs on the defense side, and so these, through the years, have been tapering off. The needs on the civilian side have not yet really started to grow because these large plants that I have talked about are not yet on line. And so, if you could visualize the operation of these diffusion plants, the level of operation is decreasing now, but it will be increasing in the future.

Senator ELLENDER. Increasing, yes. So it is to keep yourself in business.

Dr. TAPE. And the levels to which we will reach at the minimum will be considerably less than our peak capacity of several years ago.

Senator ELLENDER. Well, you figure that as the need for war decreases, your need for civilian will increase.

Dr. TAPE. Will increase, and there will be a crossover of these but there will be a low point in between the two. The timing of the two is not perfectly matched in other words.

Senator ELLENDER. Yes.

STUDY OF PRIVATE INDUSTRY'S FUTURE ROLE WITH DIFFUSION PLANTS

Now, do you visualize that as the need for this material increases, that private enterprise might get into the business of producing?

Dr. TAPE. We have looked down the road at forecast of power requirements and the role that nuclear will play, and we feel that the present three plants when operating at full capacity later on will carry the needs of this country into the late seventies and maybe even early eighties. So that there is plenty of time for the private sector to look at what should be done in terms of the next step.

As an interim measure, we are studying, however, the question of whether or not because of this transition from the national defense and security side over to the civilian side, it might not be reasonable to look at leasing or some other arrangements to industry or some government-industry combination for the operation of those plants.

Senator ELLENDER. That was the next question I was going to ask. In other words, to get the Government out of it, if we can have the private sector do it.

Dr. TAPE. This is a question which we are exploring right now. I think you appreciate that at the moment if industry were to take

over the plants, we might have a monopolistic situation which would give us problems because there would be no competition for them.

Senator ELLENDER. Of course that is something that you have to figure for the future.

Dr. TAPE. This would have to be factored into all of these studies.

REVENUES

Senator ELLENDER. Right. I understand that.

Let me ask you this: All receipts up to now, as I understand, for any of these products, do they go to the Treasury?

Mr. ABBADESSA. No, sir.

Senator ELLENDER. I thought they did.

Mr. ABBADESSA. To the extent that we receive revenues, which in the current year we are estimating at \$58 million, we reduce our requests for appropriations from this committee. I think if you will look at the big sheet you have just to your right there, Senator Ellender, there should be a gross obligations figure of about \$2.129 billion and then you will see revenues applied of about \$58 million.

Senator ELLENDER. \$58 million, yes.

Mr. ABBADESSA. In other words—

Senator ELLENDER. Those are anticipated collections you are going to make for the material you make.

Mr. ABBADESSA. And for other purposes; that is correct, sir.

Senator ELLENDER. I understand.

Mr. ABBADESSA. And we reduce our request from this committee by that figure.

Senator ELLENDER. I see.

Well, you are doing just the reverse of what other agencies do. Usually any collections they make they put directly into the treasury and ask for the full amount they need.

Mr. ABBADESSA. This is correct.

Senator ELLENDER. That is why your operation is a little different from other departments.

Mr. ABBADESSA. Yes, sir. Our operation in many respects is more commercial. Revenues is a substantial figure.

Senator ELLENDER. I see.

Mr. ABBADESSA. And we lay it out fully to the Congress in our request.

Senator ELLENDER. At the end, for instance, I presume that when you presented your program last year, you had that minus amount here in respect to revenues applied.

Mr. ABBADESSA. That is correct.

Senator ELLENDER. How much did you have last year?

Mr. ABBADESSA. \$60.8 million.

Senator ELLENDER. What did you actually collect?

Mr. ABBADESSA. What was the actual collection, Mr. Corso? I believe it was about \$67 million, was it not?

Mr. CORSO. About \$13.7 million over.

Senator ELLENDER. If you deducted \$60 million and you collected \$67 million, you still have \$7 million on hand.

Mr. ABBADESSA. Yes.

Senator ELLENDER. Am I right?

Mr. ABBADESSA. Yes, sir; you are. However, the Joint Committee and the House Appropriations Committee are very alert to under-running costs and overrunning revenues, and when they review our budget they get our figures and reduce the current year's request by any carryover that comes from the prior year.

Senator ELLENDER. So that this year you will be able to reduce the \$7 million then if your minus sign was \$60 million and you received \$67 million.

Mr. ABBADESSA. The House Appropriations Committee picked up \$13.7 million for the additional revenues. In our carryover, Senator Ellender, when we put together our 1967 budget, we anticipated carryover of about \$68.2 million. When our hearings were held by the Joint Committee later in the year, we reported to them that it looked like we had a safe carryover of about an additional \$23 million, and the Joint Committee picked up the \$23 million and reduced our appropriation request by that amount. When we went before the House Appropriations Committee, they picked up an additional \$56 million. Of that \$56 million, \$13.7 represented the additional revenues.

Senator ELLENDER. I understand.

Mr. ABBADESSA. So we lay out our figures and report them to these committees. They pick up any moneys that we have left over.

Senator ELLENDER. Well, now, to make it specific for the 1967 fiscal year, you have a minus revenue applied of \$58 million, is that an estimate for the coming year?

Mr. ABBADESSA. That is correct, sir, for fiscal year 1967.

Senator ELLENDER. I see. And should your estimates be over \$58 million, then on your 1968 budget you deduct the difference.

Mr. ABBADESSA. That is correct.

Dr. TAPE. The Joint Committee and the House will pick this up.

Senator ELLENDER. All right.

Dr. TAPE. Where you said you still have it on hand, and I was shaking my head "No," it was because two other committees had already seen this.

Senator ELLENDER. I do not happen to be on the Atomic Energy Committee, and that is why I am asking these questions.

Mr. ABBADESSA. And the staff of both of those committees are extremely knowledgeable and effective in this area.

Senator ELLENDER. I do not doubt that, but AEC always ends up with all they asked for. [Laughter.]

CONTINUATION OF STATEMENT BY DR. TAPE

Dr. TAPE. Mr. Chairman, we broke toward the bottom of page 4 of my testimony.

