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PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975

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SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

NINETY-THIRD CONGRESS

SECOND SESSION

SUBCOMMITTEE ON PUBLIC WORKS

JOE L. EVINS, Tennessee, *Chairman*

EDWARD P. BOLAND, Massachusetts

JAMIE L. WHITTEN, Mississippi

JOHN M. SLACK, West Virginia

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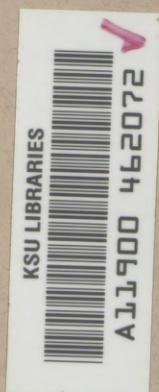
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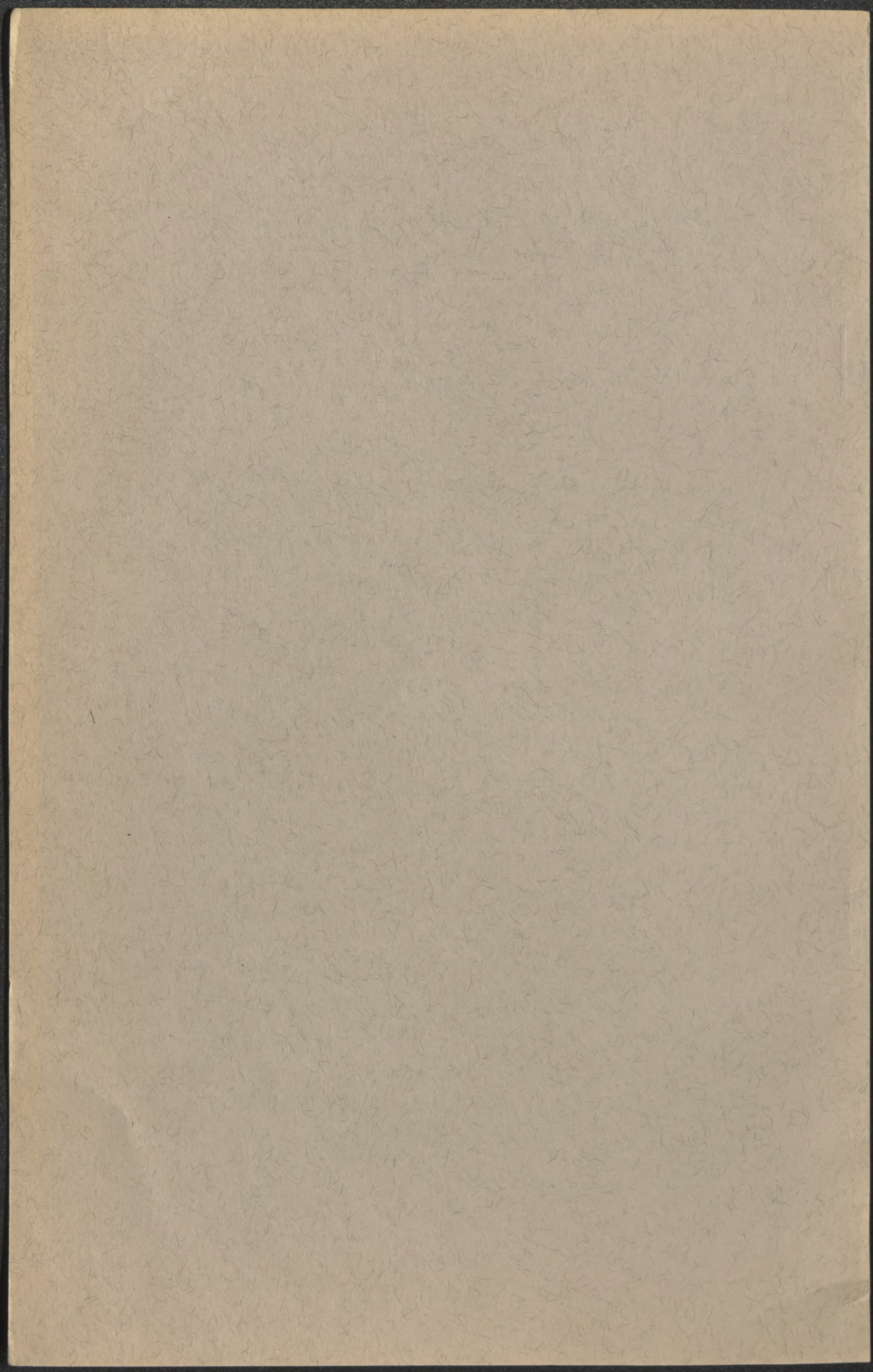
HUNTER L. SPILLAN, GEORGE A. URIAN, and JOHN G. PLASHAL, *Staff Assistants*

PART 6

TENNESSEE VALLEY AUTHORITY

Printed for the use of the Committee on Appropriations





PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975

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WASHINGTON : 1974

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PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATIONS FOR FISCAL YEAR 1975

WEDNESDAY, APRIL 10, 1974.

TENNESSEE VALLEY AUTHORITY

WITNESSES

AUBREY J. WAGNER, CHAIRMAN
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WILLIAM L. JENKINS, DIRECTOR
LYNN SEEBER, GENERAL MANAGER
JOHN S. BARRON, ASSISTANT TO THE GENERAL MANAGER (PLANNING AND BUDGET)
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LEON EDWARD ELLIS, CHIEF, BUDGET STAFF
ROBERT H. MARQUIS, GENERAL COUNSEL
LEWIS B. NELSON, MANAGER OF AGRICULTURAL AND CHEMICAL DEVELOPMENT
JAMES E. WATSON, MANAGER OF POWER
JAMES L. WILLIAMS, JR., DIRECTOR OF PURCHASING

Mr. EVINS. The committee will come to order.

This is a happy day here in this committee, for two reasons. First, today is the last day of hearings of departmental witnesses and second, we are happy to have TVA with us. We have saved the best for the last.

We have with us our friends from Tennessee Valley Authority, a very distinguished group, Aubrey J. Wagner, Chairman of the Tennessee Valley Authority. He has had a long career of service there; he worked up from the ranks and he is getting a little seniority. Don McBride, who used to be over in the Senate, well-known water resources advocate, Director; William L. Jenkins, the first Tennessean ever to be a member of the Board; he is a former Speaker of the Tennessee Legislature, and also very distinguished; Lynn Seeber, General Manager; John S. Barron, Assistant to the General Manager, and he does a good job. Lawrence L. Calvert, Washington representative. We do not get to see Brother Calvert enough. Where is he? We always enjoy seeing you. Come around to see us.

Leon Ellis, Chief Budget Staff; Robert H. Marquis, General Counsel. He has a little lobbying to do over on the Senate side. Lewis B. Nelson, Manager of Agricultural and Chemical Development; James E. Watson, Manager of Power, and James L. Williams, Jr., Director of Purchasing.

Well, he has a big job. He spends a lot of money.

Mr. Chairman, I have read your statement, it is very interesting and we will be pleased to hear you. You may file it for the record, highlight it, or proceed as you wish.

Mr. WAGNER. At your pleasure, Mr. Chairman. I would be glad to go through the entire statement or, if you prefer, I can attempt to brief it for you.

Mr. EVINS. Why don't you just go down your statement and highlight it as you wish. It is a good statement.

OPENING STATEMENT

Mr. WAGNER. Thank you, Mr. Chairman.

We welcome this opportunity to come before you again and to tell this committee something of what TVA is doing and would like to do in the future.

The Tennessee Valley region demonstrates that people can improve their economic situation and their environment concurrently. Nowhere else in the Nation has the life style of so many people changed more in so short a time and with minimal adverse effect on the quality of the natural environment. Forty years ago the Tennessee Valley region was predominantly agricultural. The region, as you know from living there so long, has changed. Now it is predominantly manufacturing and commercial. For the first time on record, new industrial projects announced in 1973 for the Tennessee Valley region represented an estimated investment of approximately a billion dollars.

Other changes are evident. Green pastures and forests have largely replaced eroded fields from corn and cotton production. Fewer people are on farms and they are making better livings. The forest resource has grown in quality and quantity and the forests themselves remain, not destroyed by the forest industry they support. Floods have been controlled, and the developed river system carries commerce and generates power. Industrial development along the reservoir shoreline has spurred the regional economy.

We have been setting new records every year for barge traffic on the Tennessee River. Investments in industrial facilities along the Tennessee River waterway also set a record in 1973, with \$329 million invested in plants and terminal facilities. At the same time, the water in the Tennessee River is of higher quality than it was in 1933. Streams and lakes attract thousands of recreationists. A plentiful supply of electric energy has made a major contribution to better jobs and better living.

These and other factors have created a new spirit of progress and optimism in the region. The once serious outmigration to northern industrial centers has all but halted. There are jobs and good living for people in the valley. There are reasons, both economic and environmental, for them to stay. Many of them are doing that.

With all its change, the valley still displays its essentially rural charm. Industrial growth has taken place primarily in the rural areas. Smaller towns and villages have greatly benefited from the location of industries in and near them. People in the valley can to a very great extent live and work in the country without sacrificing the benefits of industrial wages or urban amenities. This has been setting a pattern which we believe will be a pattern for the country as a whole.

TVA and valley institutions and agencies are working together to build new communities and to upgrade existing small towns. Our 1975 budget program contains estimates for continued planning of a new community on the Tellico Reservoir. Called Timberlake, this community is being planned to offer an integrated ideal living, working, and recreation environment in an area that is now fields and forests. Funds are also in the budget for continuation of plans for an inter-related system of existing communities and new rural village clusters on the lower end of the Elk River in Tennessee and Alabama. This will show a rational use of rural land, affording a full range of living conditions in a health environmental setting.

FERTILIZER DEVELOPMENT

We will continue to be a leader in fertilizer development and in cooperative programs of fertilizer introduction and use. Fertilizer is the key to food and fiber abundance in a crowded, hungry world. At TVA's National Fertilizer Development Center at Muscle Shoals and at State university agricultural experiment stations and on farms across the Nation, we are working to discover and demonstrate tomorrow's fertilizer, the kind that will improve the efficiency of farm production and will pose no threat to the environment. Urea ammonium phosphate and sulfur-coated urea are such fertilizers, and they are about ready for widespread introduction and demonstration.

ENVIRONMENTAL CONCERN

As a regional resource development agency, TVA is interested in a quality environment. Our task is to see in its totality what one of my first predecessors on the TVA Board, Dr. Harcourt Morgan, called "the seamless web." To use a modern vernacular, TVA has the job of "getting it all together." We are concerned for water and air, fish and fowl, stream and lake, trees and fields, and energy and the economy. But primarily we are concerned with the people in the region and their total environment. We want a quality environment and a prosperous people. We hope that environmental legislation will be interpreted in a balanced manner which will promote rather than delay the achievement of this regional goal of better quality living for the people, taking into account all of the factors that enter into good quality legislation.

To reach this goal will require dependable funding. This doesn't mean unlimited spending, but rather the continued availability of financing at reasonable levels so that projects once undertaken can proceed on an efficient schedule. We hope we have used the funds you have provided wisely and well.

Our appropriation request for fiscal year 1975 is \$74,600,000. This is one of the larger requests in recent years in terms of new money, but total obligations in 1975 will not be significantly above what is now estimated for the current budget year. For the past few years we have brought forward sizable unobligated balances, accumulated as a result of construction delays. We expect to use some \$70,100,000 in 1974. And, if inflation is taken into account, the 1975 request will buy about the same program as the 1974 budget.

The 1975 budget program does not provide for any new construction starts financed from appropriated funds. Our primary emphasis in

1975 and in the years immediately following will be to push to completion those projects that have been under way a long time.

We have some overdue projects now under construction. Completing them expeditiously will save money in a time of rising construction costs. It will give effect to project benefits too long deferred. It will enable TVA to meet its obligations to State and local agencies and bodies who are anxious to cooperate with us and who have been and are waiting for us to do our part. They are ready to or have already undertaken their share of these regional cooperative projects.

WATER RESOURCE PROJECTS

I would like to tell you a little about some of these projects.

Tellico dam and reservoir, a multipurpose project on a principal tributary of the Tennessee River in east Tennessee, has been under construction since 1967. The dam was then scheduled for closure in April 1970. A suit invoking the National Environmental Policy Act has kept the Tellico project a subject of litigation for several years. Last year at the time we appeared before this subcommittee, construction was enjoined. The injunction has been lifted and a District Federal Court and an Appeals Court have found in favor of TVA. Given the level of funding we project for 1975 and 1976, we expect to close Tellico Dam in the winter of 1976-1977, late by almost 7 years. When completed the Tellico project will add an average of 200 million kilowatthours of clean electric energy annually to TVA's output. It will add 126,000 acre-feet of flood storage to the system, affording much needed flood protection to Chattanooga, Tenn., and extend navigation some 30 miles up the Little Tennessee River, opening an underused area to industrial, residential, and recreational development.

Construction of the Duck River project began in June 1972. The project will provide 340,000 acre-feet of flood control storage, a reliable water supply on which future economic development largely depends, and a variety of recreational and economic opportunities. The people of the area are organized and are performing the non-Federal share of the cooperative project. They have pledged to repay \$16.2 million of the project costs attributable to area water supply benefits and have already paid into a trust fund some \$436,000 to amortize that indebtedness. They are obligated to work with the private sector to obtain investments of \$50 million in industrial and recreational developments, improved governmental services, and similar activities which will assure the realization of project benefits. The project is also the subject of litigation under NEPA. A Federal Court enjoined further construction of the project as of March 30, 1974, because of certain inadequacies in TVA's environmental statement, but on April 1 stayed the injunction until May 4 to give TVA an opportunity to comply fully with NEPA.

Construction of the Bear Creek multipurpose water control system in northwest Alabama and northeast Mississippi has been under way since 1967. One dam of four has been put in operation and channel improvement has been completed, affording some benefit for flood control and recreation. Our present schedule projects completion of the whole job by the summer of 1978. The project will provide flood control, water supply, recreational opportunities, and area economic benefits.

OPERATING PROGRAMS

Our appropriation-financed operating programs will require \$35,200,000 in 1975. We will continue to push forward in our regional demonstration programs to help local people and agencies make maximum use of the region's resources. Our goal now as it has been for 40 years is to instill in the region the concept of "a quality life in a quality environment."

POWER PROGRAM

Although the TVA power program is not financed by appropriations, I would like to discuss it briefly in the light of the present national and world energy situation.

On balance, TVA as a producer of electric power is in a better situation to meet the problems of a deep and pervasive energy problem than are many utilities in the United States. About 80 percent of our system production comes from coal and there is plenty of coal in the ground, at least, and about 20 percent from hydroelectric plants. We have only about a million kilowatts of capacity in oil-fired turbine units and this is for peaking purposes. Consequently, oil and natural gas shortages and prices have not directly and immediately affected our system's dependability or operating cost. We do have some real problems with coal.

Half of TVA's total system operating cost at present is represented by the cost of coal.

Half of the money that we charge to our distributors for the power supply to them represents the money that we have to put out for coal.

Despite efforts on our part to encourage restraint, we have seen the price of coal advance by jolting increments, urged upward by a number of factors, including general inflationary pressures and increasing demand.

Coal burned in TVA steam plants which cost an average of \$4.51 a ton in 1969 now averages about \$9 a ton. As we use up deliveries under old contracts the rate per ton goes up with the rising price of new purchases. We understand that some of our neighboring utilities have contracted for low sulphur coal at costs as high as \$30 a ton. Just last week TVA paid more than \$13 a ton for replacement coal, which means that before long the average rate per ton burned will increase. Expressed another way, each dollar increase in coal price adds over \$40 million a year to TVA's annual coal bill and to the consumer's electric bill.

Beyond the matter of price but not unrelated is the matter of supply. Getting new contracts to replace those expiring is increasingly difficult. Very few new mines are being opened at the present, but there are many new customers. Some former users of natural gas and oil are turning to coal. Last year national coal production dropped slightly. Demand grew by about 10 percent. Demand has outrun production and the result is showing up in higher prices for new purchases.

Total cost of environmental quality controls for projects now in operation or under construction can hardly be measured at this time. Under some interpretations of the Clean Air Act, SO₂ control could cost a billion dollars for a system that might not even work. TVA has a much less expensive way to meet ambient air quality standards which we believe is a better solution than chemical scrubbers. We think we

can do it for about \$17 million a year. Scrubbers would cost about \$225 million a year.

Basic to the solution of energy and environmental problems is a vigorous program of research and development. TVA and the Department of Interior's Office of Coal Research are cooperating in a project to produce a clean fuel gas from coal for producing electric power. We would design, install, and test two or more large coal gasifiers with desulfurization systems at a TVA power plant in an effort to solve engineering and environmental problems associated with industrial use of high-sulfur coals.

We have hopes this will give us a more economical method to control sulfur dioxide discharged into the use of the atmosphere than would the use of scrubbers, although we are researching both methods.

We will continue to investigate the possibilities of using municipal wastes as a fuel for large steam-electric plants, using TVA's Allen steam plant at Memphis for prototype tests. We are working closely with the city on that and hope to get that project underway in the not too distant future. Research and development in support of the liquid metal fast breeder reactor will continue. This is a joint project, involving the AEC, the electric utility industry, and TVA as a part of that industrial group.

Despite the problems which confront the entire energy industry, TVA will continue to meet the power demand of the region and we will do so efficiently.

This completes my statement but we will be glad to present our 1975 budget program in such detail as the committee may wish.

EFFECT OF APRIL TORNADOES

I should perhaps comment briefly on the impact of the tornadoes that struck in Tennessee, Alabama, Mississippi, generally through our power service area. Our transmission system suffered the most severe damage we have ever had.

As you know, we have 1,500 miles of 500,000 volt transmission line, our backbone transmission. About 500 miles or one-third of that was knocked out of service. We had nearly 60 large steel towers blown down.

The tornadoes struck Wednesday night and early Thursday morning, and I am glad to report to you that by Thursday, about 7:30 at night we had our transmission system back functioning.

Now this does not mean that the work is complete. We will be working on it for months. We used wood poles and various makeshift devices to restore service. Our system is not strongly tied together yet, between the east part and the west part, which can give us some problems if it gets cold, but Mr. Watson informs me we will have those ties strengthened in a matter of a few days.

We are glad to be able to get by with no more interruption of service. I should say that there were longer interruptions in the residential areas and in the areas served by our distributors, because some of these tornadoes hit right in towns and took down great areas of distribution lines and the distributors had a real job restoring service but they too did a remarkable job. It is hard to realize the devastation that

one of these tornadoes or a series of these tornadoes can create until you see it.

Mr. EVINS. That was going to be my first question. I was going to ask you about the tornado. You say 500 miles of line was out or down.

Mr. WAGNER. That was just the 500,000 volt line. We had more towers down and more line knocked out in the 161 kV system.

Mr. EVINS. About how many miles of line was knocked out?

Mr. WAGNER. I would guess 1,000 miles of line.

Mr. WATSON. Not all the towers along a given line are down, but the lines would not work because some of the towers were down.

DISASTER RELIEF ASSISTANCE

Mr. EVINS. All of this occurred subsequent to the makeup of your budget. That was the thing that concerned me, whether you are appealing to the Disaster Relief Agency for any help or assistance for restoration of your towers and powerlines.

I congratulate you for getting the power back on the line soon. Are you going to ask for or attempt to receive any type of Federal assistance for restoration because of this tornado?

Mr. WAGNER. Mr. Chairman, I have looked into that. I do not know whether I have a final answer.

Mr. Marquis may want to supplement this.

My understanding is that the Tennessee Valley Authority itself is not eligible for relief of this kind. Among our distributors the municipalities quite clearly are, the cooperatives may be but I was not as certain the last time I inquired.

Mr. Marquis, do you have anything further?

Mr. MARQUIS. No.

Mr. EVINS. I think it is worthy of consideration, because here you are going to have an enormous expense as a result of an act of God.

Mr. WAGNER. We will do that.

Mr. MARQUIS. We will certainly.

Mr. EVINS. The Federal Power Commission was before us this last week and the chairman had a statement about the many years of operation of the Federal Power Commission. He said, I am not going to talk about accomplishments of the past years, I am going to talk about our current problems. We always like to point with pride to what we have accomplished in 40 years, but we ought to talk a little more about the current situation.

TELLICO PROJECT

In this budget we find no new starts. We have been concerned this year with new starts and increases. You do have a substantial increase in your budget, from \$45,676 million last year to \$74.6 million, which is a \$28,924 million increase. So you got about a \$29 million increase, but no new starts.

I recognize that you have been delayed by environmental considerations and litigation. You told us about the Tellico Dam, which is years behind schedule. But again, you say the Federal injunction has been lifted and a district Federal court and a court of appeals has affirmed the decision, and now you are in the process of moving forward with this project.

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

Mr. EVINS. Are you going to try to have some catchup because of the years of delay?

Mr. WAGNER. Yes; we are moving as fast as we can on it.

As I indicated, when the project is funded at the level we are asking this year and at the planned levels for the years ahead of us, we would propose to fill the reservoir in the winter of 1976-77. That is as fast as we can do it.

Mr. EVINS. What is the amount of money you are requesting in new funds for Tellico for next year.

Mr. WAGNER. \$16.9 million.

Mr. EVINS. \$16.9 million. While you have no new starts, you are trying to catchup on some of the lag and move forward with projects that have long been delayed and under construction?

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

DUCK RIVER PROJECT

Mr. EVINS. Review for us again briefly the Duck River project. This involves the Normandy and Columbia Dams. This, too, has been the subject of litigation. What is the current status?

Mr. WAGNER. In March, we were enjoined from continuing construction on it, with the injunction to be effective the 30th of March. There was a hearing before the district court on the 1st of April and the injunction was stayed until the 4th of May.

Mr. EVINS. That means you can continue construction at least until the 4th of May?

Mr. WAGNER. That is correct.

Mr. EVINS. By the 4th of May will you have been able to have satisfied or attempted to satisfy the court on those matters it called to your attention?

Mr. WAGNER. Well, by the 4th of May we will have filed material with the court, yes, sir.

Mr. EVINS. Then you do not know how long it will be before the judge would rule?

Mr. MARQUIS. We never predict that, Mr. Chairman.

Mr. EVINS. Well, you have some money in here for these projects.

My question is: If the injunction is lifted, will you be able to proceed speedily and endeavor to catch up like you are in the Tellico project?

Mr. WAGNER. Yes, sir, we will.

Mr. EVINS. Hopefully I join with you in seeing that that injunction is lifted. I wish that the TVA had provided more detail originally. At least you will now. Maybe we can proceed on this other project.

Incidentally, this is the first and only TVA project where the counties of the area have been required to pay back for a part of the construction. The amount to be paid back totals \$16.2 million for water use.

Last year in our report we asked that the TVA proceed simultaneously insofar as possible with the two dams within the Duck River project. Are you doing this?

Mr. WAGNER. Yes, sir. We are proceeding with both—there are two dams in the project. Construction is proceeding on both of them.

Mr. EVINS. Supply for the record again how much you are asking for each of these dams, in new funds?

Mr. WAGNER. The Normandy Dam and Reservoir request is \$9.388 million; Columbia Dam and Reservoir request is \$3.612 million, total of \$13 million for the project.

WATER RESOURCES DEVELOPMENT

Mr. EVINS. Do you have an additional capability for Normandy and Columbia Dams?

Mr. WAGNER. TVA's additional fiscal year 1975 capability for the Duck River projects is \$5.7 million for a total fund use of \$18.7 million (Normandy, \$9.4 million; Columbia, \$9.3 million). The additional funds would enable an intensified and efficient level of construction effort on the Columbia Dam.

Mr. EVINS. Why has TVA slipped the completion date for the Duck River projects by a year for each dam?

Mr. WAGNER. The scheduled completion date for the Columbia Dam is June 1979 which is unchanged from the scheduled completion date of the budget program for fiscal year 1974. This date is, of course, dependent on adequate yearly funding.

The scheduled completion date for the Normandy Dam is June 1976, a delay of 1 year since last year's budget program. This delay was caused by severe foundation problems encountered during construction, the heavy floods of the spring of 1973 which flooded the construction site several times, and late deliveries of concrete required for the spillway and nonoverflow section of the dam.

Mr. EVINS. In connection with your construction program in general, has the TVA experienced any material shortages such as steel reinforcement loss?

Mr. WAGNER. In its construction program, TVA is experiencing increasing problems of material shortages. These shortages are occurring primarily with steel products, particularly reinforcing steel, but also include pipe, valves, fittings, and structural steel. The shortages are resulting in prolonged delivery times as well as increased cost.