The remaining portion on pages 4 and 5 and the top of page 6 really refer to the MWD project.

Senator PASTORE. Where are you now, up to page 6? We will insert that in the record as though read.

Dr. TAPE. May I also call your attention to the remainder of the testimony from the middle of page 6 where it says, "I would now like to talk briefly about each of our major programs for which funds are requested in the fiscal 1967 budget." The presentation from here on in the testimony is a summary of our total budget request, the President's budget, the presentation which was made to the Joint Committee. It is a summary of the material which we presented to the House Appropriations Committee and we have summarized it here for your committee. I would be quite happy to proceed or, if you so desire, we can insert it in the record.

TRAINING, EDUCATION, AND INFORMATION PROGRAM

Senator ELLENDER. Now, in your education program, where you are asking for \$17.3 million, are you spending any money to educate people in foreign countries? And if so, how much?

Dr. TAPE. In this particular area under education and training, we do have an endeavor in Puerto Rico, so-called Puerto Rican Nuclear Center. This is an undertaking which we have had for some years now, and, of course, the students who are in the Puerto Rican Nuclear Center are Puerto Ricans.

Senator ELLENDER. They are not a foreign country?

Dr. TAPE. We do not call them foreign students, but I would like to make the point it is outside of the continental United States.

Senator ELLENDER. What I meant are noncitizens.

Dr. TAPE. Within their program, since we are attracting people from the Latin Americas and courses are in Spanish, you will find students and participants who do come from there.

In a similar way throughout our entire atomic energy program you will find that there are aliens who are, for example, graduate students who may be graduate students in our universities, who are participating in our research program. You will find postdoctorals, that is, people who have received their Ph. D. degree and are in this country for additional experience. These types of people will be in the program to differing degrees but working as part of our research and development mission. I do not have a breakdown as to what is involved there.

Senator ELLENDER. At whose cost are they here?

Dr. TAPE. These are mixed. In some cases this will be at our cost where we pay for research being carried out, for example, for the postdoctoral. In other cases they will be on fellowships so they will be on expenses from their home institution.

Mr. ABBADESSA. To give you some feel, Senator Ellender, the present student enrollment is 121 at the Puerto Rican Nuclear Center; 103 are U.S. citizens. Fifteen are from Latin American countries, and there are 3 from other countries; 1 from Canada, 1 from Taiwan, and 1 from the United Arab Republic. But essentially it is the Puerto Ricans themselves who attend, sir.

Senator ELLENDER. Well, in your school in Puerto Rico, what percentage, if any, is paid by the local government there or do you bear all the expenses?

Dr. TAPE. We bear essentially all the expenses there.

Senator ELLENDER. Why do you do that in Puerto Rico? I would just like to put it in the record. I am just wondering why we should do that?

PUERTO RICAN NUCLEAR CENTER

Dr. TAPE. The Puerto Rican Nuclear Center started as an educational venture.

Senator ELLENDER. Right.

Dr. TAPE. And as it has developed, it has developed also into one of our very good research laboratory endeavors. They do have their own small reactor there. They have a very strong program in the medical sciences. The director of that installation is Dr. John Bugher, who is from the Rockefeller Foundation, was previously Director of our Biology and Medicine Division in the AEC. He has, during his tenure there of some 6 years now, actually brought together a very strong research program which complements the educational side of the program as well.

There is a very good program in physical and biological research, especially in those areas which focus on what you might call the tropical conditions of the Caribbean. The educational side of it also is in medicine, in agricultural areas relating to the ecology of the Caribbean, and on the physical sciences related to the tools they have.

So I think now one has to look at it, not so much as to why did we start it but, what role does it fill today. It fills a role in terms of the research mission of the Commission and the educational and training mission of the Commission and is playing an ever-increasing role in the Latin Americas. We are very, very pleased with the product.

Senator ELLENDER. What is the cost of operating that facility; do you know?

Dr. TAPE. The educational part of it is \$1,100,000. The research portion which I was talking about is about another \$900,000, so the total is about \$2 million, Senator.

Senator ELLENDER. \$2 million.

Dr. TAPE. \$2 million. That is a round figure.

Senator ELLENDER. And the benefit you derive from that is to have scholars or people available to do research in the future.

Dr. TAPE. That is correct. A number of us visited the laboratory this past year and had a very good firsthand look at it. It is quite apparent that the Puerto Ricans are doing a lot for themselves in the sense of selecting some of their best students, and seeing to it that they are put into areas which will be useful to the Puerto Rican economy, giving them training through the university. Since the facilities adjoin the university, the center ably provides assistance in graduate education to the university.

Senator ELLENDER. Yes.

Dr. TAPE. And we are through our installation providing them with help there, too.

Senator ELLENDER. Is that the only facility that you are subsidizing?

ATOMIC BOMB CASUALTY COMMISSION, JAPAN

Dr. TAPE. This is the only one of this kind under the education and training area. We do have some other expenditures outside of the United States, if this is the point. For example, we support the Atomic Bomb Casualty Commission which is a project in Japan which is for our purposes extremely important; namely, it is a group in the medical field, following up on individuals and research related to the Hiroshima and Nagasaki bombings. This work is very much mission connected with the atomic energy program. There are a few such research endeavors abroad.

Senator ELLENDER. Is that provided for in the item which you have in your presentation under training, education, and information?

Dr. TAPE. No, that item is under the medical research.

Senator ELLENDER. Biology and medicine.

Dr. TAPE. Biology and medicine.

Senator ELLENDER. I see.

Dr. TAPE. Again it is related to the direct mission.

Senator ELLENDER. Most of your facilities to carry on research are here in this country and in our colleges.

Dr. TAPE. That is correct.

Senator ELLENDER. I see. Thank you.

Senator PASTORE. All right.

EXPENSES AND EQUIPMENT

Now, are you familiar with this table? Will you please take a look at it? We are going to insert that in the record.

Dr. TAPE. Yes.

(The table follows:)

Operating expenses

Program	Appropriation, 1966	Budget estimate, 1967	JCAE authorization, 1967	Recommended in House bill
Raw materials.....	\$210,000,000	\$163,015,000	\$163,015,000	\$163,015,000
Special nuclear materials.....	376,000,000	354,228,000	354,228,000	354,228,000
Weapons:				
Development, production and stor- age of atomic weapons.....	491,291,000	459,100,000	459,100,000	454,100,000
Testing of atomic weapons.....	195,727,000	174,700,000	184,700,000	209,700,000
Special test detection activities.....	5,382,000	5,200,000	5,200,000	5,200,000
Total weapons.....	692,400,000	639,000,000	649,000,000	669,000,000
Reactor development:				
Civilian power reactors.....	81,800,000	94,480,000	94,480,000	93,480,000
Cooperative power.....	21,300,000	22,724,000	22,724,000	22,724,000
Euratom.....	5,500,000	2,000,000	2,000,000	2,000,000
Merchant ship reactors.....	500,000	500,000	500,000	250,000
Army power reactors.....	2,700,000	900,000	900,000	700,000
Naval propulsion reactors.....	90,550,000	97,400,000	97,400,000	97,400,000
Space propulsion systems.....	84,400,000	79,100,000	79,100,000	78,800,000
Satellite and small power sources.....	52,800,000	45,350,000	45,350,000	45,350,000
General reactor technology.....	58,000,000	59,100,000	59,100,000	59,100,000
Advanced systems research and development.....	29,300,000	23,700,000	24,700,000	23,700,000
Nuclear safety.....	34,450,000	38,365,000	37,000,000	37,000,000
Operational services.....	6,750,000	4,792,000	4,792,000	4,792,000
Total reactor development.....	468,050,000	468,411,000	468,046,000	465,296,000
Physical research:				
High-energy physics.....	97,850,000	109,800,000	109,800,000	107,850,000
Medium-energy physics.....	9,310,000	11,000,000	11,000,000	11,000,000
Low-energy physics.....	26,810,000	28,800,000	28,800,000	28,310,000
Mathematics and computer re- search.....	5,900,000	6,400,000	6,400,000	6,400,000
Chemistry research.....	49,850,000	53,500,000	53,500,000	52,850,000
Metallurgy and materials research.....	24,780,000	26,800,000	26,800,000	26,280,000
Controlled thermonuclear research.....	21,500,000	22,600,000	22,600,000	22,600,000
Total physical research.....	236,000,000	258,900,000	258,900,000	255,290,000
Biology and medicine.....	83,000,000	87,500,000	86,000,000	86,000,000
Training, education, and information.....	15,838,000	17,300,000	16,600,000	16,100,000
Isotopes development.....	11,600,000	14,780,000	14,670,000	14,370,000
Civilian application of nuclear explo- sives.....	15,375,000	16,200,000	17,700,000	16,200,000
Community.....	8,927,000	10,137,000	10,137,000	10,137,000
Program direction and administration.....	83,371,000	86,547,000	86,547,000	86,547,000
Security investigations.....	5,700,000	5,600,000	5,600,000	5,600,000
Cost of work for others.....	12,200,000	16,740,000	16,740,000	16,740,000
Change in selected resources.....	49,904,000	-27,088,000	-27,088,000	-28,888,000
Gross obligations.....	2,268,365,000	2,111,270,000	2,120,095,000	2,129,635,000
Revenues applied.....	-60,825,000	-58,000,000	-58,000,000	-58,000,000
Net obligations.....	2,207,540,000	2,053,270,000	2,062,095,000	2,071,635,000
Unobligated balances.....	-85,640,000	-68,270,000	-91,787,000	-148,635,000
Appropriation.....	2,121,900,000	1,985,000,000	1,970,308,000	1,923,000,000

Plant and capital equipment

No.	Construction project	Budget estimate, 1967	JCAE authorization, 1967	Recommended in House bill
67-1-a	Special nuclear materials: Isotopes process development laboratory, Savannah River, S.C.	\$2,000,000	\$2,000,000	\$2,000,000
67-2-a	Atomic weapons: Diagnostic chemistry building addition, Lawrence Radiation Laboratory, Livermore, Calif.	1,600,000	1,600,000	1,600,000
67-2-b	Weapons production, development, and test installations.	10,000,000	10,000,000	10,000,000
67-3-a	Reactor development: Fast flux test facility (AE only)	7,500,000	7,500,000	7,500,000
67-3-b	Modifications and addition to S1W reactor facility, National Reactor Testing Station, Idaho.	10,000,000	10,000,000	10,000,000
67-3-c	Research and development test plants, Project Rover, Los Alamos Scientific Laboratory, New Mexico, and Nevada Test Site, Nev.	2,000,000	2,000,000	2,000,000
67-3-d	Fast neutron generator, Argonne National Laboratory, Illinois.	1,900,000	1,900,000	1,900,000
67-3-e	Heavy water organic cooled reactor (AE only)	2,000,000	2,000,000	2,000,000
67-3-f	Modifications to reactors.	3,000,000	3,000,000	3,000,000
67-4-a	Physical research: Low energy accelerator improvements, Argonne National Laboratory, Illinois.	400,000	400,000	400,000
67-4-b	Accelerator improvements, zero gradient synchrotron, Argonne National Laboratory, Illinois.	2,000,000	2,000,000	2,000,000
67-4-c	Accelerator and reactor additions and modifications, Brookhaven National Laboratory, New York.	800,000	800,000	800,000
67-4-d	Accelerator improvements, Lawrence Radiation Laboratory, Berkeley, Calif.	1,550,000	1,550,000	1,550,000
67-4-e	Accelerator improvements, Cambridge and Princeton accelerators.	1,850,000	1,850,000	1,850,000
67-4-f	Accelerator improvements, Stanford Linear Accelerator Center, California.	400,000	400,000	400,000
67-5-a	Biology and medicine: Biology laboratory, Pacific Northwest Laboratory, Richland, Wash.	5,000,000	5,000,000	5,000,000
67-6-a	Isotopes development: Alpha fuels environmental test facility, Mound Laboratory, Miamisburg, Ohio.	3,000,000	3,000,000	3,000,000
67-7	General plant projects.	39,325,000	39,325,000	39,325,000
67-8	Construction planning and design.	2,000,000	2,000,000	2,000,000
66-5-e	Increases: Alternating gradient synchrotron conversion, Brookhaven National Laboratory, New York.	45,800,000	45,800,000	45,800,000
66-5-h	Meson physics facility, Los Alamos Scientific Laboratory, New Mexico (AE only).	3,000,000	3,000,000	3,000,000
63-CDP	Community disposal projects, Los Alamos, N. Mex.	700,000	700,000	700,000
	Total, construction	145,825,000	145,825,000	143,825,000
	Capital equipment not related to construction	150,375,000	150,205,000	150,205,000
	Adjustments to fiscal year 1967 obligations (net)	-1,000,000	-1,000,000	-1,000,000
	Carryover funds from prior year appropriation	-17,000,000	-17,000,000	-17,000,000
	Appropriation	278,200,000	278,030,000	276,030,000