BEAR CREEK

Mr. EVINS. Why is the completion date for Bear Creek now June 1978, a year later than you previously expected?

Mr. WAGNER. The completion date for the Bear Creek is delayed by 1 year as a result of limited funding in fiscal year 1975 which precludes the start of the last two units of the project in that year.

Mr. EVINS. Your justification last year indicated the floodway for Bear Creek had been completed in November 1972 before you submitted your budget to Congress. However, you indicated in the 1975 justification that the floodway was not really completed until October 1973—a year later than the TVA reported.

Can the TVA assure this committee that the floodway is complete at this time?

Mr. WAGNER. The completion date of the floodway was revised from November 1972 to October 1973 to encompass a period of restorative work required by the effect of the major floods of the spring of 1973.

The restorative work was completed in October 1973, the floodway is considered complete, and it has been turned over to the Bear Creek Development Authority which, under contractual arrangements, provides maintenance.

Mr. EVINS. The committee notes that \$116,000 is requested for mowers, tractors, other equipment, and small tools for maintenance of dam reservations. Will this be for replacement of old equipment only, and how will these items be purchased?

Mr. WAGNER. The majority of the estimate is for replacement equipment and all equipment will be purchased on a bid basis.

Mr. EVINS. Your justification for the railway bridge alterations at Decatur, Ala., indicates the present structure is dangerous. What accidents have occurred at the present site?

Mr. WAGNER. U.S. Coast Guard records show that beginning February 1971 through January of this year, a total of 24 accidents have occurred. Since November 1972, five accidents have occurred, causing \$20,550 damages to vessels involved and \$42,500 in damages to the bridge. The outage time for the bridge during this period was 63 hours. However, we have been fortunate that these accidents were not of a serious nature. There is always the potential of a major calamity that a serious accident such as spillage of hazardous materials could cause.

YELLOW CREEK PORT

Mr. EVINS. For fiscal year 1974 there were no funds budgeted for the Yellow Creek Port project. However, on page 23, we note an expenditure of \$1,199,000 in fiscal year 1974.

How were these funds spent?

Mr. WAGNER. The fiscal year 1974 funds have been spent for completion of the access railroad and the terminal dock which were delayed by land acquisition problems and heavy rainfall in fiscal year 1973.

Mr. EVINS. The total cost of the project has increased about \$1 million. What caused this large increase?

Mr. WAGNER. The increase of \$1,050,000 in the project cost resulted primarily in construction of the access railroad, the previous estimate for which was based on miles of railroad rather than engineering studies. Requirements disclosed during construction included one million cubic yards more grading, more extensive drainage structures, and higher contract cost for track placement.

FLOOD CONTROL FACILITIES

Mr. EVINS. How was the \$662,000 utilized in the current year for flood control facilities?

Mr. WAGNER. The estimate is allocated to the following projects: St. Paul, Va., project, \$538,000; Crab Orchard, Tenn., project, \$26,000; Oakdale, Tenn., project, \$5,000; Dayton, Tenn., project, \$10,000; Briceville, Tenn., project, \$31,000; other, \$52,000, for a total of \$662,000.

Mr. EVINS. You request \$400,000 in fiscal year 1975 for this activity and state that "flexibility is needed in decisionmaking procedures." What criteria do you consider in determining funding for a project in this program?

Mr. WAGNER. Projects funded under this program are small and are typically part of a community development plan of which the flood damage prevention measures are an integral part. For a project to be eligible, the sponsoring local government must agree to meet local participation requirements for cost sharing, handling construction on a contractual basis, enactment of suitable floodplain management regulations, and maintenance of the completed project. The distinguishing difference in these projects, other than their small size, is the frequent need to make a decision and commitment more promptly than the normal project planning process and budget cycle would allow. The "flexibility" referred to is needed so that planning and scheduling may be tailored to fit with other parts of the community plan.

Mr. EVINS. \$50,000 of the \$87,000 request for recreational facilities is for Little Foster Falls. Provided for this purpose last year was \$100,000. What is the total cost of these facilities?

Mr. WAGNER. TVA's 1974 budget request of \$100,000 was for Foster Falls and the 1975 budget request for \$50,000 is for Little Foster Falls. These are two separate tracts of TVA-owned land located in Marion County, Tenn. It is estimated that the development of these two areas will total \$100,000 each.

Mr. EVINS. What accounts for the significant decline in the "recreation facilities" program?

Mr. WAGNER. At the time this budget was being prepared, there was an increasing shortage of gasoline for pleasure use. TVA management, anticipating a reduction in the amount of driving for recreational purposes and consequent lowering of pressures requiring additional facilities decided to maintain facilities already developed and to limit development of new facilities at this time.

Mr. EVINS. On page 28, the request for investigations for future facilities has almost tripled to \$150,000. Please discuss this increase.

Mr. WAGNER. The increase of \$100,000 provides for preliminary design work including field surveys, and foundation investigations for the South Chickamauga Creek flood control project at Chattanooga, Tenn.

WATER QUALITY MANAGEMENT

Mr. EVINS. Do any of your "regional water quality management" activities overlap with the Environmental Protection Agency functions in the areas of "water quality inventory" or "pollution abatement activities"?

Mr. WAGNER. TVA's water quality inventories do not overlap the functions of EPA. They are coordinated with EPA and the respective State agencies of the valley States to insure that TVA's activities complement the functions of these organizations in the acquisition of basic water quality data. At the request of EPA and the States, this activity has frequently been expanded to insure the collection of basic data needed by these organizations to carry out their functions. The data base which TVA has established during the past years has been the primary source of baseline data used by the States in the preparation of the "basin plans" for the tributary basins in the Tennessee Valley. In addition, numerous requests have been received for baseline data to assist planning organizations and their consultants in the preparation of

plans for waste treatment facilities and area-wide waste treatment management plans.

All water quality data are collected and analyzed using standardized procedures established by EPA to insure data compatibility with data obtained from other sources. All TVA water quality data are entered in EPA's computerized STORET system for data handling and retrieval, and are readily available to all users having access to this system.

In carrying out its responsibilities under section 26(a) of the TVA Act, TVA reviews plans for construction and operation of facilities by others which might affect navigation, flood control, and public lands or reservations. In connection with review of such facilities which involve a discharge and in connection with request for conveyance of TVA land rights around the reservoirs, TVA reviews the engineering plans for pollution abatement measures. As a minimum the applicant must provide evidence of State certifications and review by EPA before TVA approves the plans. Under the TVA Act, the requirements of section 26(a) are in addition to requirements of other Federal and State laws. Thus, while there is some overlap between TVA and EPA with respect to review of pollution control measures, it is not considered to be a significant duplication. We are presently working with EPA to develop more streamlined procedures for coordinating these reviews which will be consistent with the requirements of the TVA Act as well as the Federal Water Pollution Control Act.

In other areas of pollution abatement, TVA provides assistance to EPA and the valley States in the early identification and investigation of major pollution incidents such as fishkills, accidental spills of hazardous materials, and coordination of major pollution-related studies such as the mercury problem. Because of the capability of TVA's technical staff and facilities located in the valley, EPA on several occasions has designated TVA staff as onscene supervisors of the investigation and of cleanup activities. Preliminary discussion with EPA indicates that this is an area where EPA would like to rely heavily on TVA's assistance in responding to such incidents in the valley.

Mr. EVINS. On page 43, how will the \$90,000 be utilized for maintenance of recreation facilities?

Mr. WAGNER. The estimate of \$90,000 for fiscal year 1975 will be used for maintenance work such as repaving, regrading and regravelling roads and parking areas; repainting and replacement of roofs of sanitary facilities; riprapping seriously eroded shoreline within heavily used public-use areas; replacement of miscellaneous expensed equipment such as well pumps, chlorinators, buoys in swimming areas; and repairing, painting, and replacement of picnic tables.

Mr. EVINS. On page 49, \$309,000 is budgeted for "preliminary surveys and engineering." Does the decline in funding for this reflect that few good hydropower sites are left?

Mr. WAGNER. TVA's current hydropower studies deal either with pumped storage or possibilities for adding capacity at existing projects, and these studies are included in the power program.

FONTANA DAM

Mr. EVINS. On page 60, you mentioned cracking of some concrete portions of Fontana Dam. Please describe this for the record.

Mr. WAGNER. Cracking was found in three blocks of concrete at the east end of the dam in October 1972. The cracks ran from the face of the dam to a drainage gallery inside the dam. The main portion of the dam was not involved but there was damage in the curved section between the dam and the spillway.

The repairs involved drilling through the concrete to install tension cables to anchor this section and the crack was grouted with concrete. Further studies are in progress to determine the definitive cause of the cracking and the corrective work required to prevent it from recurring.

LAND BETWEEN THE LAKES

Mr. EVINS. We have a project known as Land Between the Lakes. You have over \$2 million requested for next year. How much has been expended?

How many acres of land have been acquired? What is the percentage of completion, and when will the project be completed?

Mr. WAGNER. The entire area has been acquired, 170,000 acres.

Mr. EVINS. 170,000 acres?

Mr. WAGNER. Some of that had been acquired before the project, in connection with the Kentucky and Barkley Dams. Subsequently, we bought about 100,000 acres. The entire area has been acquired, at any rate.

The work now consists of building some additional facilities. We have had our offices and headquarters in trailers, and some temporary buildings.

Mr. EVINS. How much have we expended to date through TVA on this project?

Mr. WAGNER. Approximately \$50 million. I can supply the precise figure for the record.

[The information requested follows:]

The total cost at June 30, 1973, of Land Between the Lakes in obligations is \$51.4 million—\$28.4 million for land, \$3.5 million for land acquisition and relocation expense, and \$19.5 million for other improvements. Total additional costs to complete facilities underway at June 30, 1973, or started in 1974 and 1975, are estimated to be \$8.7 million.

COMPLETION REQUIREMENTS

Mr. EVINS. How much will it take to wrap up the project? You are going to maintain it after it is built, we understand that.

Mr. WAGNER. It depends on the demand for increased camping facilities, that sort of thing. I would presume that it is complete and usable now for the people who come there, but more people are coming every year.

Mr. EVINS. These funds are largely operation and maintenance funds, not new construction funds?

Mr. WAGNER. No, there is \$2.041 million of new construction money. Just off the cuff, Mr. Chairman, I would guess we may have—do we

have a figure here? I would say that it would take another \$10 million to \$15 million to complete things that ought to be done.

Mr. EVINS. That is the figure we want—\$15 million to complete it. Then it will be maintained.

LAND BETWEEN THE LAKES

Mr. EVINS. Give the Committee a status report on the progress of Land Between the Lakes in terms of growth of number of visitors and TVA's activities.

Mr. WAGNER. Visitation is increasing at the rate of 10 percent annually. Family camping continues to be popular and is growing. Use by organized groups is likewise increasing. Much of this growth is represented by participation in special interest activities, particularly those involving education activities, both formal and informal.

New recreation facilities include Brandon Spring group camp with overnight capacity for 128 people, a camp for horseback riders, a 26-mile hiking trail, an offroad vehicle area, and small conservation and education demonstrations. Also new cooperative programs for the disadvantaged such as Project Outward Bound and Project Apollo enlarge the dimension of Land Between the Lakes program thereby serving a larger segment of the public.

I would like to provide for the record a table showing the growth in visitation to Land Between the Lakes from 1969 through 1973.

[The information follows:]

	1969	1973
Family campgrounds.....	209, 274	229, 844
Group camps.....	12, 266	53, 504
Education centers.....	93, 316	177, 744
Informal use areas:		
Camps.....	75, 000	147, 199
Other use.....	522, 279	943, 225
Hunting.....	19, 372	43, 704
General and other visitors.....	326, 493	458, 780
Total.....	1, 258, 000	2, 054, 000

Mr. EVINS. What are the major expenditures planned in fiscal year 1975 for this recreation development?

Mr. WAGNER. Major expenditures planned in fiscal year 1975 are completion of the first phase construction of Brandon Spring group camp at a cost of \$390,000; completion of the Golden Pond Office Building at a cost of \$375,000; continue planned road improvements costing \$300,000; expanding camping and day-use areas at a cost of \$274,000; continue work on a major trails system at a cost of \$142,000; and cleanup and improvements of lands including esthetics along main road totaling \$110,000.

TIMBERLAKE

Mr. EVINS. Tell us the status of the Timberlake city. I notice you have some money in here for studies of new communities.

Mr. WAGNER. Let me ask Mr. Seeber to describe the Timberlake project.

Mr. SEEBER. This is still in the planning stage, Mr. Chairman. We are working with the Boeing Corp. upon an agreement whereby the

two parties would jointly develop the Timberlake concept. This agreement is being worked out. However, we must file an environmental statement on this before we can actually decide if we should proceed beyond planning. That statement is in preparation and will be completed in the near future.

Mr. EVINS. You are in the planning stage; you have the land, but in addition to the planning, you have to have an environmental impact statement?

Mr. SEEBER. Yes, sir.

Mr. EVINS. What is it to cover? Utilities in the city or what?

Mr. SEEBER. Well, it covers all environmental aspects of the Timberlake development; the impact of bringing a large number of people into this area along the Tellico Reservoir, the traffic patterns, how do you dispose of their garbage, their sewage, how do you provide them services, the impact upon wildlife, water quality? In other words, every appreciable impact of what this new town will do, both good and bad.

Mr. EVINS. What is the projected population of the community you expect to build?

Mr. SEEBER. If built we expect it would grow in 25 years to a size of about 50,000 people.

Mr. EVINS. How long do you think you will need to plan this project?

Mr. SEEBER. I would hope that our planning part of it is soon to be over, Mr. Chairman, and that we will go into an implementation phase soon, if the environmental assessment warrants it.

Mr. EVINS. Of course, the only city that you built in your history is Norris, Tenn. This is going to be the second town.

Mr. SEEBER. Yes, sir.

We also have Elkmont, a different kind of new village, but Elkmont in North Alabama is, you might say, a third.

Mr. WAGNER. This will be quite different from Norris. In Norris, TVA built the houses and owned the city. Here we would like to find out how you can develop a city, build it, with private enterprise doing the housing, building the city in a way that could be repeated in areas outside the Tennessee Valley. So that the houses that are built will not be built by TVA but by private developers on a plan that has been developed by TVA working with local planning agencies.

Mr. EVINS. Do you plan to have TVA let a contract to some corporation to develop the community?

Mr. SEEBER. That is this proposal we are working out with the Boeing Corporation for Timberlake, that would provide for them to be the master developer and for us to participate with them.

ELKMONT

Mr. EVINS. What is your plan with respect to the Elkmont City?

Mr. SEEBER. On that one we are again working with a local organization, not a private company but with a local organization. We are helping them with the planning. They have obtained options on some specific lands down there.

The concept is that you will start one small rural village with a high quality environment and then the money that is obtained from selling

off the land is plowed back in and is used over and over again for several of these villages.

Mr. EVINS. Is the TVA going to do this or is this going to be done through contract with the private developing corporation?

Mr. SEEBER. It is not a private development corporation. It is a local public development organization, but we would be doing it through them.

They in turn, of course, would get private contractors, I am sure, to do the actual building.

Mr. EVINS. You are going to do the planning and you are going to do the studying, but the development corporation is going to build the houses and build the community?

Mr. SEEBER. Yes, sir.

Mr. WAGNER. In general, Mr. Chairman, it seems to me our role is to see that as these rural areas grow and develop and people settle there instead of in the large cities, metropolitan areas, where all the problems have been created, to see that these communities and their growth is planned in a way that provides quality living, avoids the strip development along the highways that has taken place in the past.

In this process, we try to provide general planning, then we involve local organizations, local public organizations in more precise planning, so that it becomes a part of their locally controlled activity, but the building generally will be done by private builders just as it is done now.

Mr. EVINS. Is Elkmont to be built on land presently owned by TVA?

Mr. SEEBER. No, sir. It is in private ownership now. The local people have obtained an option upon it.

Mr. EVINS. How much is in this budget for planning of the project?

Mr. SEEBER. \$100,000.

Mr. EVINS. How long do you think the planning will continue?

Mr. SEEBER. Again, Mr. Chairman, we think we are ready to go as soon as the environmental statement process has been completed. I happen to have a copy of the environmental statement that has been put out, the draft version of it, just a few days ago. As soon as that process is over, I think the planning phase can turn into an implementation phase.

Mr. WAGNER. Assuming that there are no comments received about the environmental impact statement, about the draft, that will require us to change our mind or change our plans. The environmental impact statement is of course to give various agencies—

POSSIBLE ELKMONT APPROPRIATIONS

Mr. EVINS. It is not your plan at this time to come before the committee for an annual appropriation except for study and planning?

Mr. SEEBER. It is premature for us to make that decision at this time until we have completed the environmental statement process.

Mr. EVINS. I thought you said you expected the community to be developed by the sale of lands, the reimbursement from the sale of lands.

Mr. SEEBER. That will be the second, third, and fourth communities, but the first one will need funding in order to buy the land and to get started.

Mr. EVINS. You propose to have a demonstration city to see what can be done in a rural area by way of Tennessee Valley Authority's guidance and a demonstration city, and after the demonstration is over, then private enterprise will see if they can emulate it, is that right?

Mr. WAGNER. I think that is correct, although the Elkmont area is not exactly a city. It is a rural area consisting of portions of three counties. There may be more of these little centers. I think the people locally would like their ideas to get assistance in funding from somewhere to buy the land for the first unit and then turn that land over to go to others as they want to do it.

The area would be a demonstration for the rest of the region and the rest of the Nation. This is a little different than Timberlake where there is a single city.

Mr. EVINS. The Tennessee Valley Authority owns land at Timberlake?

Mr. SEEBER. Yes.

Mr. EVINS. You built Norris because the dam was there and because there was a need of the people for the homes and the community facilities. It just grew up with TVA's support and guidance. It is a tax-supporting city. It is a great community, great progress has been made there.

You plan to do a similar thing along the Tellico at Timberlake. I can understand that, because you own the land. But in this other demonstration, I want you to spell out for the record, and you can do it for the record: What are your plans, how much is it going to cost, how many years will it take, what private developers will do, what will be TVA's part?

Mr. WAGNER. We will be glad to do that insofar as the planning is complete at this time, Mr. Chairman.

[The information requested follows:]

ELKMONT DEVELOPMENT

At this time the Elkmont rural village is still in the planning stages and a decision by TVA to seek appropriations to finance the proposal must await completion of the environmental impact statement process. A draft report has been prepared and is being circulated for comment. The concept on which the draft statement is based envisions the establishment of a federally financed revolving fund of \$4.7 million. Development would be undertaken by the Alabama and Tennessee Elk River Development Agencies using the revolving fund to acquire the site and install the service system.

Revenues from land sales will be returned to the revolving fund to be available for use in the development of a second village similar to Elkmont. This process could be repeated until nine villages are completed; however, fewer villages could be developed. Assuming nine villages are developed, computer studies indicate that in approximately 18 years the project would be in a position to repay the Federal investment in the revolving fund.

If TVA elects to seek an appropriation to finance establishment of the revolving fund, we will, of course, provide the committee with additional details and justification.

ELKMONT PLANS

Mr. EVINS. I thought that the planning would probably be several years, but Mr. Seeber said, "We are about ready to go now," as I understood him.

Mr. SEEBER. Assuming that the environmental statement turns out satisfactorily, yes, sir.

Mr. EVINS. Was that statement filed by TVA or by this local development group?

Mr. SEEBER. This was filed by TVA.

NAVIGATION

Mr. EVINS. You are advanced on this project if you have gotten to the point where you filed your own environmental impact statement.

In addition to the construction program, spell out for the record the amount of miles in navigation under TVA's system, how much tonnage has increased on the river? This is always a rather promising picture. We applaud the navigation, the flood control programs of TVA.

Mr. WAGNER. I am going to give you these figures from memory, Mr. Chairman. We might need to correct them.

Generally, the navigation channel on the main stream itself is about 650 miles.

In addition to that, we have substantial mileage on some of the tributaries, the Hiwassee, we will have it on the Little Tennessee, the Clinch River, and some others.

Mr. EVINS. 650 miles and expanding?

Mr. WAGNER. Plus 130 miles in the tributaries. The traffic volume now is just short of 30 million tons a year. This is up from less than a million tons a year in 1933.

Mr. EVINS. It used to be less than a million tons, now the traffic is over 30 million tons?

Mr. WAGNER. That is correct.

The savings to shippers on this traffic is now about \$65 million a year.

Mr. EVINS. That is annually?

Mr. WAGNER. Annually, yes, sir.

In addition to that, there are other savings that accrue to people who do not actually ship by river, but who ship by rail and whose rates have been reduced because of the competition of barge traffic.

Studies made in the past indicate that those savings are at least as great as those accruing from actual shipments.

Mr. EVINS. Shipping continues to grow enormously, water traffic is increasing because of the problems of the railroads?

Mr. WAGNER. The railroads are growing, too, their traffic is growing too. That is one of the good things about this. This is partly because of the fact that the availability of the waterway has stimulated more than \$2 billion of private industry development along the waterfront. These people may ship some goods in by barge, but also some by rail. Their finished goods are apt to be shipped out by rail or truck.

So the total volume of goods moved is much greater as the region becomes prosperous.

FLOOD CONTROL

Mr. EVINS. Give us a statement on your flood control situation.

I know we had a flood at Chattanooga. We cannot control them all. But flood control provided by the TVA has been great over the years, saved lots of lives, lots of property damage.

Give us figures for the record.

Mr. WAGNER. Last year in March of 1973 we had a very heavy flood on the Tennessee River. In that flood, Chattanooga alone was saved over half a billion dollars worth of damage.

I believe this brings the total savings on the river to over \$1 billion. In that flood there also were savings along the Lower Ohio and Lower Mississippi; of about \$16 million; in total, about \$630 million was saved in that flood alone.

Mr. EVINS. Over a billion dollars on the Tennessee and \$16 million on the Ohio and Lower Mississippi because of the holdback of waters on the Tennessee?

Mr. WAGNER. That is correct.

It is interesting to note that I think in this one flood last year the savings were more than the entire \$167 million allocated to the flood control system on the Tennessee. They were more than twice the original cost of all the flood control facilities plus the cost to date of operating and maintaining them.

FERTILIZER PROGRAM

Mr. EVINS. Turning to the fertilizer program, on page 99 of the justification it states that TVA is shifting "production of basic phosphate raw materials and intermediates from TVA to private producers." What is the budgetary impact of this decision?

Mr. WAGNER. Our latest estimates of expenditures and income for developmental production in the first year of the changeover show a net improvement in operation will amount to \$1.1 million. Facilities related to electric-furnace acid production which will not have to be built as a result of the shift to use of wet-process phosphoric acid total some \$21 million.

Mr. EVINS. What activities and facilities would be terminated because of this action?

Mr. WAGNER. We will terminate phosphate matrix mining in Tennessee, and at Muscle Shoals, Ala., we will eliminate furnace phosphate raw material handling and processing, elemental phosphorus production and handling, and production of phosphoric acid from elemental phosphorus.

Mr. EVINS. The "Urea, Urea-Ammonium Phosphate Facilities," page 103, are scheduled for completion in the current fiscal year. The total estimated cost of the project is \$15,658,000. What will be the annual operating costs of the facility?

Mr. WAGNER. Estimated operating expenditures of the urea, urea-ammonium phosphate facilities in fiscal year 1975 are \$6.3 million. This includes the cost of materials used.

Mr. EVINS. What are the anticipated revenues?

Mr. WAGNER. Market value of the fertilizers produced is estimated to be \$8.4 million, or \$2.1 million above operating expenditures.

Mr. EVINS. At the top of page 103 you request 1975 funds for improvements in the urea-ammonium phosphate facility. Why do you need improvements in a facility which is brand new?

Mr. WAGNER. The urea-ammonium phosphate facility is a prototype developmental facility for a new process developed through the pilot-plant stage. Experience of many years has been that numerous small equipment changes, sometimes involving process changes, are required

during the scaleup to prototype operation in order to perfect the process and product. Preliminary operation experience with urea-ammonium phosphate since the end of December 1973 shows that it is no exception. Requirements for such improvements usually dwindle after the first 2 years of operation.

Mr. EVINS. \$1.4 million is requested for completion of facilities for making sulfur-coated urea (SCU), a greatly improved nitrogen fertilizer. Briefly describe the results of the tests using sulfur-coated urea in 48 States and 33 foreign countries.