AUTHORIZATIONS AND HOUSE RECOMMENDATIONS

Senator PASTORE. I want you to run down the columns—recommended in the House bill and the Joint Committee authorization, 1967, and 1967 budget estimates. Line 1, raw materials. The amount is the same, the authorization and recommended by the House, is that correct?

Dr. TAPE. Correct.

Senator PASTORE. Equivalent to the budget estimate.

Dr. TAPE. Yes.

Senator PASTORE. The same with reference to special nuclear materials.

Dr. TAPE. Correct.

Senator PASTORE. The same with reference to development, production, and storage of atomic weapons.

Dr. TAPE. No, sir.

Mr. ABBADESSA. The House committee reduced that by \$5 million.

Senator PASTORE. \$5 million, you are not asking for restoration.

Dr. TAPE. We are not asking for restoration, Mr. Chairman, but this is really one of the areas that I tried to call to your attention earlier where production of—production and storage of weapons is concerned. We do our utmost to meet the requirements of the Department of Defense as economically as we can and within the budget estimate.

Senator PASTORE. But you feel for the moment you can live with it.

Dr. TAPE. This is going to be very tight. We are going to make every effort to live with it, but I must hasten to add it will be tight.

TESTING OF ATOMIC WEAPONS

Senator PASTORE. All right.

Now, in the next item, testing of atomic weapons, the House gave you an increase.

Dr. TAPE. That is correct.

Senator PASTORE. Both over the estimate and over the authorization.

Dr. TAPE. There are two items.

Senator PASTORE. Did you ask for the increase?

Dr. TAPE. The Joint Committee authorization was \$10 million over our budget request. This was not requested by the Commission, but was put in by the Joint Committee in order to provide what I call leadtime in the test program looking toward 1968. In other words, there was concern on the part of the committee that we did not have adequate funds for providing leadtime items for the 1968 program. Then going to the House, there was an addition of \$25 million on the House side, and this \$25 million was in response to a request of ours for additional sums to develop additional testing capability.

Senator PASTORE. Which you consider to be essential.

Dr. TAPE. Which we consider to be very essential, and the House in its action did make allowance for that.

Senator PASTORE. Granted you the full request.

Dr. TAPE. Granted the full request.

Senator PASTORE. All right.

SPECIAL TEST DETECTION ACTIVITIES

The next item, "Special test detection activities" is the same.

Dr. TAPE. No change.

Senator PASTORE. All right.

Now, reactor development, the House cut you by \$1 million under the authorization, is that correct?

Dr. TAPE. That was in the civilian power, and that was directed at the heavy water organic cooled reactor, which results then in a slow-down of the research and development work which would go with that particular project.

Senator PASTORE. All right.

COOPERATIVE POWER

Now, the next item is "Cooperative power" which is the same.
Dr. TAPE. No change.

EURATOM

Senator PASTORE. The next one is Euratom, the same.

The next one is merchant ship reactors, you were cut by the House a quarter of a million, is that correct?

Dr. TAPE. That is correct. This particular item would provide, according to the House, study money but not to the extent we had requested. As I indicated early in the testimony, had we appealed this would not have been in an appeal.

Senator PASTORE. All right.

NAVAL PROPULSION

Now, the next item is "Naval propulsion."

Dr. TAPE. Army power reactors, Mr. Chairman, has a \$200,000 cut by the House, and the arguments for that are similar to the merchant ship reactor item.

NAVAL PROPULSION REACTORS

Senator PASTORE. All right, the next item is "Naval propulsion reactors"; it is the same.

Dr. TAPE. No changes there.

SPACE PROPULSION SYSTEMS

Senator PASTORE. The next one is space propulsion systems. There is a cut there.

Dr. TAPE. \$300,000 which was directed at the small thruster work which has sometimes been called Poodle, and this is an item which we would not have appealed.

SATELLITE AND SMALL POWER SOURCES

Senator PASTORE. All right.

Satellite and small power sources is the same.

GENERAL REACTOR TECHNOLOGY

The next item is general reactor technology; that is the same.

The next item, advanced systems research and development; that is cut by \$1 million.

Dr. TAPE. Over the authorization which was increased \$1 million over the budget request from the Commission.

Senator PASTORE. And you are going to live with that.

Dr. TAPE. We will live with that and recognize that the thermionic work was highlighted.

Senator PASTORE. All right.

NUCLEAR SAFETY

Nuclear safety, they cut you by \$1,365,000 and the House allowed you the authorization figure of \$37 million.

Dr. TAPE. Yes.

Senator PASTORE. Operational services the items are the same; correct?

Dr. TAPE. Correct.

Senator PASTORE. All right.

HIGH-ENERGY PHYSICS

High-energy physics you are cut by—

Mr. ABBADESSA. The House reduced this by \$1,950,000.

Dr. TAPE. And this, Mr. Chairman—

Senator PASTORE. That is a cut.

Dr. TAPE (Continuing). Is a cut from the authorization, and our request, and in this area there will be problems with respect to priorities of support. The major facilities which we would like to have supported more strongly than we will be able to would be the new SLAC accelerator at Stanford, the linear accelerator which is just undergoing transition from construction to operation, the AGS at Brookhaven, and the ZGS at Argonne, for example.

Senator PASTORE. But you can live with the cut.

Dr. TAPE. We will live with the cut.

MEDIUM-ENERGY PHYSICS

Senator PASTORE. Medium-energy physics, the item is the same, \$11 million.

LOW-ENERGY PHYSICS

Low-energy physics.

Dr. TAPE. Reduced \$490,000, and again this is one which we will feel but we will live with it.

MATHEMATICS AND COMPUTER RESEARCH

Senator PASTORE. The next item is mathematics and computer research; it is the same, \$6.4 million.

CHEMISTRY

Chemistry research, there is a cut there of—

Dr. TAPE. \$650,000, and the same arguments apply for chemistry as for high-energy physics.

Senator PASTORE. All right.

METALLURGY AND MATERIALS RESEARCH

The next item, metallurgy and materials research. There is a cut of \$520,000.

Dr. TAPE. The same arguments there, Mr. Chairman, and it is in this type of area in which again flexibility, I think, is quite important, because within the program totals and within the total for the commission we would like to have some opportunity to provide a response if there are problems within any one of these items.

Senator PASTORE. All right.

CONTROLLED THERMONUCLEAR RESEARCH

Controlled thermonuclear research, it is the same as the authorization.

Dr. TAPE. No change.

BIOLOGY AND MEDICINE

Senator PASTORE. Now, biology and medicine, it is the same as the authorization.

Dr. TAPE. That is correct.

Senator PASTORE. And the authorization was a million and half below the estimate.

Mr. ABBADESSA. Correct, sir.

TRAINING EDUCATION AND INFORMATION

Senator PASTORE. The next is training, education, and information, there is a cut under the authorization of half a million dollars; is that correct?

Mr. ABBADESSA. That is correct, \$700,000 in the authorization, and then \$500,000 more by the House.

Senator PASTORE. But it is a half million under the authorization.

Mr. ABBADESSA. That is correct.

Dr. TAPE. That is correct.

ISOTOPES DEVELOPMENT

Senator PASTORE. The isotopes development, that is \$300,000 below the authorization.

Dr. TAPE. Correct. That is related again to the thruster work.

Senator PASTORE. Yes.

CIVILIAN APPLICATIONS OF NUCLEAR EXPLOSIVES

Now, the civilian applications of nuclear explosives is a million and a half under the authorization.

Dr. TAPE. And that million and a half relates the difference of the authorization of Gas Buggy which was included by the Joint Committee, but for which there is no funding included in the House bill. In other words, the House did, in its language, say "Go ahead with Gas Buggy but do it within the total of the Plowshare program."

Senator PASTORE. You can do it.

Dr. TAPE. This can be done, Mr. Chairman. It will have to be at the expense, of course, of some elements of the excavation program and perhaps the scientific program, but it can be done.

Senator PASTORE. It can be done.

COMMUNITY

All right, the next item is community; that is the same.

Dr. TAPE. Correct.

Senator PASTORE. Program direction and administration is the same. Security investigations is the same.

Cost of work for others is the same.

Change in selected resources.

Mr. ABBADESSA. Those are changes in our obligational authority which are related to the other reductions, Mr. Chairman.

Senator PASTORE. As part of the 56—

Mr. ABBADESSA. Part of the total reduction. You see, what you have been looking at are costs and the reductions have been in costs. This reduction relates to obligational authority.

REVENUES APPLIED

Senator PASTORE. Now, the next item is revenues applied. Mr. Ellender has already discussed that with you.

UNOBLIGATED BALANCES

The next item is—well, unobligated balances.

Mr. ABBADESSA. This is the carryover, this is the area where the Joint Committee picked up \$23.5 million that we had left over and the Joint Committee picked up the \$56.8 million.

Senator ELLENDER. You discussed that a while ago.

Mr. ABBADESSA. Yes, sir.

Dr. TAPE. Yes.

I think on the second page, Mr. Chairman, we have two items—

HEAVY WATER ORGANIC COOLED REACTOR

Mr. ABBADESSA. There are only two changes, Mr. Chairman.

Senator PASTORE. The first change appears about halfway down, heavy water organic cooled reactor, correct?

Dr. TAPE. That is correct. The House did not appropriate the funds for the \$2 million for architect engineer work.

Senator PASTORE. But they granted you money for the reactors.

Dr. TAPE. That is correct.

Senator PASTORE. Now we drop down to—

CAPITAL EQUIPMENT

Mr. ABBADESSA. To capital equipment, the authorization was reduced \$170,000 and the House gave us the authorized figure.

Senator PASTORE. How about the community disposal projects, the authorization was \$700,000. The House—

Mr. ABBADESSA. What is involved here is we have requested—this is no change.

(Discussion off the record).

COMMUNITY DISPOSAL PROJECTS

Senator PASTORE. Community disposal projects, we were talking about that, where the request was for \$700,000. The authorization was for \$700,000, and the House eliminated it. What is your reaction to that?

Mr. ABBADESSA. I believe this is a mistake possibly in the preparation of the document itself, because the House did not eliminate the \$700,000.

Mr. COOPER. It does not show up as an item.

Mr. ABBADESSA. This was—

Mr. CORSO. I think I can explain that. This was already authorized so it does not show up as a new request for fiscal year 1967 so far as authorization is concerned, although we do have new appropriations of \$700,000 pursuant to an authorization of a prior year.

Senator PASTORE. I see.

Mr. CORSO. The community disposal project.

Senator PASTORE. There is no elimination of that item.

Mr. CORSO. This is no elimination of that item.
 Senator PASTORE. I have a question here to ask.

200 BEV ACCELERATOR

I understand you received some 126 proposals for siting the planned 200 Bev accelerator, recommending more than 200 locations in 46 States. With the assistance of the National Academy of Sciences, the selection has been narrowed to six proposals which meet the requirements. During the House hearings held in April you indicated that a final determination can be made before the end of the year.