Mr. WAGNER. In about 80 percent of foreign trials on rice, SCU had a \$7 return per dollar invested in fertilizer as compared to \$4.20 for urea. In the United States where SCU was superior, a \$12 return per dollar invested was gained, compared with \$9 for urea.

In Hawaii, two applications of SCU produced more cane than five applications of urea for an 18-month crop. In Florida a single application of SCU produced as much sugar yield from a 12-month crop as four applications of ammonium sulfate and about 0.8 ton per acre more sugar than a single application.

Crops such as corn, small grains, and cotton—whose major nitrogen needs must be met over a short period—usually have responded advantageously to SCU only when grown on porous soils.

Mr. EVINS. Has EPA expressed interest in this fertilizer because of its characteristics of reducing leaching of fertilizer nitrogen into natural waters?

Mr. WAGNER. Many discussions with EPA officials have taken place about fertilizer use and water quality including the possible place of SCU in solving these problems. However, no formal relationships have yet been established.

Mr. EVINS. What is the potential export market for sulfur-coated urea?

Mr. WAGNER. Under a normal condition of balance between supply and demand, a realistic estimate of SCU potential use in world trade is 10 percent of the total or about 915,000 tons of N based on 1973 experience. Most of this, particularly in initial years, would be expected to come from U.S. production.

STRIP MINE RECLAMATION

Mr. EVINS. The Committee notes that the Tennessee Valley Authority's strip mine reclamation efforts increased from \$146,000 to \$450,000. What is the approximate price per acre of reclaiming strip mined land?

Mr. WAGNER. While the cost per acre will vary considerably, it is estimated that basic reclamation of the orphan lands will average about \$290 per acre. The work mainly consists of mine and road reclamation and construction of offsite silt traps. In the short term, the principal value of reclamation efforts is in the prevention or reduction of offsite damages, particularly water quality in streams receiving runoff from mined areas.

Mr. EVINS. On page 73, the justification mentions that "TVA will examine alternatives and complete plans for restoring 72,000 acres of 'orphan' strip mines that were mined and abandoned in the years before strip mine reclamation was required." Who owns this land?

Mr. WAGNER. All these orphan lands are privately owned, ranging from small family plots to large corporate holdings.

Mr. EVINS. Do you have an estimate of the total cost of reclaiming this land?

Mr. WAGNER. We estimate that it would cost \$20,890,000 to reclaim some 72,000 acres during a 5-year action program.

Mr. EVINS. Wouldn't the enhanced value of this land after reclaiming it simply accrue to the owners?

Mr. WAGNER. The dollar value of the land in question would be little affected by the reclamation effort. The primary benefit would be to the general public through significantly lessening the adverse environmental impacts of erosion, stream siltation, acid drainage, and degraded esthetics. Furthermore, this demonstration would be of great value to the Nation in exploring means to correct the damage the country suffers from unreclaimed strip mines which are not now in production.

Mr. EVINS. The General Accounting Office report of March 27, 1974, relating to the examination of the Tennessee Valley Authority financial statements contains the following statement: "Problems of strip mining and land reclamation have created an element of uncertainty about future coal supplies." Explain what is meant by this statement and the problems faced regarding coal supplies.

Mr. WAGNER. In calendar year 1973 over 50 percent, or 20 million tons, of the Tennessee Valley Authority's total coal receipts was produced by surface mining methods. Over 6 million tons was produced by surface mines located in Appalachia. Evidently, the General Accounting Office is referring to the fact that to the extent that such production is reduced by strip mine reclamation legislation, the Tennessee Valley Authority will be forced to obtain replacement coal from other sources.

LIVESTOCK WASTE DISPOSAL

Mr. EVINS. On page 66, \$87,000 is budgeted for an evaluation of livestock waste disposal systems. This is an increase of \$65,000.

How does your research effort in this area differ from that of the Department of Agriculture?

Mr. WAGNER. In 1975, the Tennessee Valley Authority will initiate activities emphasizing biological recycling of nutrients from livestock wastes. Waste management systems will be designed to permit the operation of livestock enterprises with zero discharge of pollutants and with no air pollution of offensive odors. Nutrients will be removed from the liquified livestock wastes by aquatic plants and other aquatic organisms that will supply high protein supplements for livestock rations. Heat derived from power plant condenser discharge water will be tested in the system to improve biological efficiency. A unique feature of this work is the use of aquatic animals rather than a mechanical means of harvesting aquatic plants.

The U.S. Department of Agriculture research is concerned with efficient methods of disposing of livestock wastes and is concerned with environmental and animal health aspects of these disposal methods. We know of no duplication of effort between our work and that of the U.S. Department of Agriculture.

JUNKED CAR COLLECTION PROGRAM

Mr. EVINS. News reports indicate that the sale of junk cars is becoming more profitable as prices for scrap steel increase. In this connection, tell the committee of the progress being made by your junked car collection program.

Mr. WAGNER. The usual incentive for a local junk car collection program is a desire on the part of local citizens to clean up their community. Generally, the major obstacle is the high cost of collecting sufficient hulks in one location to attract a commercial scrap dealer to haul away the old cars. Any income from the scrap dealer is used to help offset local collection expenses. Higher scrap prices will have a positive effect on collection programs, but generally the effect will be to reduce the amount of local costs for the program.

The Tennessee Valley Authority's demonstration junk car collection program was developed to provide an efficient, economical system for use in rural as well as urban situations. Two special type collection vehicles have been designed by TVA which are easy to build, operate, and maneuver in difficult terrain. The special vehicles can be operated by one man and are inexpensive to build in comparison to conventional wreckers. The vehicles have been field tested by the Tennessee Valley Authority through loan to local governments which have reported on their success in locating, collecting, and selling junkers in their area. Despite differences in efficiency of personnel, effects of weather and terrain, and citizen response, most local governments have reported great success in the use of the Tennessee Valley Authority loaned collection vehicles. Over 30,000 junked cars have been collected in the Tennessee Valley region using the special collection vehicles.

Through technical assistance and short-term loan of the Tennessee Valley Authority collection vehicles, the Tennessee Valley Authority encourages local governments to develop and continue junk car cleanup programs. This kind of assistance has been provided to nearly 60 counties. The Tennessee Valley Authority has published a booklet with directions for organizing and conducting junk car cleanup programs. These booklets and plans for building the junk car collection vehicle are available. We have responded to requests from every State and most provinces in Canada and from numerous foreign countries, including Mexico, Australia, Israel, and Ecuador.

HEALTH SERVICE DEMONSTRATION

Mr. EVINS. What has been the success of your interagency health service demonstration and what is planned in 1975?

Mr. WAGNER. During the past few years the Tennessee Valley Authority's medical staff has, upon request, demonstrated various medical techniques, automated systems, and specialized equipment to Valley hospitals, clinics, health departments, schools, and local health councils. These demonstrations have largely been based on TVA experience in providing health services to its employees and most of them have been conducted in areas of the Valley that are remote from adequate health care facilities. We continue to receive more requests for the type of assistance mentioned than we can accommodate. All requests are coordinated with State and local health agencies. We plan to continue these activities in 1975 and to add some.

We will lease two mobile health units to the Smoky Mountain Mental Health Center for use in a remote area in North Carolina. A mobile unit will be remodeled and outfitted with surplus dental equipment for use as a dental clinic by the Upper Hiwassee Watershed Development Association in Hayesville, N.C. We have acquired three additional mobile units from Government surplus sources to expand our capability to meet the increasing number of requests for health demonstrations.

ENERGY CRISIS

Mr. EVINS. You have a great record on attracting industry to the area, you have a great record on flood control, you have a tremendous record on navigation, and other programs. You have had a good record on power until recent years.

Tell us what you are doing to solve the energy crisis. What is TVA, one of the great agencies, doing to solve the energy crisis?

Mr. WAGNER. In the first place, we are meeting the region's energy demands. Some people are not able to do that.

Our hydro generation is our mainstay here, or a very strong help to us, although it is only about 20 percent of our total generation now. Eighty percent of our generation is coal. In coal-fired generation we have gone to larger units. We have done everything we know how to do to maintain efficiency, and you will find that by FPC statistics our system is the most efficient in the country, I believe, the last 2 years and we have some of the most efficient units in the country.

We have bought our coal in order to hold coal prices down, traditionally on competitive bids. In the current market, which is very clearly a seller's market, we have been unable to get bids on coal. To meet this emergency situation, we have had to negotiate coal purchases.

As I indicated, we are very much concerned about what is happening to the price of coal. In order to try to control that, we have, years ago, as you may recall, bought coal reserves and we are having those mined to the maximum extent we can now. We are looking for more reserves. We recognize the problems we faced with coal problems—

Mr. EVINS. How much coal reserve does TVA own? How many small mines or other mines have you bought up? How many years' supply do you have in reserve?

Mr. WAGNER. Mr. Watson says we have close to 400 million tons, which would be about 10 or 12 years if you had to rely on it only, and of course you cannot because we cannot mine it that fast.

Mr. EVINS. Somebody said we have a sufficient amount of coal to last the country for centuries.

Mr. WAGNER. We are trying to buy more of it. You asked what we were doing to meet the energy crisis.

Also, recognizing that coal gave us problems on supply and cost and environmental problems, we have turned very heavily to nuclear generation, as you know. Our first nuclear unit, the Browns Ferry No. 1, reached 1 million kilowatts generating capacity a few days ago.

AIR POLLUTION CONTROL

Mr. EVINS. On page 153, \$61,225,000 is budgeted for "Modernization and installation of electrostatic precipitators and stacks." Do you plan on installing the equipment on all TVA coal-fired plants?

Mr. WATSON. TVA operates 12 coal-fired steam generating plants consisting of 63 generating units. As of January 1, 1974, 12 TVA generating units were in compliance with State particulate control standards which become effective in 1975. Electrostatic precipitators will be installed or upgraded on at least 37 of the remaining units, and possibly 47 depending on the interpretation of Kentucky requirements for the 10 generating units at Shawnee. The budgeted amount for 1975—\$61,225,000—includes expenditures for new precipitators at Shawnee. Electrostatic precipitators will not be installed or upgraded on the remaining four units. An SO₂ scrubber is being installed on one of these units, Widows Creek unit 8, and particulate removal will be improved on the remaining three units, Paradise units 1-3, by installing heating coils to raise the stack gas temperature and reduce corrosion in the existing precipitators.

New tall stacks are planned at three of the 12 TVA plants, Kingston, Shawnee, and Widows Creek.

Mr. EVINS. Please discuss EPA requirements for placing SO₂ removal devices on all TVA steam plant stacks and tell the committee at what cost this could be accomplished.

Mr. WATSON. EPA does not require sources to use a specific method, such as stack gas scrubbers, for controlling SO₂ emissions. However, EPA has encouraged the States to adopt strict emission standards which can be achieved at power generating plants only by burning low-sulfur fuel or by installing SO₂ removal devices. Low-sulfur fuel is not available in significant quantities in the TVA region. It is questionable that any TVA plant could meet present emission standards with low-sulfur fuel. Consequently, the only alternative available to TVA for complying with the present SO₂ emission requirements is the installation of SO₂ removal equipment on most, if not all, of its plants.

Alabama and Tennessee have adopted new SO₂ emission standards which have not received EPA approval. If these standards are approved, it would not be necessary to install scrubbers at all TVA plants. Even with these new standards, however, substantial reductions in SO₂ emissions would be required at most TVA plants. Without SO₂ removal equipment, TVA's supply of west Kentucky coal, as well as a portion of its Appalachian coal supply, would not be usable. Thus, in the context of the present coal supply situation, scrubbers would probably be required on 60-80 percent of TVA's coal-fired generating capacity.

We estimate that the capital cost of installing SO₂ scrubbers on all TVA plants would be \$1.2 billion. This estimate is based on a detailed cost estimate of \$42,000,000 for installing a scrubber on one 550,000 kW unit at Widows Creek plant. Thus, the cost of this scrubber is \$76/kW. When certain costs associated with the prototype nature of the Widows Creek scrubbers are excluded, the remaining cost is \$70/kW. This cost is then applied to other TVA plants, taking into account an engineering evaluation of the relative ease or difficulty of installing this equipment at each location. The overall cost for the other TVA plants, with a capacity of 17,176,000 kW, averages \$68/kW.

Mr. EVINS. In connection with corrosion and other damage caused by cold air entering the preheaters at the Paradise plant, what steps

are being taken to assure that similar damage is not done at other facilities?

Mr. WATSON. The Paradise units are cyclone fired and burn coal having a sulfur content of 4 to 5 percent. Cyclone units inherently operate with a higher combustion temperature which causes the oxidation of more of the SO_2 to SO_3 ; and this, together with the high sulfur in the coal, results in severe corrosion in the air preheaters when the flue gas temperature is less than the acid dewpoint.

Our Allen units are also cyclone fired, and they are equipped with air preheating coils.

All of our other units are pulverized-coal fired, and we have not experienced sufficient corrosion of the air preheaters to justify the installation of air preheating coils.

NUCLEAR POWER GENERATION

Mr. EVINS. When is the Browns Ferry plant going to be in commercial operation?

Mr. WAGNER. Well, it is planned for about June.

Mr. EVINS. How many of these nuclear power units do you have under construction at the present time?

Mr. WAGNER. I will have to count them.

Mr. EVINS. You have two at Sequoyah—

Mr. WAGNER. We have 13.

Mr. EVINS. You have 13 nuclear units under construction?

Mr. WAGNER. That is right, under construction or bought and in planning phases.

Mr. EVINS. That does not include the LMFBR or the Hartsville plant?

Mr. WAGNER. It includes the proposed Hartsville plant but not the LMFBR.

Mr. EVINS. Hartsville, do you consider that under construction?

Mr. WAGNER. No, sir.

I should make clear it still has its environmental impact statement to be prepared.

NUCLEAR PLANT CONSTRUCTION

Mr. EVINS. I am talking about under construction, how many units do you have under construction?

Mr. WAGNER. We have seven under construction.

Mr. EVINS. You have seven plants under construction?

Mr. WAGNER. Yes, sir, seven units, but the other six units have been bought and they have to go someplace.

Mr. EVINS. You mean the Hartsville units have been bought?

Mr. WAGNER. Yes, sir. They have been bought, but they could go at Hartsville or—

Mr. EVINS. How many years away from power on line are these several units that are under construction?

Mr. WAGNER. We have bought units now that would carry us through June of 1982.

Mr. EVINS. When you say you bought, you have contracted to build for TVA?

Mr. WAGNER. We have contracted to purchase and we would build them ourselves. We have contracted to purchase the units. We will continue to build our own plants as we are building them now at Browns Ferry.

COST OVERRUNS

Mr. EVINS. We are glad you have these several units underway. But on these various units, we will have to rap you on the wrist a little bit.

Take the Cumberland project, reported in your budget on page 126, you have an \$18 million overrun; it is reported on page 129 on the Browns Ferry unit you have a \$50 million overrun; it is reported on page 132, the Sequoyah plant includes an increase of \$180 million. You have \$180 million overrun.

On page 135, the Raccoon Mountain, \$192 million estimated remains unchanged, no overrun on that one to date, you do not have an overrun on that one. When you get down to Watts Bar in your justification on page 138, you have \$25 million overrun. That totals a \$273 million increase in cost estimates for these projects in one year.

Mr. WAGNER. Let me say we are not pleased with that either and we accept the slap on the wrist, but I would like to explain it briefly.

You noted in Raccoon Mountain there was no overrun.

Mr. EVINS. That was \$192 million. I would not think you would have an overrun on that.

NUCLEAR PLANT COSTS

Mr. WAGNER. The reason is, it is a hydroelectric project. These we are accustomed to build, we do not have to go through the Atomic Energy Commission licensing procedure, we do not have environmental problems delaying us there.

Most of this overrun you will find is due to the delays we have had in construction. On these nuclear plants, I think we all have to recognize they are a new technology, that there have been design changes forced on us by changes in the Atomic Energy Commission's regulations and other factors. In many instances we have had to go in and tear out something we had already built and replace it because of these requirements.

Mr. EVINS. What about the possibility of standardized plants improving this situation?

Mr. WAGNER. We are trying to work now with one manufacturer to develop a standard plant so that once it has been reviewed and licensed and approved, the problem would be simpler and the time would be reduced from there on. But that has not been done yet.

Our Sequoyah plant, when we bought it, we bought a duplicate for Watts Bar, thinking it would simplify licensing problems, but it did not, because the licensing requirements changed in midstream. These delays are what cost the extra money.

Mr. EVINS. You have about 13 units, did I get that figure right?

Mr. WAGNER. Yes, sir.

Mr. EVINS. One is going to be operative in June, you are going to have some power in June from nuclear power.

We hope you can hold these overruns down. We hope you can hold these costs down. They go into the operation of your power program, they go into the expense of your power program.

Mr. WAGNER. We are surely aware of that and we do everything we can to hold them down, but many of these overruns are beyond our control.

POWER SUPPLY—CAPITAL OUTLAY

Mr. EVINS. The Browns Ferry nuclear plant has slipped significantly compared to its original estimated completion date and it has had a tremendous cost overrun.

Comment on the most recent price increase of \$50 million over last year's estimate.

Mr. WAGNER. The Tennessee Valley Authority, along with other constructors of nuclear powerplants, is finding that original estimates of the man-hour and procurement requirements of nuclear plants have been considerably underestimated. The \$50 million increase in the Browns Ferry estimate results from increase of 4.5 million craft man-hours for continuing work revisions and additions; additional procurements due to design and scope changes; increased estimates for general costs due to the extended schedule, higher fees for Atomic Energy Commission licenses, greater preoperational expense, and additional design cost; and additional interest during construction due to increased project cost, schedule delays, and higher cost of money.

Mr. EVINS. Comment on the incident at Browns Ferry with regard to an accidental release of radioactivity.

Mr. WAGNER. During the week of February 11, 1974, a relief valve malfunctioned during the functional testing of unit 1 at Browns Ferry. Eleven maintenance personnel received slight exposure to radiation while replacing the relief valve. The exposure was less than one-tenth the exposure that would be received in a standard medical X-ray, and the personnel returned to work the same day after routine decontamination procedures. There was no hazard to the public and no release of radioactive material to the environment.

Mr. EVINS. The committee notes on page 129 that \$167,100,000 is budgeted for turbogenerator units. This is a decrease of \$7,400,000 from last year's estimate.

What is the background of this?

Mr. WAGNER. In the latest review of the estimated cost of the Browns Ferry plant, the experience to date indicated an estimated reduction in the cost of turbogenerator erection.

PRESS RELEASES

Mr. EVINS. We have read your press releases. You do a good job on issuing press releases. They seem to be mailed out almost daily. If there is a fine record on navigation, I like to put it in the record, flood control I like to put it in the record, something beneficial, I would want to put it in the record.

But all the news releases seem to tell about the higher cost of coal, the high cost of power, and the rate increases.

You are really cranking out press releases down there.

Mr. WAGNER. Well—

Mr. EVINS. It would save a little money if you could cut down on some of those press releases.

Mr. WAGNER. Some of them are required by the Atomic Energy Commission, not on coal but on the matter of coal—

Mr. EVINS. What has been the result of the Atomic Energy Commissions' regulation as far as costs on you are concerned? You say that some of these delays have been caused by the regulations of the Atomic Energy Commission. Spell this out for the record.

Mr. WAGNER. Here is one figure: Delays associated with the Atomic Energy Commission requirements for safeguards and quality assurance at Sequoyah have cost us \$43.2 million. Then we have to add another \$50 million there which was the cost of cooling towers that were required to be added not for the Atomic Energy Commission but to meet water quality standards approved by the Environmental Protection Agency.

This is the kind of thing that you find at many of these plants.

COST OVERRUN—SEQUOYAH PLANT

Mr. EVINS. Costs for "accessory electrical and miscellaneous powerplant equipment" for the Sequoyah plant have almost doubled to \$42.4 million from last year's estimate of \$23 million.

Why were you so far off the mark in estimating the cost of this component of the powerplant?

Mr. WATSON. A portion of the estimated increase for "accessory electrical and miscellaneous powerplant equipment" results from addition of cooling towers to the Sequoyah plant. A greater portion, however, arises from the fact that the labor and materials required for this work component to meet scope changes and work revisions was very considerably underestimated.

Mr. EVINS. Explain the nature of the design changes of the emergency core cooling system for this facility.

Mr. WATSON. An upper head injection system was added to the emergency core cooling system in order to improve the core cooling during the blowdown phase of a postulated loss of coolant accident. This addition required major design modifications resulting in structural changes to the reactor building and direct changes to already existing systems. Inasmuch as the project was already under design and construction, this change required considerable time-consuming redesign and construction revisions.

Mr. EVINS. Explain to the committee the problems encountered with the design for the ice condenser and emergency core cooling system for the Watts Bar nuclear plant.

Mr. WATSON. A reevaluation of the subcompartment pressures in the containment following a postulated loss of coolant accident resulted in higher pressures than originally calculated. The reevaluation included the effects of two-phase flow and dynamic forces. The design of the ice condenser was modified to account for the change in structural loads causing a significant delay in the construction schedule.

POWER PRODUCTION TRAINING CENTER

Mr. EVINS. Construction will begin on a power production training center at the Sequoyah Nuclear Plant. Why are these facilities needed at a total cost of \$16.9 million?

Mr. WATSON. At present, training required to obtain a nuclear operator's license consists of a 2-year period during which the candidate studies plant systems, plant technology, basic nuclear technology, is given small reactor training, reactor simulator, and plant observation training, and finally an AEC preparatory examination before taking the AEC-administered test for a nuclear operator's license. An operator must continue his training and be tested periodically in order to retain the license. These rigid requirements have been established to insure nuclear plant safety and reliability.

Currently, all nuclear plant operator training except plant system study and plant technology is contracted to vendors of nuclear steam supply systems. There is considerable uncertainty about the future cost and availability of such services. By 1981, TVA will require over 450 skilled nuclear operators. At least 207 of these 450 operators will require licensing by AEC. In addition, TVA will require requalification training annually for the 207 licensed operators to maintain AEC licenses. Studies and evaluations of known alternatives for supplying qualified nuclear plant operators indicated that the most economical and satisfactory solution was to construct a centralized training center at the Sequoyah Nuclear Plant.

Mr. EVINS. Place in the record at this point, while we are discussing these nuclear powerplants, page VI, which gives the summary of budget financed from power proceeds.