What is the present status of the selection, and when do you now expect to make the final determination?

Dr. TAPE. There has been no final determination with respect to the site, Mr. Chairman. We are still reviewing the proposals and still gathering information which would be pertinent to the Commission's decision. The Commission has every expectation of arriving at such a decision by the end of the year as you indicated. The six sites which the Academy recommended and with which the Commission agreed are the Sacramento site in California; the Denver site in Colorado; a site near Chicago, on the Weston site; the site near Madison, Wis., so-called Stoughton site; a site at Ann Arbor, Mich.; and a site at the Brookhaven National Laboratory on Long Island, N.Y.

These are all still under active consideration. The Commission has recently indicated to the proposers that there were certain questions we had with respect to electrical power considerations and that we had asked for a chance to get additional information there, and we are in the process of doing that now.

PLOWSHARE PROGRAM: PROJECT GASBUGGY

Senator PASTORE. Senator Dominick is going to submit a statement on the Plowshare program, Gasbuggy, and we have a letter from Senator Anderson on the same subject.

(The statement and letter follow.)

LETTER OF HON. CLINTON P. ANDERSON, U.S. SENATOR FROM THE STATE OF NEW MEXICO

U.S. SENATE,
 COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES.

September 16, 1966.

HON. ALLEN J. ELLENDER,
 Chairman, Public Works Appropriations
 Subcommittee
 U.S. Senate.

DEAR MR. CHAIRMAN: The Joint Committee on Atomic Energy last May authorized \$1.5 million as the Atomic Energy Commission's Fiscal Year 1967 share for a proposed experiment to demonstrate how a peaceful underground nuclear explosion could be used to increase the recovery of gas and oil not economically recoverable by conventional means. The Project is designated Gasbuggy. It would be undertaken in cooperation with the El Paso Natural Gas Company. The experiment would represent the first cooperative effort to use an atomic explosion for industrial purposes anywhere in the world as far as we know. The significance, as you can recognize, would be tremendous.

The House Appropriations Committee in reporting out the Public Works Appropriations Bill recommended that Project Gasbuggy be undertaken, but the Committee did not approve the authorized \$1.5 million for the Project.

I strongly urge that your Subcommittee direct the Atomic Energy Commission through its Plowshare Program to conduct Project Gasbuggy. I would hope that at least part of the funds authorized would be reinstated by the Senate, but in the event that it is not, the Atomic Energy Commission should be instructed to go

forward with the Project, using funds appropriated for the overall Plowshare Program.

Sincerely yours,

CLINTON P. ANDERSON.

STATEMENT OF HON. PETER H. DOMINICK, U.S. SENATOR FROM THE STATE OF COLORADO

Mr. Chairman and members of the Subcommittee, I am presenting this statement as an indication of my enthusiastic support for Project Gasbuggy which is part of the Plowshare Program.

We all look forward to the day when nuclear explosives can be safely employed on a wide scale for peaceful purposes. Those familiar with the program already envision many varied peaceful uses for nuclear explosives. I am confident that, as we progress with the development of techniques and devices to properly control the explosions, new applications will unfold which will exceed the potential recognized today. Certainly it takes little imagination to foresee the potential use of nuclear explosives in the excavation of large projects involving highway cuts and canals.

However, I wish to confine my testimony today specifically to Project Gasbuggy. It is envisioned that controlled underground nuclear explosions can be successfully employed to economically break up huge tonnages of underground rock. It is hoped that this fractioning of underground rock will permit the economic recovery of gas, oil and other minerals which cannot now be economically recovered by existing techniques.

As you know, the AEC, the Bureau of Mines, and the El Paso Natural Gas Company have studied the feasibility of conducting an experiment to demonstrate the practicality of stimulating the production of natural gas by means of a nuclear explosion in the low-permeability Picture Cliffs formation in northern New Mexico. The parties have concluded that the experiment can be conducted safely with a contained underground nuclear explosion and that the proposed experiment shows promise of demonstrating the economic feasibility of gas stimulation by nuclear explosives.

The economic potential of this recovery technique is tremendous. This technique, if feasible, would permit the recovery of gas which could not otherwise be economically recovered. If the experiments planned in Project Gasbuggy prove to be feasible, the application of the same technique may well prove satisfactory for the economic recovery of oil in our western oil shale deposits. The feasibility of these new techniques would be important to both private industry and the government. Many of the Rocky Mountain gas reservoirs, to which these techniques could be applied, are on federal land from which the government would derive substantial royalties. A new source for gas, oil and other minerals would be opened up which would have a substantial impact on our nation's economy. Indeed, the economic ramifications of this proposed experiment may well exceed our most optimistic expectations.

The Potential for Project Gasbuggy is so great that I urge the members of this Subcommittee to give it their full support. It is my understanding that, while the House Committee on Appropriations did not add specific funds for Project Gasbuggy, they did give the Project their full support as indicated in the language contained in the Committee's report. Because of the significance of this project, I would urge this committee to add the necessary funds to insure its implementation.

DEFERMENT OF OTHER PROGRAM PROJECTS IN FAVOR OF PROJECT GASBUGGY

Senator PASTORE. You have already indicated that if the committee so decided and recommended it to the AEC that it could be handled through existing appropriations, if this amount is allowed.

Dr. TAPE. This is correct. I indicated what would have to give, if you will, out of the original request which we made and had indicated to you that since this is of the order of—since this is one and a half million, it means that some of the more expensive projects which we would have undertaken this year would have to be deferred. This would undoubtedly be in the excavation area although there might possibly be other projects which would have to be deferred as well, perhaps scientific experiments and so on.

Senator PASTORE. Why does not the Commission or the committee give a lower priority to the Gasbuggy; what is the reason for not asking for appropriations on that?