Summary of Budget Financed from Power Proceeds and Borrowings
(For fiscal years ending June 30, 1973, 1974, and 1975)
Accrued Expenditure Basis

Page Reference	CAPITAL OUTLAY	1973 actual	1974 estimate	1975 estimate
	POWER SUPPLY AND USE			
125	Cumberland Steam Plant units 1-2	\$48,761,398	\$17,876,000	\$54,019,000
127	Browns Ferry Nuclear Plant units 1-3	95,271,105	93,677,000	82,673,000
130	Sequoyah Nuclear Plant units 1-2	121,732,778	96,072,000	41,013,000
133	Raccoon Mountain pumped-storage project	33,670,761	58,234,000	195,808,000
136	Watts Bar Nuclear Plant units 1-2	29,341,645	93,879,000	80,040,000
139	Belleville Nuclear Plant units 1-2	7,614,477	22,374,000	8,206,000
142	Hartsville Nuclear Plant units 1-4	697,039	3,554,000	1,105,000
144	Nuclear plants 7 and 8	39,928	152,000	-
	Allen Gas Turbine Plant units 1-16	412,008	544,000	-
	Allen Gas Turbine Plant units 17-20	978,970	1,126,000	-
145	Colbert Gas Turbine Plant units 1-8	68,727,422	73,668,000	72,400,000
152	Transmission system facilities	9,648,437	19,678,000	21,696,000
153	Land and land rights	29,717,137	65,177,000	109,936,000
157	Additions and improvements at power facilities	29,229,596	30,213,000	43,740,000
157	Nuclear fuel	1,882,008	834,000	825,000
	Investigations for future power facilities			
	Total power supply and use	\$477,724,709	\$577,151,000	\$711,461,000
	GENERAL SERVICE ACTIVITIES			
183	General facilities	4,961,156	5,751,000	3,317,000
	Total capital outlay	482,685,865	582,902,000	714,778,000

(Continued)

Summary of Budget Financed from Power Proceeds and Borrowings (Continued)
(For fiscal years ending June 30, 1973, 1974, and 1975)
Accrued Expenditure Basis

Page Reference	EXPENSES	1973 actual	1974 estimate	1975 estimate
	POWER SUPPLY AND USE			
158	Power operations	573,340,413	740,341,000	802,719,000
52	Allocation of multipurpose reservoir operations	3,364,326	3,971,000	3,516,000
	Total expenses	576,704,739	744,312,000	806,235,000
	INVENTORIES AND DEFERRED ITEMS			
	POWER SUPPLY AND USE			
179	Power inventories	31,448,678	-8,299,000	3,670,000
179	Deferred charges	3,397,955	3,601,000	1,913,000
179	Deferred credits	69,084	66,000	30,000
	Total inventories and deferred items	34,915,717	-4,632,000	5,613,000
	Total budget financed from power proceeds and borrowings	1,094,306,321	1,322,582,000	1,526,626,000
	FINANCING			
	Balance brought forward	-26,249,833	-17,403,449	-12,406,690
	Proceeds from borrowings	400,000,000	420,000,000	480,000,000
	Current proceeds:			
	Power operations	772,593,813	988,370,000	1,150,183,000
	Sale of retired plant	664,758	1,183,000	1,375,000
	Miscellaneous receipts	3,678,585	1,448,000	725,000
	Total current proceeds	776,937,156	991,001,000	1,152,283,000
	Payments to Treasury:			
	Reduction of appropriation investment	-20,000,000	-20,000,000	-20,000,000
	Dividend (return on appropriation investment)	-53,784,451	-63,422,241	-70,000,000
	Total payments to Treasury	-73,784,451	-83,422,241	-90,000,000
	Balance carried forward	17,403,449	12,406,690	-3,250,310
	Total financing	1,094,306,321	1,322,582,000	1,526,626,000

POWER CONSTRUCTION

Mr. EVINS. Browns Ferry, units 1 and 3, \$54 million for fiscal year 1975; the next one is Sequoyah, units 1 and 2, \$82.673 million; the next one is Raccoon Mountain, \$41,013 million; the next one is Watt Bar, plants 1 and 2, \$195.808 million, Bellefonte Nuclear Plant 1 and 2, \$80.040 million, next year; here is the Hartsville nuclear plant, \$8.206 million next year, nuclear plants 7 and 8, \$1.105 million, and you go down here to transmission facilities, \$72 million, and additional improvements \$109.936 million.

Nuclear fuel, \$43.740 million. You have one item, for \$825,000, investigations for future facilities, which totals up to \$711.461 million.

If you could avoid some of that outlay for 1 year, you could avoid a rate increase for a year, could you not?

Mr. WAGNER. Well, if we avoid that outlay for a year, there would come a year when we could not meet our power loads, Mr. Chairman. That is the problem. We do not spend this money before we have to and not any more then we have to. We have felt our primary responsibility is to see that the region has the electric energy it needs.

Mr. EVINS. Last week AEC testified before the committee that TVA was unable to provide \$12 million worth of power to AEC for operation of gaseous diffusion plants during the current fiscal year.

Explain to this committee the situation, and considering the significant slippage in the construction of your nuclear powerplants, tell us how confident you are of meeting future AEC requirements for the uranium enrichment plants. This is testimony of AEC last week. They wanted to buy \$12 million worth and you could not supply it.

POWER SUPPLY FOR AEC

Mr. WATSON. Mr. Chairman, they are correct. We told them several years ago that we were not going to be able to supply it unless they would sign a contract under which we could justify the construction of equipment that would supply that load. So since they had not signed the contract and it takes 8 to 10 years to build capacity to supply their loads, we are not equipped to supply their future requirements.

Right now they still have not signed the contract for some of the things that they want in the future.

Mr. EVINS. You are going to be able to supply it when all these nuclear powerplants come on the line, do you not think?

Mr. WATSON. No, sir; we are not. We have not built capacity to supply the requirements that they are talking about, because they have not signed the contract to buy the power. We cannot ask the consumers of the Tennessee Valley to supply capacity that is not under contract.

Mr. EVINS. You had an offer to sell \$12 million worth of power. Your abundance of available power supply is not as abundant as it would appear from some of the press releases then.

Mr. WAGNER. Mr. Chairman, I think the point is that that was not a firm contract. To go back to your point a minute ago, pointing to this \$711 million expenditure for capital outlay in 1975, now what the AEC asked us to do in some instances is to put capacity in without any firm assurance that they would give us a load.

We have said if you want the load, we will sign a contract for it, and we will build the capacity. But we have felt we should not borrow money to build capacity without having an assurance that we can sell the power, reasonable assurance we can sell the power when the capacity is completed.

Mr. EVINS. OK. The Cumberland steamplant is now operational. However, on page 126 of your justification, it states that: "Adoption of new water quality standards by the State of Tennessee may require the addition of water-cooling facilities."

Briefly describe these new impositions.

Mr. WATSON. Well, the State of Tennessee used to have water quality standards of 93° in the water temperature with 10° rise. They later changed that to 86.9°, I think, and a 5.4° change. So that the original design of the Cumberland plant will no longer meet the new requirements. Now we do not feel that the new requirements are realistic.

Mr. EVINS. They used to have a 93° water standard, and they reduced it to an 80° water standard?

Mr. WATSON. To 86°.

Mr. EVINS. This imposes additional duties, responsibilities, and costs on TVA?

Mr. WATSON. Because the water we put in the river is warmer than the river water normally. So we have an increase in the temperature, and their restrictions with regard to not raising the river temperature within a reasonable mixing zone by not more than 5° makes it necessary for us to put in cooling towers rather than running the river water—

Mr. EVINS. How much would these projected water-cooling tower facilities cost?

Mr. WATSON. On Cumberland, the cooling towers cost is estimated at \$43.8 million in capital expenditures, and an additional \$48.7 million in estimated operating costs over the plant's remaining life.

Mr. EVINS. In your opinion, would the advantages of the water-cooling facilities be commensurate with the cost?

Mr. WATSON. TVA does not believe the cost of adding cooling facilities are justified at the Cumberland steamplant. The plant utilizes low-rise condensers so as to comply with a thermal criteria of 10° F. rise and 93° F. maximum which TVA believes provides adequate protection for fish and other aquatic life.

Mr. EVINS. To your knowledge, has the plant had any significant ecological impact on the Barkley Reservoir thus far?

Mr. WATSON. TVA is in the process of postoperational fisheries studies designed to assess the ecological impact of thermal discharges from the Cumberland steamplant. However, we have seen no evidence to date to indicate that the plant is doing or will do significant ecological damage.

RESOLUTION OF TENNESSEE LEGISLATURE

Mr. EVINS. Mr. Jenkins used to be speaker of the legislature. You ought to send him down there and get them to know and understand the facts. TVA is a great agency, but they are becoming so insulated that they are losing some of the good image.

The Tennessee Legislature passed a resolution for the first time in its history resolving that the TVA rates should be investigated. They sent that to me through the Governor. These rates already have been investigated two or three times by the Congress. I just show you here for exhibit purposes these letters which I have received in recent months from people in the area about the TVA rate increases.

Many of them are petitions with hundreds and thousands of names on them. This is not petty. This is weight; this is a tremendous exhibit. I do not think TVA has ever received anything like this. This is the voice of the people speaking; this is an expression of public opinion. At this point in the record, we will insert a sampling of these letters and various newspaper articles concerning this rate increase.

[The information follows:]

[From the Jamestown Leader-Times, Mar. 21, 1974]

EVINS BILL TO HELP HOLD DOWN TENNESSEE VALLEY AUTHORITY RATES

A bill cosponsored by Congressman Joe L. Evins, Democrat of Tennessee, and designed to assist the Tennessee Valley Authority to maintain low-cost power rates has been favorably reported by the Committee on Public Works and should reach the floor of the House next week.

Congressman Evins and 17 other Congressmen from the Tennessee Valley are cosponsors of the bill—H.R. 11929—which would result in savings of almost \$400 million to the Tennessee Valley Authority over the next 5 years.

During testimony recently before the Committee on Public Works, Congressman Evins explained that the bill would authorize the Tennessee Valley Authority to credit expenditures for pollution control against its required annual repayments to the U.S. Treasury.

On the assumption that the Tennessee Valley Authority invests from its own resources \$150 million per year over the next 5 years for pollution control facilities, the legislation proposed by Congressman Evins would result in an estimated \$394.5 million which would be retained by the Tennessee Valley Authority for use in the power system. Otherwise, this amount would have to be paid by the Tennessee Valley Authority to the U.S. Treasury.

In addition, by crediting expenditures for pollution control facilities against Treasury repayments, cash will be made available for investments that would otherwise have to be made with borrowed money. Therefore, the Tennessee Valley Authority will have to borrow less and thereby obtain a savings in interest costs. This reduction in interest costs would further reduce the need for borrowing and expand the benefits to the Tennessee Valley Authority.

"This bill is needed and necessary to provide some relief to the people of the Tennessee Valley who recently received the seventh electric power rate increase by the Tennessee Valley Authority in 6 years," Congressman Evins said during testimony before the Committee on Public Works urging governable action on the bill.

"Power bills of \$100 or more for a single month are not uncommon for relatively modest homes. Homeowners were encouraged for years to utilize 'low-cost electricity' for heating, cooking, and other uses—and now the owners of these all-electric homes are bearing the brunt of almost prohibitive electric bills," Congressman Evins said.

"Industries are also suffering in the TVA service area because of heavy increases in their electric power bills," he said.

Congressman Evins is chairman of the Subcommittee on Public Works Appropriations, and representatives of several industries testified last year before the Evins panel that electric power for their plants was costing more in Tennessee than in other States.

One industry spokesman testified that his plant would not have located in Tennessee if it had been aware of the planned electric rate increase and that his company would locate no additional plants in the Tennessee Valley area.

Congressman Evins noted that the Tax Reform Act of 1969 provided private utilities with tax credits for pollution control costs, but no similar relief has been provided for public utilities until the pending legislation was proposed.

The bill sponsored by Congressman Evins and the other Tennessee Valley legislators would place the Tennessee Valley Authority, the Nation's largest producer of electric power, on a similar footing with other utilities in regard to high-cost pollution control.

The bill does not in any way lessen the environmental standards, which the Tennessee Valley Authority must meet, but it does ease the financial burden placed on the Tennessee Valley Authority by new environmental standards.

The favorable report on Congressman Evins' bill by the Committee on Public Works noted:

"The Tennessee Valley Authority as a federally owned resource development agency, has a concern with air and water pollution control that goes beyond meeting the requirements of the air and water quality laws of the land. The private power companies must comply with these laws. But the Tennessee Valley Authority was taking environmental protection actions of considerable importance two decades ago, because it had a congressional mandate for resource development and conservation."

Congressman Evins said, "the Tennessee Valley Authority has long enjoyed its traditional role as a low-cost power rate yardstick, and in my view is in danger of losing this image because of the sharp increase in power rates over the past 7 years."

"The Tennessee Valley Authority rates are rising more rapidly than the Nation as a whole, and the Tennessee Valley Authority customers are paying a higher electric bill because 4 out of 10 homes in the service area are all-electric," he said.

"In the Tennessee Valley today, residential customers are paying approximately 65 percent more for the same amount of electricity used 7 years ago—and industries are paying 90 percent more," Evins said.

"This bill—H.R. 11929—would provide some relief not only to the Tennessee Valley Authority, but to its customers and consumers in the Tennessee Valley."

[Crossville-Cumberland Co. Times, Feb. 27, 1974]

PROBE OF TENNESSEE VALLEY AUTHORITY RATES IS URGED

State representative Larry Bates, Democrat of Martin, has sponsored and introduced a resolution in the 88th general assembly urging the Congress of the United States to investigate the recent rate increase of electric power by the Tennessee Valley Authority.

Speaking on the resolution, Representative Bates stated, "The electric bills for customers of the Tennessee Valley Authority and its retail electric systems have increased substantially in recent months. These increases in the electric rates have placed undue hardships on the citizens of Tennessee who are living on fixed incomes."

Bates added, "The 14-percent increase in power rates appears unreasonably high. The Tennessee Valley Authority does not even need prior approval for major rate increases from any Federal or State regulatory agency."

Bates continued, "For this reason we are urging the Congress of the United States that an investigation be made of the recent rate increases of electric power by the Tennessee Valley Authority and its rate structure."

[From the Nashville Banner, Mar. 23, 1974]

ELECTRIC RATES: CAN SOMETHING BE DONE NOW?

Backers of a bill, passed 209 to 193 by the U.S. House of Representatives, that would allow the Tennessee Valley Authority to charge off to the Federal Government the total cost of its pollution control program, say it will help slow the rate of the Tennessee Valley Authority rate increase for electricity.

It is to be hoped something will help slow the rate!

As U.S. Representative Joe L. Evins, Democrat of Smithville, said on the House floor last Wednesday on debate on the bill, the Tennessee Valley Authority has had seven electric power rate increases in the last 6 years with the effect of making the total average consumer's bill more than 80 percent more than it was 6 years ago. Thus, Mr. Evins said, it puts the Tennessee Valley Authority in danger of losing its low-cost power yardstick image.

What the bill passed in the House does, is let the Tennessee Valley Authority deduct the \$150 million it expects to spend for pollution control over the next few years from the money it turns over to the U.S. Treasury in debt repayment.

Supporters say enactment would lessen rate increases to the consumer.

The Tennessee Valley Authority increased its power rates in January, adding an extra \$2 a month to the average consumer's electric bill. Thus, in the heart of supposedly cheap power, costs of heat and light soared 14 percent in just that last boost.

J. W. Eakin, the Tennessee Valley Authority district manager of the Division of Power Marketing, told a public hearing in Nashville Tuesday he doesn't "see much cause for optimism" in the cost of electricity, and would not rule out the possibility of another rate increase to consumers in July. He was asked if more people attended the hearings might something be done about the rate hikes. His reply was, "It is erroneous to think that you can come to a meeting and protest and stop the rate increase."

Mr. Eakin also said that because of a substantial drop in anticipated sales of electric energy—no doubt due to the Government's plea for fuel conservation—TVA revenues for the year were \$38.5 million lower than had been expected when the January rate increase was announced.

He cited rising costs in coal as "changing this picture significantly" of operating margin. He said coal has increased from \$4.77 a ton in 1970 to a high of \$11.70 now.

An Associated Press story Thursday pointed out that some Americans are paying up to 50 percent more per month for electricity this year than last. It also said consumers are organizing to fight the rate hikes.

It is imperative that the U.S. Senate take into consideration what the high cost of electricity is doing to the consumer, not only in this area but in all States, when it takes up this measure.

TVA HAS \$800 MILLION IN SURPLUS EARNINGS

Knoxville, Tenn.—The Tennessee Valley Authority has amassed more than \$800 million in surplus earnings—\$52.6 million during the year ending June 30, 1973—according to its annual report.

The report was issued this week as electric bills throughout the TVA area were increased because of a 14 percent hike in TVA electric power rates. The governmental agency said the rate hike was necessary to meet rising expenses.

The surplus, known as retained earnings, are held back so TVA can maintain an appropriate ratio of financial equity to its debt, TVA board chairman Aubrey Wagner said.

"To maintain the financial integrity of the system," said Wagner, "you have to plow some earnings back in."

During congressional hearings last year, the surplus margin was questioned by U.S. Representative Joe L. Evins, Democrat, of Tennessee. The Congressman noted the profit margin far exceeds that sought by privately owned electric utility companies.

"You are far from being in the depleted and depressed condition that you would make it appear," Evins said at the time. A spokesman for Evins said all aspects of TVA's most recent rate hike will be investigated.

Wagner noted the TVA Act of 1933 authorizes the agency's three directors to establish an operating margin above routine expenses, which include production costs.

If the earnings were not retained, he said, the authority might not be able to demonstrate financial stability. Without that, he suggested, it could not obtain the multimillion dollar bonds it gets for expanding its power network and antipollution efforts.

"If we operate with no margin, by 1990 we would be 90 percent in debt, according to our projections," Wagner said in Nashville.

INCREASING RATES OF ELECTRICITY IRK CONSUMERS

(By Louise Cook)

Some Americans are paying up to 50 percent more per month for electricity this year than they did last, an Associated Press survey shows.

Consumers are beginning to organize to fight the rate hikes.

A spot check of monthly electric bills this year and last showed that most increases have been about \$1 or \$2, generally about 10 percent, with the highest reported boost coming in Jacksonville, Fla., where the average tab went from \$17.90 last year to \$27.70 this year.

Utility companies say the increases are due primarily to the rising cost of fuel. They noted that imported crude oil has jumped fourfold since Jan. 1, 1973. Most of these increases are passed on to the consumer automatically, with no review by State or local authorities.

NORTHEAST HIT HARD

Areas like the Northeast which depend heavily on imported oil have been the hardest hit. In the Northwest, where water is a major source of electricity, the price hike has been less severe. Other operating costs like labor also are generally higher in the East and traditionally have made electric bills more costly. The AP check showed that the price of a kilowatt hour of electricity ranges from just over a penny in Nevada and Oregon to 7 cents in New York City.

All-electric-home owners have been especially hard hit. Such a homeowner in New York's Orange County, for example, has seen his monthly bill jump from \$101.67 in March 1973 to \$205.60 this year for 5,000 kilowatt hours of electricity. In some cases, electric bills are topping mortgage payments.

Most of the consumer outcry has come in the form of protests at public hearings. A Public Service Commission hearing in New York City was disrupted by customers complaining about Consolidated Edison Co.'s request for a permanent rate hike of almost 23 percent.

The Vermont Welfare Rights Organization and the Vermont Public Interest Research Group have intervened in all major rate cases before the State's public service board in the past year.

ELECTRIC RATE INCREASE SAMPLES AROUND UNITED STATES

Here is a sampling of electricity rates per kilowatt hour before and after price increases in the past 6 months:

Tennessee Valley Authority: before, 1.27 cents; after, 1.36 cents; percent increase, 7.

Public Service Board of Vermont: before, 2.50 cents; after, 3.15 cents; percent increase, 26.

Northern and central California: before, 2.26 cents; after, 2.60 cents; percent increase, 15.

Virginia Electric & Power Co.: before, 2.2 cents; after, 2.28 cents; percent increase, 5.

Louisville Gas & Electric: before, 2.03 cents; after, 2.04 cents; percent increase, less than 1.

New Orleans Public Service, Inc.: before, 2.02 cents; after, 2.28 cents; percent increase, 13.

Northern States Power Co. of Minnesota: before, 2.93 cents; after, 3.23 cents; percent increase, 10.

Niagara Mohawk Power Co.: before, 2.53 cents; after, 2.74 cents; percent increase, 8.

Potomac Electric Power Co.: before, 2.47 cents; after, 2.63 cents; percent increase, 6.

Portland, Oreg., General Electric: before, 1.24 cents; after, 1.34 cents; percent increase, 10.

Tucson, Ariz., Gas & Electric: before, 2.75 cents; after, 3.03 cents; percent increase, 10.

Kansas City Power & Light Co.: before, 2.63 cents; after, 2.76 cents; percent increase, 5.

Detroit Edison: before, 2.92 cents; after, 3.02 cents; percent increase, 3.

Consumers Power of Michigan: before, 2.52 cents; after, 2.73 cents; percent increase, 8.

Georgia Power Co.: before, 1.77 cents; after, 2.25 cents; percent increase, 27.

Metropolitan Edison Co. of Reading, Pa.: before, 3.04 cents; after, 3.22 cents; percent increase, 6.

Wisconsin Power & Light Co.: before, 2.46 cents; after, 2.58 cents; percent increase, 5.

Wisconsin Power & Light: before, 3.75 cents; after, 3.8 cents; percent increase, 1.

Jacksonville Electric Authority: before, 2 cents; after, 3.8 cents; percent increase, 90.

Consolidated Edison of New York: before, 5.2 cents; after, 7 cents; percent increase, 35.

Southern Nevada: before, 1.2 cents; after, 1.5 cents; percent increase, 25.

Alabama Power Co.: before, 2.24 cents; after, 2.25 cents; percent increase, 9.

[From the Nashville Banner, Dec. 18, 1973]

TVA RATE HIKES RAISE QUESTIONS WITH CONSUMERS

Representative Joe L. Evins of Smithville has spoken for thousands of Tennesseans in expressing concern and wonder over the latest increase in power rates by the Tennessee Valley Authority.

In the heartland of public power and, presumably, low rates, the cost of heating and lighting has gone up again, this time 14 percent. The higher price—TVA's seventh rate increase in 6 years—will show up on next month's bill.

The average consumer can figure on spending an extra \$2 a month to accommodate the increase. The total bill, with these annual increases, is about 90 percent more than it was 6 years ago.

The higher rates concern Representative Evins, one of the biggest friends TVA has ever had.

"I deplore the recent rate increases announced by TVA—I fear that TVA is destroying its image as the low-cost power yardstick of the Nation," he said.

Representative Evins thinks there may be some collusion between the Office of Management and Budget and TVA. If TVA raises its rates, some may reason, then private power companies can use TVA as an example to justify their rate increases.

The gist of Representative Evins' argument is that TVA seems headed toward a high-rate yardstick, rather than a low-rate one.

Certainly, the TVA has experienced increased costs of operation, just as all Americans have, but the ability of TVA to generate revenue from congressional appropriations, bond sales, and operating revenues causes some to wonder why TVA shouldn't be one power company able to hold down its rates.

Cheap power is and always has been the chief reason for TVA's existence. That shouldn't change now.

In this area of public power rates, there is plenty of room for political demagoguery, and no doubt there will be efforts by some to tie TVA shortcomings, if that's what they are, to President Nixon's coattails.

But Representative Evins generally steers clear of solely partisan prater. The questions he has raised are ones that Tennesseans have a stake in. The TVA, if it is to continue in the role for which it was created, should fully explain why users must bear this increase.

Honorable EVINS. Hold those TVA prices down. I'm a retired employee, living on social security and a small pension. With these high prices, it's all I can do to make ends meet now. We, and our forefathers, are the ones that's made this country what it is, with our taxes et cetera. Keep us in mind now.

Thanks for what you have done in the past; keep up the good work.

Respectfully,

AUSTIN SMITH,
Fayetteville, Tenn.

CITY OF PLEASANT HILL, INC.,
Pleasant Hill, Tenn., March 21, 1974.

HON. JOE L. EVINS,
Representative, Tennessee Fourth District,
Rayburn House Office Building,
Washington, D.C.

We who live within that area which is served by the TVA wish to commend you for the stand which you have taken in regard to the exorbitant increases which this enterprise is levying for the electric power which it is generating.

For the month of February the average temperature reading at 6 a.m. was 33 degrees. Surely you will agree with us that this was a rather high reading for the month. However, when we received our bills for that month many were double the amount which they had been charged for months with a comparable temperature reading. I believe that I speak the truth when I say that TVA has increased its rates six times during the past 7 years.

Isn't it true that this gigantic organization has branched out into many fields of endeavor other than the generating of electric power? Could it be possible that it has been found necessary to increase the price of power in order to finance

these many other interests? Should this be the case, as it very well could be, it is our thought that it is an injustice to their thousands of power customers.

We not only commend you for the corrective steps which you and your co-workers have already taken, but courteously request that you continue your efforts to thwart TVA in its mad attempts to add insult to injury by future unnecessary and unwise increases in its rates for electric power.

This letter is being written on behalf of the thousands who feel that they are being unjustly treated by this manufacturing giant of electric power. Many of the homes on the plateau have no second method of heating their homes. And it may be truthfully stated that many in this area are elderly maiden ladies, widow women, and men, all trying to exist on social security checks and/or other limited fixed incomes.

Once again our sincere thanks to you and all who are cooperating with you in your efforts to secure justice for the thousands of consumers of TVA-produced electric power.

Very truly yours,

JAMES W. CONLIN.

Re The TVA and Volunteer Electric Cooperative.

Crossville, Tenn., March 11, 1974.

HON. JOE L. EVINS,
House of Representatives,
Rayburn House Office Building,
Washington, D.C.

DEAR MR. EVINS: Since you are aware of the recent Crossville meeting of concerned citizens regarding the last "rate hike"; I would like to point out a further need for a congressional action.

Chairman of TVA, Aubrey Wagner has appeared on TV, stating that even a further rate increase is expected. This he states—is due to the higher costs of fuel.

The rate increase just levied, and without due warning, was to cover this fuel raise and as well some labor and material costs.

If what Aubrey Wagner states is put into effect, it will be the third rate increase in 3 years. This last rate should not be permitted.

I am aware of the measure introduced by Senator Brock and Senator Baker, to effect relief, tax-wise and payment of indebtedness. This is coming along too late and will not be easily understood by most folks served under TVA.

Fortunately Tennessee has a great number in influx, of retired but still ambitious people who do understand utilities. Many of them are from areas of investor-owned utilities, who maintain a continuous flow of information, too, the various States from whence they come have Public Service Commissions that intervene and stem rate increases.

This is lacking under TVA.

It is suggested that the Congress commission a public relations group that can immediately release to all media a flow of information that is not included in the house organs of the likes of Volunteer Electric Cooperatives.

Few folks understand rates and what goes toward their makeup. This should be simply stated. In meetings and in paid advertising it was not.

Few folks understand the bonanza created by TVA in the first place. That goes for REA. This should be in review.

Rising costs in nearly everything can be expected and when understood will be accepted.

It is hoped that with your guidance and intimate knowledge of your district that you can personalize this much-needed information, and at once, by a series of articles in the local papers with spot-timing of like in radio and TV.

The co-op and REA group as a whole should have public relations people; educated in and fluent to followup.

Mr. Paul Austin—TVA here in Crossville is just not doing the job he should be at this time. His recent talk and publicity in print "The Energy Crisis—Fiction and Fact" illustrates this.

There is a simple way. It should be sought and offered.

Selling has been my business and though now retired I cannot refrain from the job at hand. From the mid-1920s to the beginning of 1970 I had a continuing action contact with the utilities of the Nation, have been a factor in their growth, investor-owned, private, municipal, REA and REMC.

The successful, sell "the sizzle—not the steak".

An action—will be appreciated by the voters, the taxpayers and all others in your district.

Yours very truly,

ALAN B. CONANT.

GRINSLEY, TENN., February 23, 1974.

Hon. JOE L. EVINS,

DEAR CONGRESSMAN: I'm writing for a number of my neighbors and myself in regard to our TVA electric bills.

I live in a small 2-room cabin and my bill went from \$25 to \$42 this month. I just make \$1.60 per hour and I can't possibly feed my family and pay such bills as that. The Government appealed to the public to save energy which we are trying to do, then they came up with a much larger bill then ever.

I've worked in electric work for 20 years and I know I could turn everything I own on and my bill shouldn't be this big as there is hardly ever anyone at my home except at night. I think there is something awful bad wrong and our local officers won't try to do anything about it. One of my neighbors draw a disabled Social Security check; his bill was \$64 which is over half of what he draws, he can't possibly live on what he has left.

We would appreciate very much if you could send some Federal man in here to check and see what is wrong. There is no use to see our local officer for they won't do anything about it. You or anyone you might be able to send are welcome to visit my home and see just what I have in use. The neighborhood is very much upset by this outrageous bill. If it will help I'll send a petition with all them signed it to you.

Thank you.

I Remain your friend,

Sincerely yours,

CLARENCE ROBERTS.

JAMESTOWN and PALL MALL, TENN., February 25, 1974.

Hon. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR SIR: I am writing you in regard to our Electric Co. (Volunteer). Us and everyone else around are getting bills we can't pay, they are entirely out of reason, we not at home days, gone 5 days a week. We couldn't possibly burn what they charge us with, there going have to be something done.

What is being done with all the surplus money the Electric Company has? We have wrote and talked to different people about it and no one can or will do anything about it. I have to work over a week to pay our electric bill and there is dozens of others just like us. Ours has more than doubled as of last year and we haven't had any cold weather much at all this Winter. Somethings got to be done or we have to have our electric cut off.

Please see what you can do and look into the situation for us; sure will be appreciated, anyone living within 50 miles is in same boat as us. Don't throw this in wastebasket before you read it, help us if you can.

Thanks.

DIAMOND DAVIS FAMILY.

P.S.—We live 2½ miles from Sergeant Alvin C. York's homeplace, his wife and family is in the same shape we are in. Plus everyone else around.

UNICOI COUNTY HIGH SCHOOL,
ERWIN, TENN., March 7, 1974.

DEAR REPRESENTATIVE EVINS: How I admire your stand on TVA. I have followed your battles with them with interest. Please, continue your efforts.

Take my case:

When I retire as a teacher, I'll have a fixed income of \$368 a month and my husband is a partially disabled veteran. We are raising a 3½-year-old grandson, etc.

Now how can we ever manage? We'll have to get rid of our electric heat and go back to a stove if this keeps on.

Keep on digging at that huge surplus they have piled up!

Sincerely,

GENEVA MASHBURN,
(Mrs. Edward Mashburn).

MURFREESBORO, TENN.

Congressman JOE L. EVINS,
Congress of the United States,
House of Representatives.

DEAR SIR: I would like to ask you a question concerning the Tennessee Valley Authority electric rates. Have you had any success in getting the TVA authorities in reducing the cost of our electricity? I have read in the newspapers how concerned you have been over the very frequent higher rates that have been imposed upon the people. I hope in the future you will be able to reduce the TVA electric costs. Please answer if possible about your opinions.

Sincerely,

CHRISTY MARAVICH.

[From the Gainesboro Jackson County Sentinel, Dec. 6, 1973]

TVA—NO SHORTAGE BUT RATE HIKE POSSIBLE

The Tennessee Valley Authority said Monday it expects to have plenty of power this winter for its regular customers, but probably will have none to sell to electric utilities elsewhere in the country.

Coupled with this report on the agency's power production potential was a statement by a TVA spokesman that its wholesale electricity rates may be raised this week, effective January 1.

Chairman Aubrey J. Wagner and other TVA officials have cited rising costs of production in saying the agency may have to boost its rates.

The authority which produces 80 percent of its power at coal-fired steam plants, said it has on hand a 76-day stockpile of fuel at the expected rate of burn.

But coal deliveries have not kept pace with consumption of the fuel at TVA's 12 steam plants in recent months. TVA invoked emergency buying procedures to try to get its stockpiles up to the 90-day minimum it likes to maintain, but added that these "to date have not altered the situation."

TVA has begun testing the first unit of its Browns Ferry nuclear powerplant in north Alabama. If its 1,125,000 kilowatts can be added to the TVA system in the next month or so, the agency said in a statement, "it will help insulate the power system from the shortage of fossil fuels."

But TVA cautioned that any large new generating unit, such as Brown's Ferry, is subject to unexpected shutdowns during the initial period of operation. The TVA statement added:

"Because the national energy situation contains so many uncertainties at the present time, TVA does not expect to assist electric utilities in other sections of the country except in short emergency situations."

In discussing the likelihood of power rate increases, TVA officials have said fuel costs have gone up 31 percent this year. And interest rates on power bonds and notes have soared 39 percent.

The authority raised its wholesale rates 9 percent a year ago. However, the increase that actually was passed on by cooperatives and municipal distributors to their residential, commercial and industrial customers averaged about 6 percent.

[From the Clay Statesman, Celina, Tenn., Feb. 20, 1974]

INCREASE BY AS MUCH AS 225 PERCENT

COUNTIANS HARD HIT BY ELECTRIC BILLS

Clay Countians were hard hit by their electric bill this month, some saying it had increased by as much as 225 percent over last month.

Customers of Tri-County Electric Membership Corp. were complaining publicly and to the cooperative, but a co-op official said there was little the co-op could do to help them.

Donald Winn, office manager in Lafayette, said he had a large number of calls and blamed the 14-percent increase in price of electricity from the Tennessee Valley Authority for some of the increase. He went on to cite several other possible reasons for a particular bill being higher this month.

"Normally, February bills (which cover the January reporting period) are the highest of the year," he said. Most of the bills covered the period from December 5, 1973 to January 5, 1974.

Other reasons for an increase, he said, might be:

1. The holiday period, when more persons are at home and using more electricity through extra cooking, heating spare rooms, and using more electrical appliances.

2. An ice storm, which put from 6,000 to 7,000 homes out of service for a week, and therefore may have added another week to the regular bill through delay. (In which case, he said, the next bill for those homes might reflect only a 24 or 25 day "month".)

3. In particular cases as a fairly regular occurrence, some may have misread their meters. About 15,000 customers read their own meters. The co-op has 370 routes for meter readers. Where a meter was misread or read some days after the regular date on which families read them, "extra" days may appear on the meter because it was read later than usual in that month.

"We sometimes get bills that show as much as 40 days on them. Naturally, those bills will be higher. If each user read his meter on the same day each month, he would have a better reading of the exact amount of electricity being used," Mr. Winn said.

Clyde King, Celina banker and member of the co-op's board of directors said several things occurs to him about the increase.

"It is regrettable but Tri-County is only passing on the increase from TVA. This is the first month the increase has been applied. My bill was higher, like everyone's else," he said.

He said TVA gave the higher cost of coal and large expenditures for devices to meet environmental control devices at its generating plants as reasons for raising the wholesale rate.

"I was hoping that they could have spent that money on some of the old loans. I'm not convinced the TVA increase was justified," he said.

Meanwhile, Mr. Winn suggested that anyone who has reason to suspect that his bill contains a error, either this month or anytime in the future, should get in touch with the Tri-County office in Celina.

But first, he said, they should take into account the increase, which is \$1.77 per thousand kilowatt-hours used.

"If they look closely, they will see that the consumption has probably gone up, not just the price," he said.

By multiplying the basic rate times the number of thousands of hours used and adding in the \$1.77 per thousand increase, they can get a better reading on how the bill was figured, he added.

Tri-County bills are prepared by an office in Jackson, Tenn., and for that reason the books are not always at the Lafayette office. But by taking the information on the meter stub it will be possible to figure the bill, he explained.

ROUTE 2,
Smithville, Tenn.

Hon. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR MR. EVINS: I am writing in regard to the January electric bills. Everyone in our area was expecting a 15 percent increase in our electric bills, but when our bills came there was an increase of from 50 percent to 101 percent or more. That is hard to take. If you are a family with 3 or 4 children, you work all week and bring home about \$100. Then by the time you buy groceries and pay your electric bill you don't have any money left. Here is the way some of the bills ran last month, then this month:

\$24 last month; \$42 this month. \$28 last month; \$53 this month. \$21 last month; \$43 this month. \$26 last month; \$59 this month.

These are just a few of the undersigned bills. If there is anything at all you can do to help it would be greatly appreciated. I know you have helped the people before, and if you can't this time I don't know who we can turn to.

Yours truly,

ELSIE STEINBACH; Mrs. Vella Barns, Smithville, Tenn., Route 2; Willie McCormick, Route 2, Smithville; R. E. Rogers, Route 2, Smithville; Mrs. Imogene Rogers, Route 2, Smithville; Lakey E. Rogers, Route 2, Smithville; Larry W. Norwood, Route 2, Smithville, Tenn.; Bug Smoot, Route 2, Smithville, Tenn.; John Michael, Route 2, Smithville, Tenn.; Mrs. Luther W. Fisher; Mrs. J. Alton; Rucker City; Mrs. Clara Goodman; Mrs. Marie Knowles, Miller Heights; Mrs. Dollie Ridigo, Miller Heights; Mrs. Aaron Pedigo, Aaron Pedigo, Miller Heights; Sandra Merriman; Carl Blankenship; Mrs. Norma Gunter, Luttrell St., Smithville; Mrs. Eugene Blair, Luttrell St., Smithville; Mr. Willie Chapman, Route 4; Mr. & Mrs. Reed Miller; Mr. & Mrs. Wayne Shehone Melba Joy Campbell; Mrs. Fannie Holder; James Miller; Mr. & Mrs. J. D. Pedigo; Lynn Certain; Lois Atnip; Mr. and Mrs. Bobby Wilcher; Mr. and Mrs. Lynn Newley, Smithville City; Mrs. Ruby Adioch; Mrs. Gene Magness, Route 5; Ms. Geraldine Hendrixson; Mrs. Billie Grace Smithson, Route 3, Smithville; Mrs. Marie Cubbins; Mrs. Marie Hill; Mrs. Dorothy Carter, Route 4, Smithville; Mrs. Harold Roberts; Mrs. Lillian Gandy; Edward Lee; J. V. Frazier; J. R. Ethridge; Nelda Barnes, Mr. Obie Adcock; Orthana Young; Mrs. Effie Adcock; Mr. Green Walls; Ms. Joan Walls; Harold M. Adcock, Smithville, Tenn.; Eddie Green, Smithville, Tenn.; Mr. Lellan M. Cantrell, Smithville, Tenn.; Mrs. Elsie Neely, Smithville, Tenn.; Billy Adcock, Smithville, Tenn.; Arvil Norton, Smithville, Tenn.; Mr. James Rice, Sparta; Ms. Laura Ellen Randolph, Sparta; William Steinback, Smithville, Tenn.; Mrs. Nettie E. Green, Smithville, Tenn.; Mr. Jack W. Green, Smithville, Tenn.; Mr. Clayton Adcock, Smithville, Route 2, Mr. and Mrs. Clayton Adcock, Smithville, Route 2; Ms. Carol Green, Smithville, Tenn., Route 2; Mrs. Donna Bright, Smithville, Route 2; Sherman Bright; Smithville, Route 2; Fred Steinbach, Smithville, Tenn.; Mrs. Sara F. Adcock, Smithville, Route 2; George Cantrell, Smithville, Tenn.; Jerry Cantrell, Smithville, Tenn.; Ray Darlen, 212 Tulsa Ave., Tullahoma, Tenn.; James A. Adcock, Route 2, Smithville, Tenn.; Richard Tittsworth, Route 1, Smithville; Mr. Fate Cantrell, Tenn.; Lesta McConick, Route 2, Smithville, Tenn. Route 2; Douglas Linost, Smithville, Tenn., Route 2; Wallace Cantrel, Route 2, Smithville, Tenn.; Mr. Buford Jaco, Route 2, Smithville, Tenn.; Margon Halbs, Route 3; Clyde Hawkins, Route 2; Raymond Steele, Route 4; Billy Adcock, Route 2, Smithville, Tenn.; Ms. Susan Anderson, Route 2, Smithville, Tenn.; Ms. Brenda Gayle Jones, Route 2, Smithville, Tenn.; Firman E. Young, Route 2, Smithville, Tenn.; Diane Emmerton, Route 2, Smithville, Tenn.; Richard Tittsworth, Route 1, Smithville; Mr. Fate Cantrell, Route 2, Smithville, Tenn.; Mr. Elmus L. Powell, Route 2, Smithville, Tenn.; Ruby Griffin, Route 2, Smithville, Tenn.; Billy Jones, Route 2, Smithville, Tenn.; Brenda Emberton, Route 2, Smithville, Tenn.; Ronnie Emberton, Route 2, Smithville, Tenn.; Stacey Adcock, Route 2, Smithville, Tenn.; Ms. Doris Cantrell, Route 2, Smithville, Tenn.; A. T. Luna, Route 2, Smithville, Tenn.; L. B. Ray, Route 2, Smithville, Tenn.; Cantrell Jones, Route 2, Smithville, Tenn.; Mr. and Mrs. Cephas Jones, Route 2, Smithville, Tenn.; Lesta McConick, Route 2, Smithville, Tenn.

PALL MALL, TENN., February 5, 1974.

DEAR SIR: I am writing to you because something has got to be done about our light bills. Last month my bill was \$26. This month \$55.62. And we have turned our heat down because it is warmer. I have a family and I cannot afford this.

I got paid today. For 2 weeks my check was \$117. I had very little left after paying my light bill.

Besides, I travel 28 miles a day to my job. I could quit work and draw welfare and it looks like I am going to have to. I cannot work and pay \$90 a month on my house and all my other bills plus all this for lights. I was barely making it before. What do I do now?

I am trying to help myself. There is no sense in the way every thing is going up. The light bill will be \$100 next month. If you people don't do something, somebody has got to start somewhere.

Thank you.

WILMA GIREATH.

JAMESTOWN, TENN., *March 1, 1974.*

Mr. JOE L. EVINS,
Washington, D.C.

DEAR SIR: We want you to know how the Volunteer Elect. Cooperative of this State is treating us.

My husband (Herman Wood) died last February. I live alone on my little social security and retirement. I have oil heat, no washer, or dryer. I keep the house cool, sleep in a cold room. I cook very little and stay in one room. When my husband was living I used my electricity more because I cooked more and he kept a fan going because of his breathing. Then our electric bill only got up to \$32 or \$34 in the coldest months. This month my electric bill is \$50.49. I haven't had any company and haven't used any extra lights or cooking. It was \$26 in December and \$27 in January. They calculated it this month and pretended they hadn't charged me enough those months, when they read the meter and the rate of electricity hadn't gone up.

It doesn't look reasonable. I have been very careful in this energy shortage and it doesn't seem it is helping any one but the electric cooperative to make more money clear. How can older people live on a fixed income and every thing getting higher and all companies trying to get rich.

The people of Fentress County are very disturbed about the cost of electricity. We are wondering what could be done. Some have put in wood stoves and still their electricity bill hasn't changed.

We feel that if anything can be done you will do it.

Thank you for all you have done for us.

Yours respectfully.

CLARA T. WOOD.

MURFREESBORO, TENN., *January 23, 1974.*

HON. JOE L. EVINS,
House Office Building, Washington, D.C.

SIRS: Let me begin by saying that I admire and respect you for the many stands you have taken in consideration of the middle class citizens and taxpayers. In a time when most lawmakers consider only the rich, special interest groups and the very poor, this makes you a unique man.

Once again TVA has seen fit to raise our electric rates, after having been subsidized so long by tax money, this seems exorbitant and ridiculous to me. December was a very mild month, comparatively, in middle Tennessee, yet my electric bill was practically doubled over the month of November (I am sending copies to prove this) and the excuse the power company offers is the raise in rates by TVA and cold weather in December.

I see by the paper that the excuse TVA offers is largely the increase in cost of coal.

I have relatives in east Tennessee who were furnishing coal to TVA at reasonable rates but they, as small operators, were forced out of business because of TVA's refusal to buy their coal. Now with the little operator out, just as in oil, the big operators are getting whatever they demand and the burden ends up on my shoulders. I believe there has been collusion between TVA and the large mine owners and surely antitrust laws must have been violated.

I respectfully request that you do all that is in your power to rectify these injustices and hopefully obtain some relief for we taxpayers and consumers.

Thanking you in advance for whatever help you may be able to provide, I remain, respectfully,

Your supporter,

GORDON COURTNEY.

P.S.—I am enclosing the names of just a few of my fellow workers who feel as I do about the energy crunch put on them by big business and big Government. We the undersigned wish to respectfully protest the exorbitant rates exacted of us by the power distributors of middle Tennessee.

Gordon Couvtry, Walter W. Adams, George McDaniel, Ike Parker, Ramsey Ghee, R. N. McKaper, W. F. Shipp, Wm. Sewell, Sanford F. Wilson, Jimmy W. Hughes, Helen M. Shreue, William H. Miller, William M. McKnight, Eugene Vaughan, Jessie Buy, J. E. Miller, Nathan D. McDaniel, William F. Guthrie, George Kelley, Sally Arnold, Joe E. Crowell, Allan Colyar, Neil Overall, Walter Luffkin, Robert Patton, James M. Barrett, Granville Underwood, George E. Blytter, Glendon Ruhoidse, Nathan Kh. Terbman, Glen Dennis, Claude W. Eakes, W. C. Swain, Thurman J. Green, Dallas H. Burns, Jerry C. Parker, Bobby R. Sills, Michael C. Harris, Frealon G. Zlembro, Elmer E. Patterson Jr., William R. Laurviell.

JAMESTOWN, TENN., *February 20, 1974.*

Hon. JOE L. EVINS,
U.S. Congress,
Washington, D.C.

DEAR CONGRESSMAN EVINS: We are writing this letter to call your attention to the recent increase in electricity rates.

Our electric bill for December (billed in January) was \$26. The bill for January (billed in February) was \$58. The month of January was not that much colder than the month of December, so the increase in the bill must be attributable to the increase in the rates. We heat with electricity, but we have a small home. It seems that this is an excessive increase in the cost of electricity, especially since we have had other increases in the past couple of years.

It is extremely hard to pay such extreme increases in the cost of living, especially on a fixed income such as ours. We have a small social security income.

We would appreciate it greatly if you could investigate these increases. It would help many people in our circumstances, as well as working people who are getting extremely high electric bills.

Sincerely yours,

Mr. and Mrs. ALVIN UPCHURCH.

WESTMORELAND, TENN., *February 9, 1974.*

Hon. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN EVINS: As outraged and frustrated citizens, we appeal to you, our representative, to use whatever influence you have to get something done concerning the skyrocketed electric bills which we have received from Tri-County Electric Membership Corp. this past month.

We expected some increase due to the Tennessee Valley Authority's increase, but in most cases bills have doubled and tripled. When we say this, we do not mean just the previous month's bill, but they have doubled and tripled the highest bills ever received by individuals.

The great majority of people serviced by the tricounty area are working middle class families, and these bills are creating a tremendous hardship. Some families are finding them almost impossible to pay. Many others are receiving social security as their only means of income and their electric bill exceeds or is almost as great as their monthly check.

This seems an unreasonable and unrealistic demand by Tri-County Electric Membership Corp. and we urge you to do whatever is within your power to serve the people who elected you in this matter.

Yours truly,

JAMES E. LAUDERDALE.

P.S.—Previous bill \$24.98. This month's bill \$51.98. The February electric bill reflects much more than a 14 percent increase. The period that this bill covers was a mild one. A very unreasonable increase.

WESTMORELAND, TENN., February 9, 1974.

HON. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN EVINS: As outraged and frustrated citizens, we appeal to you, our representative, to use whatever influence you have to get something done concerning the skyrocketed electric bills which we have received from Tri-County Electric Membership Corp. this past month.

We expected some increase due to the Tennessee Valley Authority's increase, but in most cases bills have doubled and tripled. When we say this, we do not mean just the previous month's bill, but they have doubled and tripled the highest bills ever received by individuals.

The great majority of people serviced by the tricounty area are working middle class families, and these bills are creating a tremendous hardship. Some families are finding them almost impossible to pay. Many others are receiving social security as their only means of income and their electric bill exceeds or is almost as great as their monthly check.

This seems an unreasonable and unrealistic demand by Tri-County Electric Membership Corp. and we urge you to do whatever is within your power to serve the people who elected you in this matter.

Yours truly,

EZRA HARRISON.

P.S.—Previous bill, \$32. This month's bill, \$47.80. Our bill was out of reason. We are not satisfied with it. Many more like these we have to have our lights cut off.

WESTMORELAND, TENN., February 9, 1974.

HON. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN EVINS: As outraged and frustrated citizens, we appeal to you, our representative, to use whatever influence you have to get something done concerning the skyrocketed electric bills which we have received from Tri-County Electric Membership Corp. this past month.

We expected some increase due to the Tennessee Valley Authority's increase, but in most cases bills have doubled and tripled. When we say this, we do not mean just the previous month's bill, but they have doubled and tripled the highest bills ever received by individuals.

The great majority of people serviced by the tri-county area are working middle class families, and these bills are creating a tremendous hardship. Some families are finding them almost impossible to pay. Many others are receiving social security as their only means of income and their electric bill exceeds or is almost as great as their monthly check.

This seems an unreasonable and unrealistic demand by Tri-County Electric Membership Corp. and we urge you to do whatever is within your power to serve the people who elected you in this matter.

Yours truly,

Mr. and Mrs. WILLIE E. HAMMOCK.

P.S.—Previous bill, \$21.80. This month's bill, \$40.33. We are 71 and 78 years living on a fixed income both under the care of a doctor. We can't pay these high electric bills and buy medicine.

WESTMORELAND, TENN., February 9, 1974.

HON. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN EVINS: As outraged and frustrated citizens, we appeal to you, our representative, to use whatever influence you have to get something done concerning the skyrocketed electric bills which we have received from Tri-County Electric Membership Corp. this past month.

We expected some increase due to the Tennessee Valley Authority's increase, but in most cases bills have doubled and tripled. When we say this, we do not mean just the previous month's bill, but they have doubled and tripled the highest bills ever received by individuals.

The great majority of people serviced by the tri-county area are working middle class families, and these bills are creating a tremendous hardship. Some

families are finding them almost impossible to pay. Many others are receiving social security as their only means of income and their electric bill exceeds or is almost as great as their monthly check.