Dr. TAPE. The reasons for not asking for appropriations for Gasbuggy this year, Mr. Chairman, were connected primarily with an analysis having to do with the time urgency. There were differences of opinion as to whether or not this particular project was required in this year or whether it could be done at some later date. If you look at the project from the point of view of analysis of gas resources and projection of future resources, there are those who will argue that our resources are sufficient now that we do not have to answer this kind of question this year.

On the other side of the argument are those who will argue that we do not know whether or not this technology will give rise to additional resources. We have every expectation that it will give rise to such additions, but before the industry can be convinced there needs to be a demonstration project.

So I think that it is a question of how much is industry interested, and an expression of their interest is related to how much money are they willing to put up as their part of the participation. You may recall that in rather extensive hearings before the Joint Committee that it came out that although industry had indicated earlier that perhaps they might put in a million dollars, this number was increased to a larger figure, and as a result then the Government's contribution would be less. It was as a result of this indicated very strong interest on the part of industry and their willingness to participate to a greater extent that I believe the Joint Committee decided it was timely to include it in the authorization.

Senator PASTORE. In the event we do recommend that you do initiate this project within existing appropriations when allowed by the Congress, what will be the status then as to industry participation? I mean, how will you go about it? What will you require?

Dr. TAPE. Well, we certainly will want a maximum of industry participation, and there is no question in my mind that the greater the participation, the more likely we will be able to get complete support for the project.

Senator PASTORE. What will a project like that finally cost?

Dr. TAPE. The total estimated cost is \$4.7 million.

Senator PASTORE. \$4.7 million; so you would expect industry to come up with —

Dr. TAPE. It is about a third at the present time. It would be hoped that this might even be improved.

STATEMENT OF HON. WARREN G. MAGNUSON, U.S. SENATOR FROM THE STATE OF WASHINGTON

Authorization of 200 BEV Accelerator

Senator PASTORE. I have a statement here from Senator Magnuson he would like to file which has to do with the 200-billion-electron-volt accelerator. Incidentally, that has not been authorized yet, has it?

Dr. TAPE. No, it has not. You will recall, Mr. Chairman, that in the President's submission to the Congress of the fiscal year 1967 budget he indicated that design funds would be requested once a site has been selected, and the design has been authorized.

(The statement referred to follows:)

PROPOSED AEC 200 BILLION ELECTRON VOLT ACCELERATOR SITE SELECTION
RECOMMENDATIONS

Mr. Chairman, the 200 billion electron volt accelerator will be the nation's largest scientific instrument. The total cost of this instrument is presently estimated to be in the neighborhood of \$348 million, with an annual operating budget of about \$60 million.

These were the originally proposed cost figures. It can reasonably be expected that when the Report of the National Academy of Science Site Evaluation Committee is acted upon, the costs will be significantly higher.

I say this because the Site Evaluation Committee was candid enough to state, "It has not been the purpose of this Committee to estimate the cost of construction and operation at various sites." It would thus appear that \$348 million is only the beginning and that the cost of this scientific instrument will increase considerably. These various costs have not been estimated for the sites picked by the NAS Committee, but the AEC expects to choose from among the recommended sites. Cost will be the great unknown factor.

If not cost, what did the Site Evaluation Committee evaluate? They examined what they called the "return on investment." The Committee said:

"The cost differences dependent on the various physical features of the proposed sites cannot be accurately determined without detailed studies of the design of the accelerator and the experimental program at each site. In the judgement of the Committee, however, the ultimate cost of the project depends less on the physical features of the site than on the competence and ingenuity of the physicists and engineers who will design the facility and be responsible for its operation."

The Committee then "assigned paramount importance to the considerations that affect the recruiting of personnel . . ." Climate, housing, schools, cultural activities and other such environmental factors weighed most heavily with the Site Evaluation Committee.

One cannot be critical of the Committee for mentioning these environmental considerations. Without adequate staff, the best instruments are useless. The Committee was saying, in effect, that genius of man's mind is perhaps more important than his tools. One can, however, be critical of a proposal to spend over \$348 million of the tax payers' dollars primarily on that basis.

The costs of construction and operations can be calculated and verified. The ability of certain environmental considerations to attract men of genius cannot be calculated. Because the Committee finds an area culturally adequate does not mean other scientists will agree and flock to the site. The Committee found areas which it felt were pleasing and concluded that all scientists would also find them pleasing. Not only is this an irresponsible disregard of the tax-payers' monies, but it leads to conclusions which neither the Site Committee nor the AEC can justify.

I have no doubts that if Washington, D.C. had a more even climate and better housing and schools, every Senator here would have a greater opportunity to attract skilled staff personnel. This is not the same thing as saying that better climate, housing and other factors necessarily would bring in better staff. Some people like the area; others are attracted by the job opportunity. What I am saying is that the Site Committee was weighing imponderables; I repeat—imponderables, unless they have devised a way of looking into a man's mind. Men of genius go where their genius can be used, just as men of war fight in Korea or Viet Nam, and not where life is the softest.

It is curious to note the *Science Magazine* report of April 15, 1966:

"As things worked out, members of the Academy (site visiting) committee visited selected portions of only six of the competing 43 states, and curiously enough, the six finalists were in those selected portions. Furthermore, three of those visits took place prior to the visits of the AEC evaluation teams that were supposed to report to the (NAS) committee."

That Magazine also made an interesting point when it stated:

"But when the number of proposals reached the unexpectedly high total of 126, spread across 46 states, and the intensity of politicking similarly rose, the AEC came to the preposterous, but politically safe, conclusion, that some two-thirds of the proposals, covering 43 states, 'met the basic criteria for the site'. Just how this could be was difficult to establish, since even in this well-developed country, there aren't 85 places that offer a combination of 3000 level, stable acres

in reasonable proximity to a major airport, first-class university, and an industrial research and development center, as well as suitable housing and cultural and educational facilities for 2000 professional families, plus adequate water and power for the big accelerator."

The Lawrence Radiation Laboratory made a design study for the AEC on the 200 BEV acceleration. It is instructive to compare their site criteria with the NAS recommendations. At least the Lawrence Laboratory recognized that cost is an element, and did not simply write it off as irrelevant under the circumstances.