This seems an unreasonable and unrealistic demand by Tri-County Electric Membership Corp. and we urge you to do whatever is within your power to serve the people who elected you in this matter.

Yours truly,

Mrs. PAUL M. HAMMOCK.

P.S.—Previous bill, \$28.29. This month's bill, \$50.58.

PALL MALL, TENN., February 5, 1974.

DEAR SIR: I am writing to you because something has got to be done about our light bills. Last month my bill was \$26. This month \$55.62 and we have turned our heat down because it is warmer. I have a family and I cannot afford this. I got paid today for 2 weeks. My check was \$117. I had very little left after paying my light bill.

Besides I travel 28 miles a day to my job. I could quit work and draw welfare and it looks like I am going to have to. I cannot work and pay \$90 a month on my house and all my other bills, plus all this for lights. I was barely making it before. What do I do now? I am trying to help myself. There is no sense in the way everything is going up. The light bill will be \$100 next month if you people don't do something. Somebody has got to start somewhere.

Thank you.

WILMA GILREATH.

HENDERSONVILLE, TENN., February 4, 1974.

JOE L. EVINS,
Rayburn Office Building,
Washington, D.C.

DEAR SIR: I am writing to express my opinion about the energy crisis.

I feel if no gas is to be sold on Sundays, stores should be closed. People who want to shop or just take a drive on Sunday just make sure their tank is full on Saturday. People who find that due to an emergency must travel have to work around traveling on Sunday.

I think going to daylight saving time was a good idea but I feel it was started too soon in the year.

I personally do not feel like turning my lights out in my home when all you see are lighted signs and billboards along the roads.

I also feel the Tennessee Valley Authority activities should be thoroughly investigated.

Also why we export some products and then discover we have a shortage is very hard to understand.

I feel I am not alone in being very concerned about the welfare of our country.

Sincerely,

Mrs. KEN MOTTS.

TULLAHOMA, TENN.,
February 1, 1974.

Hon. JOE L. EVINS,
House Office Building,
Washington, D.C.

DEAR CONGRESSMAN EVINS: On behalf of concerned citizens of Tullahoma concerning the rate increase in utilities, we would like to know exactly what can and will be done concerning this tremendous increase in electricity.

The Tennessee Valley Authority announced a 15 percent increase and people felt this was legitimate, but when the bills started coming in and the increase was from 50 percent to 150 percent more, we felt that we were certainly being taken advantage of.

We would like to know what our limitations are concerning this matter and what happens if we refuse to pay our bills. What can be done if we agree to pay what we paid last month, plus a 15 percent increase. Can they be made to accept this? Also, can we agree, if all else fails, to pay this bill in installments?

How do you propose for people on fixed income, such as widows, the elderly people and the poor people living on welfare, to pay such an increase.

We have many questions concerning this matter and we feel that we are being taken advantage of and being discriminated against to the fullest extent. Please help us in a time when we desperately need the services of your position, which you agreed to fulfill.

Sincerely yours,

HOWARD STREET.

HENDERSONVILLE, N.C., January 9, 1974.

HON. JOE L. EVINS,
House Office Building,
Washington, D.C.

DEAR MR. EVINS: After reading the enclosed clippings one wonders what gives.

Practically all public utilities are limited to 6½ percent on earnings. How come the Tennessee Valley Authority can accumulate so much surplus? Do they still come to Congress for a handout? How about their paying back some of the other taxpayers have had to put out for benefit of the Tennessee Valley Authority?

Yours truly,

F. T. LAURIOT.

JANUARY 7, 1974.

TENNESSEE VALLEY AUTHORITY HAS \$800 MILLION IN SURPLUS EARNINGS

KNOXVILLE, TENN., (AP)—The Tennessee Valley Authority has amassed more than \$800 million in surplus earnings—\$52.6 million, during the year ending June 30, 1973—according to its annual report.

The report was issued this week as electric bills throughout the Tennessee Valley Authority area were increased because of a 14-percent hike in Tennessee Valley Authority electric power rates. The governmental agency said the rate hike was necessary to meet rising expenses.

The surplus, known as "retained earnings," are held back so the Tennessee Valley Authority can maintain an appropriate ratio of financial equity to its debt, the Tennessee Valley Authority Board Chairman Aubrey Wagner said.

"To maintain the financial integrity of the system," said Wagner, "you have to plow some earnings back in."

During congressional hearings last year, the surplus margin was questioned by U.S. Representative Joe L. Evins (D-Tenn.). The Congressman noted the profit margin far exceeds that sought by privately owned electric utility companies.

"You are far from being in the depleted and depressed condition that you would make it appear," Evins said at the time. A spokesman for Evins said all aspects of the Tennessee Valley Authority's most recent rate hike will be investigated.

Wagner noted the Tennessee Valley Authority Act of 1933 authorizes the agency's three directors to establish an operating margin above routine expenses, which include production costs.

If the earnings were not retained, he said the authority might not be able to demonstrate financial stability. Without that, he suggested, it could not obtain multimillion dollar bonds it gets for expanding its power network and antipollution efforts.

"If we operate with no margin, by 1990 we would be 90 percent in debt, according to our projections," Wagner said in Nashville.

TULLAHOMA, TENN., December 22, 1973.

Re TVA power hikes.

HON. JOE L. EVINS,
Congress of The United States,
House of Representatives, Washington, D.C.

DEAR SIR: Enclosed is a copy of a petition of which I wrote on December 19, 1973, and made several copies also that day. The favorable response of people signing this petition has so impressed me that I thought it necessary to write you as soon as possible and inform you of the contents of the petition and the discontent of the people. With whatever faction is responsible for the Tennessee Valley Authority's power hikes to its customers. Virtually every person wants to express their concern and disapproval in regard to this matter.

It is interesting to note in the 1966 edition of The World Book Encyclopedia, the Tennessee Valley Authority, page 126, paragraph 2, under Electric Power: "Tennessee Valley Authority power is distributed to more than 1,500,000 consumers by more than 150 local electric power companies. Tennessee Valley Authority was designed to provide as much power as possible at the lowest rates possible. Almost all farms in the area now use electricity. Household users of Tennessee Valley Authority power pay less than half as much per kilowatt-hour as does the average consumer. Tennessee Valley Authority pay no Federal taxes, but makes payments to States and counties in place of taxes."

May I respectfully suggest, if it has not already been done, as a part of your preliminary investigation to gather information from various other power companies in regards to their kilowatt-hour hikes and compare them with TVA. It would be very interesting to know if we are still paying less than half as much per kilowatt-hour as does the average consumer. As related as facts in the World Book Encyclopedia. If not, we are certainly entitled to know why.

Thank you for the stand you have already taken in regard to this matter, and please be assured of the support of virtually all of the people in the TVA area. Copies of signatures on petitions same as the one that is enclosed or similar in nature will be forwarded at a later date.

Sincerely yours,

CHARLES J. MARTIN.

P.S.—I have forwarded letters similar to this one to Senators Howard Baker, Bill Brock, and Gov. Winfield Dunn.

Enclosure.

We the undersigned registered voters in the TVA area propose to use this as our means of protest against TVA's continued power raises. Should these raises not be in accordance with justice or fairness to its customers.

We respectfully petition the aforesaid Honorable U.S. Senators and Congressmen or other Honorable Representatives names affixed hereto, to initiate a legal and proper investigation of TVA to determine what if any influence the Office of Management and Budget has on these continued raises. Or any other faction which might influence any unjustifiable TVA power raises to its customers.

WILLIAMS, OWENS AND GRAVES,
PADUCAH, KY., January 16, 1974.

HON. JOE L. EVINS,
House of Representatives, U.S. Congress, Washington, D.C., Capitol Building,

DEAR CONGRESSMAN EVINS: I note that you are taking a stand against TVA rate increases, and I commend you for it. It is amazing to me that the Tennessee Valley Authority feels it is necessary that it have a 10 percent net when the private industry can function on a 3 percent earning basis.

Congratulations and good luck! I hope you can accomplish something against this bureau which now is taking the usual bureaucratic attitude.

Respectfully yours,

CHARLES ALLEN WILLIAMS.

NASHVILLE, TENN., January 12, 1974.

Representative JOE L. EVINS,
Member TVA Committee,
Rayburn Building
Washington, D.C.

DEAR REPRESENTATIVE EVINS: My electric bill has just come in for the lengthened month of December 5 to January 8. The kwh 4,746 recorded on this statement, for two rooms, with the 14 percent addition imposed by TVA, totaled a cost of \$69.54 gross, or \$63.41 net.

First, I do not believe that 4,746 kwh could have been the right reading of the meter; something radically wrong must have been due either to the eyesight or to the morals of the meter reader who represented the Nashville Electric Service. I have discussed this item with one of the NES women who answers the "Discuss Bills" telephones; she was courteous but by no means convincing in her explanations. And I have one other question to ask the NES "Discuss Bills" women on Monday, January 14.

Second, from the reports of other criticisms aired on the Nashville television channels, any listener would know that a very large proportion of the Nashville population has been deeply aroused by this 14 percent addition to electric rates imposed by the TVA. If you have not been flooded by letters of complaint, then thousands of Nashville electricity users are either completely inarticulate or are too disgusted for words about their excessive electric bills.

Since you are a member of the TVA Committee, I have been advised to write to you to act as a Representative of vast numbers of Nashville electricity users who do not believe that the reasons asserted by the TVA for this 14 percent rise in appropriations are justified. We are asking you, as a Representative of this section of Tennessee, to declare for us a decided protest against such an unfair addition to our electric bills.

As the middle of seven children, I was reared on a schedule of rigid economy ; and I am always extremely sparing in the use of electricity.

We Tennesseans shall all be deeply grateful to you for whatever you can do to bring the TVA to a sense of solid reason in its request for appropriations and especially in its deletion of a large part of this last 14 percent increase.

Sincerely yours,

MS. NADINE W. OVERALL.

MIDDLE TENNESSEE ELECTRIC
MEMBERSHIP CORPORATION
P.O. BOX 220 LEBANON, TENNESSEE 37087
THIS BILL IS DUE WHEN RECEIVED AND COVERS
SERVICE BILLING TO DATE OF METER READING.
FAILURE TO RECEIVE BILL WILL NOT RELEASE
CUSTOMER FROM PAYMENT OBLIGATION.

TYPE OF SERVICE	METER READING		USED	CHARGES
	PARENT	PREVIOUS		
EL	03788	03063	7250	8860
OL			167	450
TX				326

METER READ		CLASS	KW DEMAND	NET AMOUNT TO BE PAID
DATE	DAY			
JAN	07	881		9636

NO OTHER NOTICE WILL BE SENT
If unpaid 10 days after discount date service
may be discontinued without further notice

HELP!

William B. Palmer
200 Langlewood Drive
Mount Juliet, Tennessee
37122

LEXINGTON, TENN., December 31, 1973.

HON. JOE L. EVINS,
House of Representatives,
Washington, D.C.

DEAR REPRESENTATIVE EVINS: I would like to take this opportunity to protest the exorbitant rate increase by the Tennessee Valley Authority. TVA has unduly raised the rates over a period of the last 5 years, and it has reached the point of being ridiculous.

TVA state that they needed \$240,000,000 in order to make changes because of the environmental protection laws. I feel that this is not necessarily true, as the Environmental Protection Agency has stated that, on a company to company basis, they would relieve companies of the new regulations; and surely, TVA would be exempt at this time; therefore, they will not need this \$240,000,000. TVA could obtain an exemption to use high sulphur coal at their steam plant, and as you know, high sulphur coal is less expensive, and this would be an additional saving to them.

After looking at the TVA financial sheets that they sent, they have made more money in the last year than in any other prior year, and their net income is sufficient so as not to have to have a rate increase, if they made the above suggested adjustments.

It would be appreciated if you would help us in this matter, as the increase in rates will be an undue hardship on our older people that are retired and on fixed incomes. It would be appreciated if you would give this matter your immediate attention.

Yours very truly,

BOBBY JOE OSBORNE, Mayor.

GROUP CIRCULATING PETITIONS PROTESTING POWER RATE HIKES

A group of Tullahoma women is circulating petitions protesting increases reflected by January electric bills.

A statement by the group, mainly composed of industrial workers, said the signed petitions will be sent to State Rep. J. Stanley Rogers and to Rep. Joe L. Evins. It cited examples of power bills, some of which had tripled in the last month.

Among the increases cited were from \$24 to \$72, \$47 to \$90, \$40 to \$120, \$41 to \$87 and \$35 to \$69.

The petition reads:

On behalf of Concerned Citizens of Tullahoma Concerning the rate increase in utilities, we would like to know exactly what can and will be done concerning this tremendous increase in electricity.

"The Tennessee Valley Authority announced a 15 percent increase and people felt this was legitimate, but when the bills started coming in and the increase was from 50 percent to 150 percent more, we felt that we were certainly being taken advantage of.

"We would like to know what our limitations are concerning this matter and what happens if we refuse to pay our bills. What can be done if we agree to pay what we paid last month, plus a 15 percent increase. Can they be made to accept this. Also, can we agree, if all else fails, to pay this bill in installments?

How do you propose for people on fixed income, such as widows, the elderly people and the poor people living on welfare, to pay such an increase?

"We have many questions concerning this matter and we feel that we are being taken advantage of and being discriminated against to the fullest extent. Please help us in a time when we desperately need the services of your position."

"It's the little people like us," one of the women said, "that get hurt by these things. My light bill was more than my house payment and I think that's bad."

She added that several of the women had called the power system to inquire about the high bills and "they didn't get the same answer."

She said that two women living in trailers had called and one was given the weather as a reason and the other was told that her mobile home should have underpinning.

Another said that "we have to have electricity and groceries to survive and we can't afford either."

A spokesman for the group said those signing the petitions are served by the

Tullahoma Power System and none have increases on their electric bills below 15 percent.

Lee Beavers, administrative manager of the power system, said he had heard about the petitions "through the grapevine."

Mr. Beavers said he was not familiar with the petitions "but you can put this in the paper. If I were circulating these petitions I wouldn't just pick on the power system. I'd say let's get everybody and include the grocery, the newspapers, the price of women's hairdos and gasoline. Everybody should get in the act."

The legislature passed a resolution, the people are speaking. Editorials appear. One man said, "The king is dead, long live the memory of the king."

Another man wrote me and the letter is in there, he said, "I was brought up to believe that TVA was next to Jesus Christ." He said, "Now I think they are like the devil."

Mr. McBRIDE. Someplace in between those two is TVA. I do not think we have ever claimed to be like Jesus Christ and I am certain not like the devil.

Mr. EVINS. That letter is in the record.

Mr. McBRIDE. We have seen it, we have seen it, we know about it.

Mr. EVINS. He said he was brought up as a child to believe that TVA was next to heaven and the angels.

Now recent action has caused him to change his opinion.

Mr. WAGNER. We have letters like that, too. We have letters.

Mr. EVINS. No man who is sensitive to the will of the people can ignore these things.

TVA POWER RATES

Mr. WAGNER. We cannot ignore them either. I think the people—I would like to say at least once for the record, our current cost of electricity to consumers is 1½ cents a kilowatt hour, and that is among the lowest in the United States.

There are articles in the paper now that indicates rates in some areas are up to 6, 7, 11 cents a kilowatt hour. We are doing our level best as we always have to keep our power costs down, but like other people, we have to pay our bills and there is no place to get the money except from our consumers. Nothing would give us more joy than to be able to reduce our rates, I assure you. With coal prices going up—

Mr. EVINS. TVA's electric rates were raised at a rate four times greater than the average increase imposed by other utilities during the past 6 years.

We would not go over these facts except TVA keeps issuing these statements about the coal costs and they do not always include in them what other utilities have done; your rates have grown about four times faster. Your rates may be lower, you have a lower base from which to start, but your rates have increased much faster than the private utilities.

Tell the committee of the need for the 20 percent rate increase which was placed into effect by the TVA in January.

Mr. WAGNER. With the chairman's permission I would like to insert a statement and table covering that point.

Mr. EVINS. Insert the material in the record at this point.

[The information follows:]

The need for the January 1974 rate adjustment made by the Tennessee Valley Authority was foreseen in forecasts of financial operations prepared over the past year. The tabulation below shows revenues, costs, and the resulting operating margin for fiscal year 1974 both with and without the January 1974 rate adjustment. As shown by the estimates operating margin would have been less than zero without the January 1974 rate adjustment. The principal increases in costs which are projected for the fiscal year which drastically reduce the operating margin are fuel expenses and money costs. The estimated price of coal included in the forecast below is 38.8 cents per million British thermal units, up 13 percent over the 34.3 cents per million British thermal units actual price paid in fiscal year 1973. The amount of interest charges which the Tennessee Valley Authority must pay for its use of borrowed funds is also rising by large amounts each year because a high proportion of the funds for construction of power facilities must be borrowed.

(In millions of dollars)

	Estimated financial results, fiscal year 1974	
	With January 1974 rate adjustment	Without January 1974 rate adjustment
Total operating revenues.....	977.3	887.9
Operating expenses:		
Production.....	541.2	541.2
Transmission.....	20.4	20.4
Customer accounts.....	.5	.5
Demonstration of power use.....	1.2	1.2
Administrative and general.....	31.1	31.1
Payments in lieu of taxes.....	31.1	31.1
Social security taxes.....	4.8	4.8
Provision for depreciation.....	105.2	105.2
Total operating expenses.....	735.5	735.5
Operating income.....	241.8	152.4
Other income and deductions.....	77.3	77.3
Total income.....	319.1	229.7
Interest charges.....	180.2	180.2
Net income.....	138.9	49.5
Return on appropriation investment.....	63.4	63.4
Operating margin.....	75.5	-13.9

Mr. EVINS. The announcement of the increase stated that higher rates would be "beginning in January." However, it has been noted that the increase actually was applied to the December bills of many consumers. Please comment.

Mr. WAGNER. The recent upward adjustment in the Tennessee Valley Authority rates became effective on bills rendered from meter readings taken on and after January 2, 1974. Under this arrangement the higher rates began applying about 30 days prior to whatever the particular customer's January meter reading date was. For example, if a customer's January meter reading was on the 15th, the higher rate was applied to his use between his December reading of about the 15th and January 15th.

This arrangement is fairly common in the utility industry because meter reading and billing is spread over the month's working days. Thus there is no single day on which all meters are read and no single day on which a rate adjustment can be put into effect for all customers simultaneously.

Mr. EVINS. On page 163, it is noted that the average price per kilowatt-hour to a Tennessee Valley Authority resident user has increased at a faster pace since fiscal year 1968 than the average national price. Certainly interest costs, the price of coal and other costs are increasing to utilities all over the country. Explain why the Tennessee Valley Authority costs to the consumer are increasing at a faster rate than the rest of the Nation.

Mr. WAGNER. Since 1968, TVA's average price per kilowatt-hour for residential users has increased at a faster pace than the national average for a number of reasons. When the Tennessee Authority began operations in the mid-1930's the average price was somewhat higher than the national average. Through a series of developments including substantial development of the region's rather large hydropotential, extra large and lower unit cost thermal generating units, mine mouth plant location, large seasonal interchange, extra-high voltage transmission, and other innovations, Tennessee Valley Authority was able to steadily lower its rates which encouraged greater consumer electrical use. Throughout this development the Tennessee Valley Authority maintained a "barebones" cost approach. Private industry, being profit oriented, was much slower in adopting some of these large developments which result in lower rates and greater electrical use. Thus, their rates on the average tended to remain at higher levels—in some areas as much as double, or more, the Tennessee Valley Authority rates.

Because of Tennessee Valley Authority's "barebones" pricing of electricity and its willingness to operate with minimum margins, and because it had substantially exhausted the use of technological advances to further cut costs, when costs of necessities such as those for fuel, money, equipment, labor, and others began their substantial upturn, Tennessee Valley Authority had to react much sooner and in greater magnitude than the remainder of the Nation's power industry as a whole. Despite the series of upward adjustments in the Tennessee Valley Authority rates, the average cost to the valley's residential user is still well below the national average. In 1968, Tennessee Valley Authority's average rate to residential customers was about 44 percent of the national average, in 1973 it was about 56 percent.

COAL COSTS

Mr. EVINS. Coal costs have been accelerating rapidly. Do you feel that any of these cost increases are the result of a few massive companies owning such a significant portion of the Nation's energy reserves—including coal?

Mr. WAGNER. In recent years there has not been a significant number of new mines opened in areas where the major coal companies principally operate, especially in the west Kentucky and Illinois coalfields. We are informed that due to the uncertainty in regard to air quality restrictions and proposed surface mine legislation, coal companies are reluctant to make major investments in new mines at this time. In contrast, independent coal companies seem to follow a more aggressive course in mine development and coal sales since they are dependent on coal sales as their only source of income.

Mr. EVINS. What is the average price per ton of coal of your most recent contracts as opposed to the price of the past 2 years?

Mr. WAGNER. On the eastern part of our system, at our Kingston steam plant for example, we are now in the process of awarding 12 contracts at an average delivered price of \$13.21 per ton. Looking back over the past 2 years, this price is approximately \$4 per ton greater than the average award price for new coal contracts delivered to Kingston.

On the western part of our system, we are presently negotiating a coal contract that will have a base free on board mine price of \$15 per ton. Looking back over the past 2 years, this price is approximately \$8 per ton greater than the average award price for new coal contracts, free on board mine, for that area.

At the present time, even at these greatly increased prices, we are unable to purchase sufficient quantities of coal to maintain desirable stockpiles.

Mr. EVINS. It has been noted that some of the Tennessee Valley Authority's coal suppliers are failing to deliver the amount of coal scheduled under contracts and have been falling short by a half million tons per month. What is the significance of this and what steps are being taken to remedy the situation?

Mr. WAGNER. Underdeliveries on coal contracts are a serious problem to the Tennessee Valley Authority. Much of the shortage is due to factors that are or claimed to be beyond the control of coal producers. Such factors include mine fires, compliance with mine safety legislation, shortage of materials and supplies, and shortages of railcars and river barges for the transportation of coal to the Tennessee Valley Authority plants. In addition, it is likely that some producers are giving priority to shipping coal to other markets where they can obtain higher prices than they are receiving under existing Tennessee Valley Authority contracts. In this regard, Tennessee Valley Authority has recently commenced litigation against three coal contractors seeking to secure contract performance. Insofar as practical, Tennessee Valley Authority conducts field checks of contractors experiencing difficulty in meeting shipping schedules to ascertain the problem for the deficiency in deliveries and to obtain assurance that the producer is attempting to rectify the situation. In addition, Tennessee Valley Authority works closely with transportation companies in order to maximize the efficiency with which available equipment is utilized and to assure that the Tennessee Valley Authority is receiving a fair share of available equipment.

Mr. EVINS. Tell the committee the impact pending strip mine legislation would have on the cost and availability of coal to the Tennessee Valley Authority.

Mr. WAGNER. The two principal strip mine bills in Congress, S. 425 and H.R. 11500, have the potential to greatly restrict Appalachian strip mining as they contain blanket requirements to restore the surface to original contour. This has the potential of interrupting the delivery of strip coal from the mountainslopes of Appalachia of up to 6 million tons a year in Tennessee Valley Authority's market. We do not believe sufficient information is known about the mining procedures to be established by these bills to make a realistic estimate of the

amount of Appalachian strip production that would be lost permanently and the amount of time and additional equipment needed to restore other production.

ENVIRONMENTAL COSTS

Mr. EVINS. The Tennessee Valley Authority has estimated environmental costs will total \$170 million in the current year. These are primarily construction costs.

What percentage of the Tennessee Valley Authority's power operating costs are due to increased environmental requirements and what are the projections of these future expenses?

Mr. WAGNER. Environmental protection costs are difficult to assess because some investments which improve environmental factors also improve operating efficiency—cooling towers are an example of this type of investment. More often, the addition of environmental protection equipment results in loss of operating efficiency. Precipitators and scrubbers, in particular, require power for their operation, and their operation in turn reduces plant efficiency. Thus, an exact or complete cost analysis is not possible using plant accounting procedures. However, estimates have been made by TVA which indicate that environmental protection costs currently may possibly be in the order of \$30 million per year, and this amount is approximately 3 percent of current power operating costs. By fiscal year 1977 environmental protection costs may possibly be three times current costs based only on the implementation of programs which TVA has planned or underway.

Mr. EVINS. In your view, are environmental standards excessive in some cases in that the improvement to the environment, because of cooling towers or electrical precipitators, may be rather modest as compared to the cost?

Mr. WAGNER. Yes, certain environmental standards are excessive. In the area of air quality standards, the requirements for controlling SO_2 are, in many cases, more restrictive than necessary to meet the air quality goals of the Clean Air Act. Regulatory agencies should permit operators of sources considerable latitude in developing strategies for reaching the goals of the Clean Air Act, rather than insisting on specific control measures. In this way, the most cost-effective control measures can be developed.

In one respect, there are also inequities in regulations for particulate control. In cases where high efficiency electrostatic precipitators have been installed prior to the adoption of State standards and ambient particulate standards are being met, improvements in the environment from adding additional particulate control equipment would be modest compared to the cost. At three TVA plants, Gallatin, Shawnee, and Watts Bar steamplants, electrostatic precipitators were installed to meet Federal standards adopted in 1966. However, this equipment must be modified at substantial cost to meet State standards adopted in 1972. It is doubtful that the environmental improvements in such cases are commensurate with the cost.

In the area of water quality control, it is TVA's view that the benefits to be gained by the addition of auxiliary cooling facilities at its existing generating plants and some of its proposed generating plants are not commensurate with the costs. TVA's environmental review of

the Browns Ferry and Sequoyah nuclear plants indicated that cooling towers were not required to protect aquatic life; however, TVA is spending a total of \$85 million to install cooling towers at these two plants in order to comply with environmental standards.

TVA has proposed revisions to the State air pollution control regulations which would recognize intermittent control methods as a valid control strategy where it is demonstrated that ambient standards can be met. The States are considering these proposals and appear ready to accept them, at least on a trial basis. However, they are awaiting guidance from EPA.

BASIC BOND RESOLUTION

Mr. EVINS. The Basic Bond Resolution established several rate and bondholders tests which must be met to protect the bondholders investment. If TVA fails to meet one or more of these tests, would the Board feel obligated to raise power rates?

Mr. WAGNER. The Basic Bond Resolution constitutes a contract by TVA with its bondholders; thus TVA is obligated to meet the three financial tests contained in that resolution. Section 15d(f) of the TVA Act also contains and requires that TVA meet two of these financial tests. Therefore the Board must adjust or increase power rates when necessary to provide the revenue required to meet the respective financial tests contained in the TVA Act and the Basic Bond Resolution.

Mr. EVINS. At the time of any of the recent increases, did the TVA estimates indicate a failure of any of these tests? Also, in retrospect, have any of TVA's estimates been wrong in that the requirements of these tests would have been met without any of the rate increases?

Mr. WAGNER. Mr. Chairman, I believe the questions could best be answered by statements and tables we have prepared concerning these matters.

Mr. EVINS. Insert them at this point in the record.

[The information follows:]

I. The tabulation below shows the rate test margin for fiscal year 1974 with and without the January 1974 rate adjustment. Without the January 1974 adjustment TVA would fail the controlling rate test margin by about \$13 million in fiscal year 1974.

RATE TEST MARGIN (BASED ON LEVEL DEBT SERVICE)

[Millions of dollars]

	With January 1974 rate adjustment	Without January 1974 rate adjustment
Revenues.....	977.3	887.9
Requirements:		
Operation, maintenance, and administration.....	599.0	599.0
Payments in lieu of taxes.....	31.1	31.1
Level debt service.....	187.3	187.3
Payments to Treasury:		
Dividend.....	63.4	63.4
Reduction of appropriation investment.....	20.0	20.0
Total requirements.....	900.8	900.8
Margin.....	76.5	-12.9

II. Tabulation A below shows the actual rate test margin in each of the past fiscal years during which a rate adjustment was put into effect and the additional revenue received during the year from the rate increase. The difference between the two numbers is the rate test margin which would have resulted without the rate increase. Tabulation B shows a similar comparison for the operating margin and the current year revenue adjustment. While the operating margin for a single year is not a test margin, the cumulative total of operating margin for the successive 5-year periods beginning with fiscal year 1961 is the protection of bondholder test margin.

[In millions of dollars]

	Fiscal years—			
	1968	1969	1971	1973
A				
Rate test margin.....	56.1	35.9	55.8	48.9
Revenue from rate adjustment during year.....	26.8	9.5	92.0	32.8
Rate test margin with no rate adjustment.....	29.3	26.4	-36.2	16.1
B				
Operating margin.....	1.9	-2.4	53.9	52.6
Revenue from rate adjustment during year.....	26.8	9.5	92.0	32.8
Operating margin with no rate adjustment.....	-24.9	-11.9	-38.1	19.8

These tabulations show the necessity of rate adjustments in fiscal year 1968, fiscal year 1969, and fiscal year 1971 to avoid negative margins. The January 1973 rate adjustment would also have been negative without the extraordinary amount of rainfall and resulting hydro generation which was available to replace coal-fired generation. However, TVA's desired margin in each of these years, as well as the intervening years, was for a margin in the range of 8-10 percent, and the fact that substantially lower actual margins resulted is an indication of the conservative nature of the rate adjustments which were applied.

Mr. EVINS. The TVA Act gives the board a great deal of discretion in determining the operating margin. Since the 1959 amendments TVA's operating margin has averaged 4.5 percent. Last year the TVA informed this committee that an 8-10 percent margin for reinvestment was more desirable. The fiscal year 1975 budget reflects a higher margin.

Why is TVA projecting such a large operating margin for 1975?

Mr. WAGNER. Since fiscal year 1961 different financial tests have controlled as interest charges have risen and the TVA power system has been expanded. Most recently the rate test margin has controlled because of the large amount of construction work in progress. However, during the current fiscal year another financial measure beyond the tests of the TVA Act and bond resolution has approached a critical point. This measure is "interest coverage," an important financial test considered by the bond rating agencies when assigning ratings. Interest coverage is the ratio between the amount of interest that has to be paid and the earnings available for paying it. This ratio must be at least 1.5 in order for TVA bonds to be sold in certain States. Long-range studies have indicated that to maintain an adequate interest coverage and to lower the amount of borrowing to a level so that a reasonable proportion of power facilities are provided from the revenues of existing rate payers, an operating margin of approximately 15 percent should be maintained. On this basis the January 1974 rate adjustment was developed.

Mr. EVINS. TVA plans to make a \$1.1 million payment to the Bureau of Employees' Compensation related to claims for injuries sustained by TVA personnel while at work on projects. Last year an expenditure of only \$120,000 was estimated under this category.

Please discuss this significant increase.

Mr. WAGNER. The category of "Other additions and improvements" includes provision for payments to the Bureau of Employees' Compensation related to claims for injuries sustained by TVA personnel while they were working on projects now completed. The 1975 estimate exceeds the 1974 estimate by about \$1 million to provide for such payments related to the construction of the Cumberland steamplant for which the last year of construction was fiscal year 1974.

GENERAL SERVICE ACTIVITIES

Mr. EVINS. What is the current status of the Reno Bridge?

Mr. WAGNER. TVA executed an agreement on March 28, 1974, with White and Van Buren counties whereby the bridge after construction by TVA will be maintained by the counties. We expect to have drawings and specifications completed by late April, and advertisement for contract bids will be early in May. Construction should begin by June 30, 1974.

Mr. EVINS. It is noted another \$828,000 will be spent from the power budget for computing equipment. You budgeted \$850,000 for this purpose last year, but the current justification indicates TVA spent \$1,612,000, almost double the budget. Why is this equipment needed and what caused this sizable increase in expenditures?

Mr. WAGNER. The justification for this equipment is primarily based on requirements of TVA's engineering organizations in designing, constructing and operating electric power generating facilities. Some of the equipment such as an automated drafting system permits a speedup in preparation of engineering drawings. Production schedules can no longer be met by manual means alone. Other pieces of equipment provide for expanding the central 360/165 computer system to enable TVA to provide in-house services which otherwise would have to be contracted outside the agency at a much higher cost. With this equipment in-house there is not only a cost savings but a time savings as well. Engineers and other professional employees can obtain solutions to their problems in substantially reduced time and decisions can be made faster. This reduced time applies not only to design and construction decision, but to environmental decisions also.

The increase of \$762,000 for fiscal year 1974 resulted from the purchase, at a cost of \$212,000, of an automated drafting system, \$150,000 for an on-line data storage and retrieval system, and \$400,000 to initiate in-house time-sharing services currently being contracted for outside the agency.

Mr. EVINS. TVA is planning to spend \$3,237,000 for replacement of 386 trucks, trailers, and construction machines. How does this compare with previous years?

Mr. WAGNER. I would like to present this table which shows a comparison of replacement trucks, trailers, and construction machines.

[The information follows:]

Fiscal year	Replacements	Cost (obligations)
1973 actual.....	380	\$2,488,000
1974 estimate.....	370	2,423,000
1975 estimate.....	386	3,237,000

Mr. EVINS. What is TVA's total fleet of these types of vehicles?

Mr. WAGNER. The total fleet of these types of vehicles at June 30, 1973, was 3,494.

Mr. EVINS. What energy conservation efforts has TVA made in its use of fuel for vehicles?

Mr. WAGNER. A few examples are: we have marked all speedometer faces of TVA vehicles to remind drivers of the 50 m.p.h. governmental speed limit; we have established pooling procedures where possible to reduce the number of trips between specific locations; in fiscal year 1974, replacement sedans purchased were six-cylinder compacts and we plan to purchase compact sedans for our 1975 replacements; and we have established a central travel dispatch coordinator in each office or branch to coordinate all travel within that specific unit.

Mr. EVINS. Mr. Whitten.

YELLOW CREEK POWERPLANT SITE

Mr. WHITTEN. The chairman has covered many, many aspects of your operation.

There are powerplants in my area where you want land to provide a generating plant. What is the status of that operation? Have you acquired your land, made your plans?

Mr. WAGNER. The land has been one hundred percent acquired. We have 868 acres which is all we would need for a plant there. As you will recall, we had some questions about the physical suitability of this site to meet AEC's requirements in case it should be a nuclear plant we would want to locate there. We haven't made any decision on that yet.

Mr. WHITTEN. Do you need a little help to make up your mind?

Mr. WAGNER. A little time, maybe, Mr. Whitten, is all.

We have cleared the physical suitability of the site now and this site is one that would be in active consideration in our next selection for a plant.

Mr. WHITTEN. Those are pretty general terms. Do you mean you buy your land before you decide what you might do?

Mr. WAGNER. We have found in order to be able to move when we need to we have to buy a number of sites before they get used up for other purposes and we have been acquiring an inventory of sites for some time.

Mr. WHITTEN. Once you do that, you take it off the tax rolls, do you not?

Mr. WAGNER. We pay tax equivalent on it because it is power property. It is not taken off the tax rolls.

Mr. WHITTEN. I was told that this site had been selected and it was a matter of time as to when you would use it, is that correct?

Mr. WAGNER. That is correct. It is under active consideration for our next installation.

BEAR CREEK PROJECT

Mr. WHITTEN. In connection with the Bear Creek development, are you like the Corps of Engineers where you list what is approved by the Office of Management and Budget for a project, but your capability is larger than frequently shows in your budget?

Mr. WAGNER. Our budget is for \$2,945,000, and that is as it was approved by the Office of Management and Budget.

Mr. WHITTEN. What is your capability in that area?

Mr. WAGNER. We have two additional dams there which we could get underway, and we could spend another \$5 million on those dams.

Mr. WHITTEN. What is your plan if the figure is held where it is?

Mr. WAGNER. We would complete Little Bear Dam and that would be it for 1975.

ENVIRONMENTAL IMPACT STATEMENTS

Mr. WHITTEN. All of us on this committee are very interested in environmental impact statements.

I happen to be chairman of the subcommittee dealing with the Environmental Protection Agency. We tried last year to expedite the preparation of impact statements by providing funds for 14 additional high-level positions for EPA. These high-level people in Washington and the 10 regions can deal directly with you and perhaps obviate some of the problems that have arisen in times past over the preparation and review of these statements. The testimony this year is that the procedure has improved quite a bit.

Another item that came up in our hearings, we found EPA had been issuing pamphlets at the expense of the Government. EPA had sent these pamphlets all over the United States telling people how to file suit to stop these various activities. We called on them to stop any such practice.

In our hearings on the energy crisis, EPA says they have not stopped any of the projects. The answer to that is they haven't. They just sent out these notices so the people would file suit and stop them.

With that kind of a practice, how much of your activity would have been delayed by reason of lawsuits?

You mentioned Tellico Dam. Have there been other places where you have been delayed as a result of these suits which have been filed and which were promoted by the Environmental Protection Agency?

Mr. WAGNER. There was a short delay at Duck River, and there is still litigation pending there.

RATES

Mr. WHITTEN. I have spoken to my chairman about the reaction of the people to these increases in rates. I am in accord with the chairman's views about it.

Earlier in the year, we had before us the Secretary of the Treasury, Mr. Shultz, and we had his associates, and one of them was Mr. Voleker, Undersecretary of the Treasury for Monetary Affairs. I asked a question about commodities and material goods. I asked if they were going up in price or if our money was getting cheaper. He said it was the latter. In other words, it is inflation.

Whenever you are delayed to prepare an environmental impact statement or whether it is because of a lawsuit, the record shows your costs increase about 8 percent per year. I believe I am right in my memory here that with regard to two reservoirs built by the Corps of Engineers, one had increased \$26 million because of a year's delay

and one had increased \$30 million. Those were just two examples given.

Now, that is in the monetary costs.

Now, how much has this delay entered into the total capacity of energy that you might have had available? How much quicker would your energy have been available from Tellico or from these other places if you did not have this delay? Could you give an estimate as to the power that might have been made available and how much quicker it would have been available?

Mr. WAGNER. I don't have an offhand figure, but we can supply that for the record.

[The information follows:]

Estimated delay in scheduled availability of power generation attributable to requirements for environmental impact statements and other environmental considerations.

	Time delay (months)	Capacity delay (kilowatts)
Browns Ferry.....	3	3,456,000
Watts Bar.....	9	2,540,000
Belleville.....	26	2,664,000
Hartsville.....	20	5,200,000
Tellico.....	24	(¹)

¹ Generating units are not being installed in the Tellico project at this time. The Tellico Reservoir, however, will be connected to the Fort Loudoun Reservoir and will add an average of about 200,000,000 kWh annually to the Fort Loudoun power generation.

Mr. WHITTEN. We are going to have to put first things first. One of the things that disturbs me on the other committee of which I am Chairman is that it looks to me like about nine-tenths of EPA's efforts are to get rid of undesirable things while they at the same time, freeze the funds to stop pouring raw sewage into your streams. A thousand other things far more dangerous to human health are going on while EPA is trying to stop odors and loud noises.

We had Governor Rockefeller, who heads the Water Commission, before our committee the other day. He estimated the cost of cleaning up the Nation's waters would be \$2 to \$3 trillion dollars. Of course, we don't have that much money to spend.

TRANSMISSION LINE LOCATION

I'd like to mention another matter which is a small item but it is very important to the people affected. I think all of us know that frequently an issue raised in a letter from a constituent may not be big in relation to the Federal Government, but it is big to the man who wrote you.

I have received complaints about putting TVA lines across a field. It wouldn't have bothered folks back in the horse and buggy days, since with a mule and a plow, you could plow under it. Now you are using chemicals and other things essential to proper agricultural use of lands, and you put a line down the middle of a man's field, you have done great damage where he no longer can use airplanes to spray and no longer work his farm as he used to. How long has it been since you reviewed your policy of placing your lines so as to do as little damage as possible to the landowner?

Mr. WAGNER. We review that continuously.

Mr. WHITTEN. Have you had complaints about that?

Mr. WAGNER. Yes, we have.

Mr. WHITTEN. Have you made modifications in connection with it?

Mr. WAGNER. We have in some instances where we could do it but very often the problem is that if you make a change to accommodate one property owner, you worsen the situation for his neighbor and what we try to do is the best job that we can for all of them together.

Mr. WHITTEN. In connection with each of your projects, do you give attention and study to the effects on the surrounding area and the landowner?

Mr. WAGNER. Yes, sir, that is done.

Mr. WHITTEN. I wish you would take a further look at that. Recently I had occasion to take up a situation with your people, where there was a crossroads and they were set to take one of the four corners that had been developed, which would have cost you a lot more money than some undeveloped land across the road. I appreciate the fact that TVA did work it out and take the undeveloped land right across the road.

Mr. WAGNER. Whenever we can make an adjustment to accommodate the landowner, we certainly do but it is a question of balancing the needs of adjoining landowners and also a question of cost to the consumers of power, all these things must be taken into account.

Mr. EVINS. Mr. Davis.

TVA POWER DEVELOPMENT

Mr. DAVIS. Mr. Wagner, just take us down the road a little bit on what you see with respect to particularly power development in the TVA area. I believe you told us that currently about 20 percent of the total power is coming from hydro and the balance from other.

Mr. WAGNER. From coal primarily.

Mr. DAVIS. How much of an impact do you foresee with respect to nuclear power?

Mr. WAGNER. All of our new capacity under construction except Raccoon Mountain, which is a peaking plant, a storage plant, is nuclear. By the time the plants we have bought and are under construction are in operation, as I recall it, we will be about 40 percent nuclear and about 46 percent coal-burning and the balance would be 14 percent hydro.

The problems with coal in our system where we are in an area of high-sulfur coal, with the price of coal going up and supply problems that are accumulating, and the environmental problems you have with burning coal, these all impact on cost and impact on the environment and they have led us to the conclusion each time that we have added capacity that nuclear was the route to go.

You say to take you on down the road. We probably would be building nuclear capacity into at least the middle eighties and barring unforeseen circumstances, I wouldn't see us adding any coal capacity in that time. Something might come up to change that decision but generally we are going nuclear. In the longer run, we are hopeful that the breeder demonstration plant will prove satisfactory, so that ultimately we would be going away from the light water reactors into breeder reactors.

Mr. DAVIS. What kind of a timeframe are you talking about when you talk about 40 percent nuclear?

Mr. WAGNER. By 1982, 1983, something like that.

Mr. McBRIDE. I think one of the difficulties that we have in connection with this whole thing is that regardless of how many nuclear plants we get on the line, and if we can maintain our hydro and there is no question we can, we still have to burn at least 40 million tons of coal a year for the next 15 years. Notwithstanding the fact that as the nuclear comes on, the total fuel to generate the kilowatt hours should drop down a little for the simple reason that nuclear fuel is less expensive but, on the other hand, God only knows where this coal business is going to be, and we don't know today what the total impact of environmental requirements will be in order to operate these plants. Apparently if there is not some compromise made between the rules of the Environmental Protection Agency and the people who have to operate coal plants like we do, just to keep in operation is going to cost us a billion dollars. That does not include the cost of operation and maintenance of that billion dollars in capital assets.

Another thing that I think we need to remember is, when these environmental facilities go in, like the scrubber and thermal pollution control, and so on, the cost of operation and maintenance, because of these facilities that take electricity, is going to actually reduce the total of the kilowatt hours that we put on the line.

It is really a complicated picture to put it all together, but then I think we must recognize that at least for the next 15 years that there is no way we can escape burning 40 million tons of coal annually.

LIGHT WATER REACTOR TECHNOLOGY

Mr. DAVIS. When you talk about reaching 40 percent nuclear, this is entirely within the existing light water reactor technology?

Mr. WAGNER. That is correct. These are plants we already have built, have under construction or bought. The 13 units we were talking about earlier.

Mr. DAVIS. Looking down the road on hydro, have you fairly well developed now the existing sites, or is there a number of good sites available for hydro development?

Mr. WAGNER. They have been virtually all developed, Mr. Davis. We may find another site or two where we could build a pump storage facility for peaking power, but that would be all. For baseload, or for normal hydro operation, the sites have been virtually all developed. It cannot be a significant factor in our future.

Mr. DAVIS. With respect to your powerplants at existing sites, have you pretty well built them in originally to use up the available water at those sites?

Mr. WAGNER. We did, although as peaking power becomes more expensive we will probably be looking at plants to see if it might pay us to go in and add additional units. We have done that already at Wilson Dam and Wheeler Dam and it may be there are other places where we would want to do that, but it would be a small addition in any case and it would not give us added generating capacity other than for peaking. I shouldn't say it would give us none, but it would not be significant. The principal reason for doing it would be to get peaking capacity.

YELLOW CREEK PORT

Mr. DAVIS. I am somewhat confused here now with respect to the justifications on the Yellow Creek. I think it was stated in there that it was intended to meet it in late calendar 1973, but, as I read succeeding pages, it looked like we were going into additional funding on that. Can you clarify that for us?

Mr. WAGNER. There is no more funding requested for it. It has been delayed some, and the total cost estimate has increased. We have had some problems with railroad fill and that has delayed us some, but the project is well along and there are some industries who have already agreed to locate on this land which the Mississippi Port Authority has bought. The project is about wound up as far as its construction is concerned.

Mr. DAVIS. I suspect then that what you were talking about being completed in late calendar 1973 was largely construction. What we are talking about subsequently is development of facility at the port, is that correct?

Mr. WAGNER. Yes. This project, you will recall, will be operated by a local port authority and as proceeds from it come in they ultimately pay back the Federal investment in it.

FLOOD CONTROL WORK

Mr. DAVIS. In your flood control work primarily do you act in cooperation with local units in sort of preparing the groundwork, but once the actual construction begins, then you turn to the Corps of Engineers and to the Soil Conservation Service, or is the Tennessee Valley Authority to any extent in this area a construction agency in itself?

Mr. WAGNER. We are a construction agency ourselves in the projects we undertake. Our principal flood control system is in the major dams and reservoirs we built on the Tennessee River. We operate those to control the floods. The operation of one at the mouth of the river, Kentucky Dam, is controlled, in cases of flood danger on the lower Ohio and Mississippi, in accordance with instructions issued by the Corps of Engineers.

As local flood control works are built—I am thinking about a project like Oliver Springs, which this committee funded and which has been completed. There was some channel work to be done and it was about \$1 million or something like that. We did the excavation for the channel work but we tied that together with many other activities. We disposed of the spoil material from the channel excavation in areas Housing and Urban Development could use for a housing project to build housing that was flood free. The excavation was also coordinated with a State highway relocation, so that the two worked in conjunction with each other.

At the same time, I should say there are some projects in the area that the Soil Conservation Service investigates and carries out, perhaps not as extensively as in other areas, but there are some, and the Corps of Engineers has undertaken a local flood control project.

Mr. DAVIS. I think I am a little unclear here as to where your responsibility ends and begins in relation to where the responsibility

lies in other parts of the country, like the Soil Conservation project, or the Corps of Engineers project, or whatever it may be.

Mr. WAGNER. The Soil Conservation project, the type they normally build, we do not engage in. Generally their activity is about the same in the valley as it is elsewhere.

We have built some smaller dams and reservoirs. Some in Beech River, for instance, which were bigger than Soil Conservation normally builds and they were part of the total system for flood control and regional development, and we built those. Soil Conservation Service was tied in with it; they knew what was going on and it was done with their agreement, at least, but in general, dam and reservoir projects we build, channel work that is tied in with local development that is not pure and simply flood control, we undertake. A local development flood control project has pure and simply flood control; the Corps of Engineers are authorized to undertake that. They have done very little of it though since we have been in the Tennessee Valley and I think generally the flood control work outside of agricultural work is done by TVA in the Tennessee Valley.

LOCAL FLOOD DAMAGE PREVENTION

Mr. DAVIS. I suppose, Mr. Chairman, that generally in this area then what TVA does is what the Corps does in other parts of the country in this project under a certain amount that we provide a lump sum for?

Mr. EVINS. I believe their original statute is much more broad and gives them more flexibility. It says, "Whatever will upgrade the economy." That is a pretty broad phrase.

Mr. WAGNER. We have used it in many instances to spend very small amounts of money for a flood control project that generates a considerable amount of local expenditure that ties in with highway developments, local industrial development programs and that sort of thing. I have forgotten the total figure at Oliver Springs, but I believe it was about an \$8 million project and we put about \$1,000,000 in for flood control. This was a coordinating factor and the thing that got that community back on its feet again.

Mr. McBRIDE. Incidentally, in that regard, Mr. Davis, I think you would find upon investigation that the Tennessee Valley Authority has very close liaison with State and county organizations. For example, when we build one of these projects where there is a highway involved, we work with them and try to turn out a total planning job for development. Many times there will be a dozen agencies besides TVA involved in it, either counties, municipalities, the State, or regional ones like the Appalachia Regional Commission and so on and so forth.