The Lawrence Laboratory recommended a minimum of 2500 to 3000 acres. NAS recommended "at least" 5000 acres. This NAS Site Committee correctly stated that it did not estimate costs.

The Lawrence Laboratory recommended seismic history be considered. NAS remembered this because in recommending the Sierra foothills site near Sacramento, the Committee also recommended that special designs be used to "provide protection against seismic shocks. . . ." These special designs would increase the costs. This Committee correctly stated that it did not estimate costs.

The Lawrence Laboratory said proximity to major transportation is desirable. According to the NAS scale, this means drives of 30 minutes to two hours make the airport "proximate." A drive of 2½ hours means the airport is only "moderately accessible." By these standards, many places would qualify.

The Lawrence Laboratory recommended that proximity to a university would aid the program. NAS found the following: At Ann Arbor, "other major Midwestern universities . . . are near enough"; "Brookhaven" is "near" Princeton, Yale, and other schools in the Northeast; Madison is "near enough" to other major Midwestern universities. By these definitions, there is hardly a site in the nation that isn't "near enough" to major schools, except poor Denver which is not near a major university despite the proximity of the University of Colorado. The Committee did not explain why 2½ hours was too long to drive to an airport, but not too long to drive to a university. The definition of proximity is very flexible. This Committee correctly stated that it did not estimate costs. It attempted to estimate the effects of the environment on men's minds.

The Lawrence Laboratory said costs, among other things, are benefited by mild climatic conditions. NAS recommended sites with some of the following characteristics: Almost a month a year below zero; almost 6 months a year at or below 32 degrees; over two weeks a year above 100 degrees; 59 inches of snow per year; 48 inches of rain per, etc. Some of these sites would appear to offer little cost benefit by reason of a mild climate. This Committee correctly stated that it did not estimate costs.

The Lawrence Laboratory said desirable nearby communities will aid in the attraction and retention of personnel. Again NAS was faced with the problem of "nearness" as well as the problem of defining "desirable." Being within 50 miles of New York qualified Brookhaven. Denver was found to be culturally "adequate"; Chicago was found to be culturally "adequate"; and the Sierra Nevada recreational areas were found to be "attractive."

In view of these examples of adequacy, it is difficult to understand how even six communities qualified. If Chicago is only "adequate", and the Sierra Nevada are only "attractive," the demands of scientists are great indeed. This Committee correctly stated that it did not estimate costs. It attempted to estimate the effects of the environment on men's minds.

Finally, the Lawrence Laboratory suggested that existing facilities and local cost factors could be important. Lacking cost consciousness, NAS did not give serious attention to these matters.

One might reasonably ask, if the taxpayers' dollars were not considered by the NAS Committee, what role did they perform? According to NAS, the Committee, "was formed to assist the Atomic Energy Commission in the evaluation of sites." The Atomic Energy Commission has stated in a letter to me that this "Commission has concluded that the most promising site will be found among the six recommended." It thus appears that the NAS has done more than "assist" the AEC; it has virtually dictated the site, based on decisions about what other people will find pleasing.

One point that both the NAS and the AEC have missed in their evaluations was that the expenditure of \$348 million in construction and \$60 million in annual operations would make any community significantly more attractive than it was before.

By the AEC's own statement, there are only 50 senior design scientists and 1,000 research scientists in the United States who are qualified enough to be involved with this instrument. I would suggest that an accurate site determination could most easily be made by polling these 1,050 people about their favorite spot in the nation. In this way, there would be no need for speculation about the effects of the environment on the individual. If construction and operating costs are in fact immaterial, the Congress will want to be assured that the \$348 million initial outlay and \$60 million annual operating outlay of taxpayers' money is in fact being spent to insure happy, contented scientists who will somehow then be inspired to do their best, imaginative work. This poll would certainly be easier than evaluating 126 sites or even six sites. Modern techniques could easily manage this project.

I note with interest the publication entitled, "Federal Funds for Research, Development, and Other Scientific Activities" published by the National Science Foundation. On page 70 of that report is a listing of the Federal Contract Research Centers of the Atomic Energy Commission. In addition to AEC Research Centers near areas recommended by the NAS Site Committee, such as Brookhaven, Chicago, and Sacramento, the AEC has activities at Pittsburgh, Pennsylvania; Idaho Falls, Idaho; Schenectady, New York; Miamisburg, Ohio; Albuquerque, New Mexico; Knoxville, Tennessee; Salt Lake City, Utah; and Richland, Washington. The centers at these areas, which did not meet the physical, social, or cultural requirements of the NAS Committee, presumably are adequately staffed by full time and visiting personnel. Perhaps the 1,050 people capable of working on the 200 BEV Accelerator has more specialized social or cultural requirements than the personnel at the AEC centers which I have mentioned.

I am not aware of anything indicating that the AEC is not getting an adequate "return on investment" from these sites, but perhaps NAS has information of this nature.

The existence of Research Centers at these other locations indicates to me that many research scientists will live comfortably and perform useful work in areas with characteristics different than the over-generalized statements describing the ultra-cosmopolitanism, super-sophistication required by people working on the 200 BEV Accelerator.

Perhaps the Congress will have to try to answer the question posed in *Science Magazine*:

"Here we get down to some of the fundamental tensions between the basic research community and its government patron. Is science so valuable and so specialized in its requirements that society must support science on the terms of the practitioners of science?"

It will be interesting to watch the Atomic Energy Commission justify a site recommended by a group whose charter states, "It has not been the purpose of this Committee to estimate the cost of construction and operation"

CONCLUSION OF HEARING

Senator PASTORE. Any questions?

Senator HRUSKA. No, thank you, Mr. Chairman.

Senator PASTORE. Thank you, gentlemen, for appearing before us today. If there are no further questions, this concludes the hearing and we shall stand in recess.

Dr. TAPE. Thank you very much, Mr. Chairman.

(Whereupon, at 4:15 p.m., Wednesday, September 27, 1966, the hearing was concluded, the subcommittee recessed, to reconvene subject to the call of the Chair.)

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