I am personally very proud of the fact that we have cooperation of other governmental agencies from the grassroots clear up. We try our dead level best, instead of being the big shot in this, we just provide the leadership and the tools that will make it possible for the other areas of government to participate in the economic development of the area, as the chairman said.

FISHERIES AND WATERFOWL PROGRAMS

Mr. DAVIS. Referring to your fisheries and waterfowl programs, would it be fair to say that this represents a preemption in your area of what State Departments of Conservation and the Department of the Interior, through the Fish and Wildlife Service, do in other parts of the country?

Mr. WAGNER. Certainly not the State Departments of Conservation because they work with us very closely. Generally the work we do there is related to reservoir construction and operation. One thing that comes to mind now is a project where we had a small hydroelectric project that was built before TVA. We acquired it back in the thirties.

This project had outlived its useful life and there was a question of what to do with it. We found first of all we had to repair and maintain the dam. The question is what you do with an old dam. It was not feasible to remove it because it would have put a slug of silt down the river, which would have been very bad.

The area was turned into a waterfowl refuge. This was a job we undertook because it is a project we own. It was done in conjunction with a State conservation department, a game and fish commission. It will be used by them and by the people locally as an area for studying waterfowl and so on.

Mr. JENKINS. It in no way amounts to a preemption. It would perhaps more accurately be described as complementary to the programs of the States.

Mr. WAGNER. Mr. Jenkins was formerly conservation director in the State of Tennessee, so he is qualified to speak on that.

Mr. DAVIS. You don't feel your toes were being stepped on?

Mr. JENKINS. No, sir. Not in that instance.

Mr. DAVIS. Take a matter like fishery stocking for instance. Where do you get into that as contrasted to the States?

Mr. WAGNER. Stocking is done by the States now. We have promoted it from our studies of water quality. We found the water quality in the tailwaters below our dams would support trout life in areas where there was no trout fishery before. The biota on the bottom of the stream in these areas is good food for trout. Working with this information, the States have stocked waters below many of our dams.

We have also encouraged them to introduce new species into the area, such as rockfish and muskelunge. They had been in the streams in the Cumberland Plateau but not in the lakes. There is fairly good muskie fishing in Norris Lake now and maybe one of the others, Woods Lake.

Our work is generally research and promotion of new ideas, this sort of thing, and the stocking is done by the States.

WATER-MILFOIL CONTROL

Mr. DAVIS. The justifications refer to a Eurasian water milfoil problem.

Mr. WAGNER. I wish we had never heard of it. It was a plant sold originally in pet shops to put in aquariums for tropical fish, to produce oxygen for them. A boat dock operator put it beside his dock to make a hiding place for a pet bass as near as we can learn. From there it spread into the whole system and is a problem because it fouls boat

propellers, but particularly it provides breeding grounds for mosquitoes. We have tremendous expenditures to try to control it. It is virtually impossible to eliminate it, but if you get down to where the growth is only in a few spots, you can find it and treat it. It has been a real problem for us.

Mr. McBRIDE. I think what water milfoil is to the TVA, water hyacinth is to the Corps of Engineers, particularly down in Florida and that area. It is just a nuisance and that is all you can say about it. I don't know how much money we have spent in trying to control it, but it is a sizable sum.

Mr. WAGNER. We spent in the millions of dollars in that and controlling it. We have used 2-4D, pelletized, distributed from helicopters. We also learned that the best way to control it is to dry it out. We draw our reservoirs down in the wintertime and then what is exposed does not come back the next year. It dries out and it is dead, but this stuff will grow in water up to about 15 feet deep. We don't have that much drawdown in our main stream reservoirs so there is always a little band of it that remains.

SULFUR-COATED UREA

Mr. DAVIS. Your sulfur-coated urea fertilizer program, apparently you are now convinced that this is something very much worthwhile, but the fertilizer industry, as such, hasn't accepted it as such?

Mr. WAGNER. I think their research people have accepted it, but the idea is to get it out and used and introduced so they can observe results. We think this is one of the really dramatic new things in the field of fertilizers. If you would like something more on it, Dr. Nelson, who heads that operation, is here, and I would be glad to ask him to describe it in more detail.

Mr. DAVIS. What do we look for in the way of prospects? Is private industry going to move ahead with this?

Mr. NELSON. I think very definitely they will go ahead, particularly after we build our demonstration plant, the last step for which is in our budget here. After we get it out and demonstrate it, I think private industry will use it because it isn't going to be a costly process. They can build a manufacturing plant at a relatively low cost. I think it is a matter of time before they will. The ICI of England, a private industry, is now producing it mostly for the garden trade, but it hasn't reached agricultural use.

Mr. WAGNER. Our general practice has been to experiment with new fertilizers. When we get one that we are satisfied is a good one, following testing with land-grant colleges, extension and experiment stations, and so on, we work to get it more broadly introduced. In summary, we try it out and as industry accepts it we drop out completely. Many of the fertilizers we manufactured in the early days we are not making at all any more.

The industry has found this extremely helpful to them. The research facility at Muscle Shoals is recognized as the fertilizer research facility in the United States and as a matter of fact the best in the world. It is basically research, experiments, demonstration, and then withdrawal.

Mr. DAVIS. Its main advantage appears to be a controlled release of the nitrogen.

Mr. WAGNER. That is correct. Also there is becoming evident a growing need for sulfur as a plant nutrient so the sulfur you add has a purpose other than just slowing down release. It slows release down so you can make one application of nitrogen instead of three or four, and this has an added advantage in controlling stream eutrofication. There is much concern now about fertilizers getting into our streams and causing growth of organisms in the streams. If we slow down the release of nitrogen, this can help to control that and it prevents what Lewie Nelson has called "luxury consumption." If you get the nitrogen all on at one time and it is released quickly, you get lush growth that is not good.

Mr. NELSON. There is one other major advantage. At present only about 50 percent of the fertilizer nitrogen is actually recovered by the growing crop. It looks like this slow release fertilizer may increase efficiency. We have had some experiments where plants have recovered at least 20 percent more nitrogen than with normal fertilizers, so this should be a big factor in the economy generally.

FERTILIZER DEMONSTRATION

Mr. DAVIS. Who represents your best source of demonstration on that, the Agriculture Extension Service, the county agents, and people like that?

Mr. NELSON. The land-grant universities, through either the extension service or the agricultural experiment station.

Mr. WAGNER. We have had research programs with virtually all the universities in the States, including the University of Wisconsin.

Mr. DAVIS. They would be the ones who would get out to your county agent and people like that.

Mr. WAGNER. That is correct.

Dr. Nelson has made research around our coal-burning plants. You can see in the plant growth the extent of the sulfur fall. If all the sulfur is taken out of the coal, out of the stack gases, farmers are going to have to add more of it to their soil.

Mr. DAVIS. Do you have a study like that?

Mr. NELSON. There was a study made several years ago in cooperation with the U.S. Department of Agriculture and the land-grant universities in the seven or eight southern States. It shows very definitely there is an outline where the sulfur comes down.

Mr. DAVIS. Mr. Chairman, like you, there are lots of other things I could deal with, but I think Mr. Wagner's statement in itself was very concise and very informative.

I just wanted to say that Tennessee's gain was Wisconsin's loss when we lost Red Wagner in Wisconsin.

TELLICO DAM

Mr. MYERS. Chairman Wagner, being a new member of this committee. I have learned much this morning. I had previously thought most of the interest of Tennessee Valley Authority was producing electrical energy. I think most of the country thinks that. I didn't realize you were in so many other areas.

I am particularly intrigued with your navigation system you have developed on the Tennessee River and other tributaries. I congratulate you for that. I think the Nation will have to invest more funds in this field. Perhaps you have blazed a trail and set a pace here that other areas of the country must follow.

I did notice you have planned a 30-mile extension in conjunction with the Tellico Dam when it is completed.

Mr. WAGNER. That is correct.

Mr. MYERS. I don't see any benefit-to-cost ratio. Do you have one for that extension or is that necessary?

Mr. WAGNER. It is not on that extension specifically, but there is a benefit/cost ratio for the total project which would include the navigation benefits, 1.7 to 1. That is the entire project. The navigation benefit, if it was separately evaluated—I don't have the figure in mind, but it would be very substantial because one of the things that this dam and reservoir will accomplish is to carry barge transportation up to an area where there is a railroad crossing, a first-class highway, and a considerable area of level land which is scarce in East Tennessee where this project is located. It opens up an opportunity for new industries to come in, water using industries.

We have found on the Tennessee River every place we have a major railroad crossing and a barge canal and buildable land we have gotten clusters of industry. This is just as sure as anything you can predict.

Mr. McBRIDE. May I add too, this is one 30 miles of navigation that won't even require a lock because the Tellico project and the Fort Loudoun Dam are connected merely by a channel that will have no lock in it at all.

Mr. MYERS. Is the canal built?

Mr. WAGNER. There are two rivers that join. Fort Loudoun Dam is on the Tennessee River, located just above the junction of the Tennessee and Little Tennessee Rivers. The Tellico Dam is being built on the Little Tennessee just above the junction and the divide between the two will be brief, just about 800 feet.

Mr. MYERS. Does this navigation require authorization?

Mr. WAGNER. It is in our basic law. The basic TVA Act authorizes us to build such projects as are needed to develop the Tennessee River and its tributaries.

Mr. MYERS. Do you have a benefit/cost ratio?

Mr. WAGNER. We must present that to the Office of Management and Budget. I don't know whether the law requires it, but as a matter of fact if we went to the Office of Management and Budget with a project not having a favorable benefit/cost ratio, they wouldn't recommend it and I presume the committee wouldn't fund it.

FLOOD CONTROL BENEFITS

Mr. MYERS. What is the extent of flood control benefits with regard to corn and wheat and so on? Provide that for the record.

[The information requested follows:]

Although there are no specific agricultural flood control benefits claimed for the Tellico project, they are included in other water resource development projects under construction. For example, the Bear Creek project will provide significant agricultural flood control benefits.

The benefits were computed using the guidelines contained in Senate Document 97. TVA agricultural economists used prices for agricultural crops based upon analysis of available price data, including projections by USDA and subsequent interim price standards issued by the Water Resources Council. Although no flood control studies are currently under way which involve agricultural crops, the price standards issued by the Water Resources Council on February 4, 1974, will be applicable on future studies. Some of the new standards are as follows:

Water Resources Council February 1974 Price standards

<i>Crop and Unit</i>	<i>Amount</i>
Soybeans ----- bushel	\$3. 64
Corn ----- do	1. 59
Cotton ----- pound/lint	. 31
Calves ----- cwt	45. 90
Wheat ----- bushel	1. 61

Mr. MYERS. Could you also provide for the record something on how freight traffic has increased along this area of navigation, particularly with regard to the tributaries?

Mr. WAGNER. We will be glad to do that.

[The information follows:]

Traffic on the Tennessee River waterway, including tributaries, has increased as follows:

	<i>Tons</i>
1933 -----	940, 223
1943 -----	2, 869, 218
1953 -----	7, 119, 227
1963 -----	14, 432, 708
1973 preliminary -----	29, 000, 000

The 1973 total includes 647,000 tons moved on principal tributaries.

The availability of a navigable waterway benefits shippers in two ways.

It makes available an efficient method for moving freight and it creates a competitive factor which railroads recognize in their rate making for areas served by the navigable channel. Benefits from the efficiency of water movement of freight on the Tennessee River in 1972 are calculated at \$65.6 million, the cumulative total of \$680.5 million. The second type of benefit is not easily quantifiable for the simple reason that the quantities of freight moving on rail rates reduced to meet water competition are not generally available. During the last 3 fiscal years 75 such reductions were recorded for movements which potentially could use the Tennessee River navigation channel. The extent of the reductions varies but in fiscal year 1973 most of them were in the range of 15 to 45 percent.

These benefits are an important factor in attracting basic industry to the Tennessee River waterfront sites. The private industrial waterfront investment in calendar year 1973 stimulated by these factors amounted to \$329 million, the largest amount in any single year. The total of such investment is \$2.45 billion, 99 percent of which has been made since the navigation channel was completed in 1945. This investment brought with it job opportunities for 41,200 persons.

The development of basic industries along the waterfront acts as a stimulus to further development in the manufacturing sector in industries which either supply materials and parts to the basic industries or which process the output of the basic industries into semifinished or finished goods. Additionally, the growth in manufacturing jobs creates opportunities for expansion in trades and services. Our studies indicate that the relationship is at least 1:1, that is one additional job in trades and services is brought about by a new job in manufacturing.

ELECTRIC POWER

Mr. MYERS. I am particularly intrigued with the tributaries.

Mr. WAGNER. That has been a great boon to the communities served.

Mr. MYERS. Back to the power, have you been selling power during this energy crisis to other sections of the country who are in a short supply right now?

Me. WAGNER. We have interchanged some power, but we have not basically supplied on a continuing basis any power.

Mr. WATSON. We have not built power generation to supply other areas and, of course, the TVA Act prohibits us from doing that.

Mr. MYERS. You don't have surplus power today then?

Mr. WATSON. We do exchange power almost every day, one way or the other. For example, we have seasonal interchange agreements with systems to the South and West of us and we have emergency and economy interchange arrangements with surrounding utilities. In the course of maintaining adequate generating capacity for our own area, we at times have power available for short term sale to utilities which may need it.

TRANSMISSION LINES

Mr. MYERS. One last observation. In your discussion with Mr. Whitten, you were talking about construction of transmission lines. That is a real problem, I know, and it is a headache for you folks. I never could understand why you couldn't construct your high line following a road, or maybe a river, or at least section lines where at least you have a fence row instead of cutting across an 80-acre or 120-acre field. Why is that necessary? Why can't you follow straight lines?

This is a real problem, these transmission lines, whether they be wooden poles or a metal tower. Why can't you go in straight lines and avoid much of this public relations problem you have?

Mr. WAGNER. We go in straight lines as far as we can, but if you follow section lines, you have to go North and South or East and West and unfortunately you can't always do that. The places you have to serve will not permit it without excessive costs.

Mr. MYERS. Highways usually go that way. They don't zigzag around. In my area there is a section line highway. They go up to the corner and turn right and go down a mile. Why couldn't you do that?

Mr. WAGNER. In our area the highways don't follow the section lines.

Mr. MYERS. That makes it easier. You can follow the highways with your powerlines.

Mr. WATSON. Mr. Myers, there is a lot being done in this area now. There is a lot of attention being paid to where transmission lines should be built where they will cause the least environmental problems with regard to farming, and also from the standpoint of how they look.

We try to run them along ridges; we try to run them along creek-beds; we try to minimize the effect on not only the esthetics, but also the other uses of the land. Every transmission line we build now is coordinated with the planning commissions, either the county, the city, or whatever group is looking at the overall land use in the area. So things are changing quite rapidly in this field.

Mr. MYERS. I envy your accomplishment, I will say that, coming from an area that is way behind in that particular area. You are doing a good job.

Thank you.

LIQUID METAL FAST BREEDER REACTOR

Mr. EVINS. Will you provide for the record a status report of the LMFBR with regard to TVA's participation?

Mr. WAGNER. We will be glad to do that.

[The information requested follows:]

LIQUID METAL FAST BREEDER REACTOR

At the end of fiscal year 1975, it is expected that the principal subcontracts will have been signed between Westinghouse and General Electric, and Westinghouse and Rockwell International. These are the only principal contracts that have not been executed. The licensing of the project is proceeding with the anticipated submittal of the Environmental Report and Preliminary Safety Analysis Report, by the end of calendar year 1974. Assuming AEC approval, construction could begin during fiscal year 1975. The plant design is continuing on a schedule consistent with the submission of the Preliminary Safety Analysis Report before the end of 1974 and possible start of construction in 1975.

In fiscal year 1975 TVA will continue to provide senior management personnel to serve on the board of directors of the Breeder Reactor Corp. and Project Management Corp. Senior management personnel also serve on the Project Steering Committee of PMC. At the present, TVA has provided 14 of its most capable employees to work directly on the staff of PMC.

It is expected that the Environmental Report and the Preliminary Safety Analysis Report will be submitted to the AEC near the end of this calendar year. TVA has made numerous studies in support of these activities. We will produce various portions of these reports dealing with areas such as environmental monitoring, operations, and transmission facilities. TVA will carefully review both of these documents before they are submitted to the AEC for a construction permit. We expect to more fully define our plans for operations and to begin the environmental monitoring program, which will be conducted by TVA, if the construction schedule requires it. We will be performing studies on the transmission facilities for the project and will plan and provide the facilities required for construction power.

During the plant design stage, we will provide information on utility requirements associated with operations and maintenance.

Because of our experience with other plants and our knowledge of the general area where the plant will be built, there are numerous other areas where TVA is supporting the LMFBR and other project participants by supplying information covering a spectrum of topics from ecology to features of the turbine generator. The availability of this information to the project provides a firmer basis upon which to plan, design, construct, and operate the project.

TVA will be reimbursed by PMC for many of these activities. TVA will make annual contribution to the project which it is obligated by contract to make.

INTEREST COSTS

Mr. EVINS. What has been your experience with regard to interest costs in the current year and what is anticipated for fiscal year 1975?

Mr. WAGNER. Total interest charges in the current year are expected to be only slightly higher than the \$180.2 million estimate. Although interest rates have increased and remained at higher levels than expected, lower average borrowings will help offset the effect of these higher rates. At the present time short-term rates exceed 9 percent and long-term rates are approaching that level. Therefore, with new borrowings in fiscal year 1975 estimated at 7 percent the total interest charges of \$208.2 million is too low unless interest rates decline considerably.

Mr. EVINS. How successful have conservation efforts been in the TVA region?

Mr. WAGNER. Significant conservation of electric energy is apparently taking place in the TVA power service area. Use of electricity by most consumers, as reflected by TVA's monthly sales to distributors, was down sharply in December, January, and February. Contributing to the decline are the stepped-up energy conservation activities by TVA and the distributors, impacts of the energy crisis, a general eco-

conomic slowdown, higher inflation, and a very mild winter. Our best estimate at this time indicates that total energy conserved for various reasons by reductions in use below anticipated levels during December 1973–February 1974 is about 1.2 billion kWh. Such reductions are expected to drop somewhat with the end of the heating season but energy conservation will continue because of the long-term characteristics of the programs currently being pursued.

Mr. EVINS. There have been comments in the press that conservation efforts may lead to higher power rates in that decreased revenues from the sale of electricity are occurring at the time of increasing fuel costs.

Comment on this.

Mr. WAGNER. Since a reduction in the ultimate consumers' energy requirements would normally reduce the utilities' need for fuel, and thus offset part of the effects of increasing fuel costs, we would question the accuracy of the press comments cited in this question. Of course, higher fuel prices will require higher per unit rate charges even at reduced sales volumes. In addition, however, we expect that in the shortrun the need for higher rates in the face of reduced sales of energy also stems in part from the utilities' inability to continue to cover the fixed costs on the capital investments at reduced sales levels. At lower sales levels these fixed costs must be spread over fewer kilowatt-hours and if the utilities' rate structures do not adequately reflect their cost characteristics (too much reliance on high end block energy charges to cover fixed costs, for example) serious revenue deficiencies are likely to occur.

THERMAL POLLUTION

Mr. EVINS. The EPA recently announced joint EPA–TVA experiments billed as "the most extensive ever undertaken to study thermal pollution effects on aquatic life." It was announced the TVA will spend \$1 million for the construction of channels and lab facilities in connection with this experiment.

Please discuss the necessity and objectives of this research.

Do you have any other joint research efforts with the Environmental Protection Agency?

Mr. WAGNER. Various criteria for the control of surface waters have been proposed by State, interstate, and Federal pollution control and conservation agencies. These criteria are based primarily on short-term, bio-assays and limited field observations. To determine safe stream temperature and temperature increases, subjective judgments must be made. These criteria may overestimate or underestimate the degree of protection aquatic life really needs.

The purpose of this research project is to objectively determine the effects of changes in annual temperature regimes on warm water aquatic communities. It is proposed that natural warm water reservoir communities will be simulated in experimental channels. These communities will be treated with different control annual temperature regimes and the resulting effects on growth, reproduction, and mortality will be observed.

We are also working with EPA on an ammonium bisulfate process. This project is a test of the ability to remove SO_2 from powerplant stack gas with ammonia scrubbing and regeneration following scrubbing to produce concentrated sulfur dioxide. Tests are being conducted in TVA's advanced concepts pilot plant at Colbert Steam Plant.

We are also looking into control of NO_x formation in wall coal-fired utility boilers. This study will concentrate on refining combustion modification techniques for the reduction of NO_x and related pollution emissions from a TVA wall coal-fired boiler, a type which represents a significant portion of utility boilers. The long-term testing (4 to 6 months) will study intensively the effects that combustion modifications have on corrosion and boiler performance.

In addition EPA and TVA are studying atmospheric dispersion and interaction of sulfur oxides, sulfuric acid, nitrogen oxides, ozone, and particulates in stack emissions from coal-fired powerplants.

LEGISLATION

Mr. EVINS. The House passed a bill in the last 2 weeks to give TVA credit for expenditures for environmental costs. That bill is pending in the Senate. Can you give us any prospect of that being passed and what you are doing; what you can tell us?

Mr. WAGNER. Mr. Chairman, I don't claim any ability to forecast what would happen in the Senate. I can say that the bill would be helpful to us. I guess I can say that we would be glad to see it pass, but I don't know what the status is there.

Mr. EVINS. A few years ago we asked your lawyer to come up with some legislative recommendations and he said he hadn't talked with the board about any and hadn't considered any, so Congress created some of its own, trying to be helpful to TVA. We hope this legislation will be passed.

Mr. Wagner, we would give TVA credit for annual required payments into the Treasury for environmental costs and those environmental costs are going to increase as the years go along. Maybe you can transfer some of your future cost to the current situation by giving credit and show a little flexibility, with your skill and imagination.

FPC OVERVIEW

We had the Federal Power Commission here and they say they reviewed the power rates for the Southwestern Power Administration, the Southeastern Power Administration, the Bonneville Power Administration, and also the Alaska Power Administration, but they don't review the TVA rates.

By the way, I noticed recently that Tupelo, Miss., announced a rate reduction. They said they could absorb the TVA rate increase. This is the only one I have seen. Could you encourage some of the other municipalities, the cooperatives, to follow good old Tupelo?

DISTRIBUTOR RATE REDUCTIONS

Mr. WAGNER. Mr. Chairman, a number of our distributors have instituted rate decreases right along as their operations have grown and they have been able to work economies into them. They increase their rates when we increase our rates to them, of course, but there has been, along with that, quite a number of reductions.

Mr. EVINS. Who can you name for the record besides Tupelo?

Mr. WAGNER. There are a number of them and I can supply it for the record.

Mr. EVINS. I wish you would supply it for the record. We want to commend those cities.

[The information requested follows:]

The following distributors of TVA power have reduced rates during the period January 1, 1972 through April 1, 1974.

North Georgia EMC.
Tullahoma, Tenn.
Lebanon, Tenn.¹
Winchester, Tenn.
Tarrant City, Ala.
Duck River EMC.
Muscle Shoals, Ala.
Oak Ridge, Tenn.¹
Huntsville, Ala.
Lexington, Tenn.¹
Weakley County, Tenn.

Starkville, Miss.
Pickwick EC.
Holly Springs, Miss.
Northcentral Mississippi EPA.¹
Johnson City, Tenn.
McMinnville, Tenn.
Pulaski, Tenn.
Trenton, Tenn.
Tupelo, Miss.
Loudon, Tenn.
Benton County, Tenn.

Mr. WAGNER. I think we should emphasize the fact that our distributors, I think, do a very good job in holding their costs down on the whole.

Mr. EVINS. A number of distributors have contacted me and said, "You are on the right track to hold these rates down. We wish we could. We have to pass them along. We hope the TVA won't continually raise them." That is what the distributors tell me.

OFFICE BUILDING

The committee understands there is a new office building being built in Knoxville which TVA plans to lease. A few years ago, TVA built a facility in Chattanooga. Why are you leasing in this case, where you built in Chattanooga previously?

Mr. WAGNER. The facility we built in Chattanooga was a dispatching center which is really a vital element of our system. It is more like a dam or a substation than an office building. We have traditionally leased our office buildings, and that is what we are doing in this case.

NUCLEAR FUEL PAYMENTS

Mr. EVINS. On page 157, the committee notes that \$43,740,000 is budgeted for progress payments to be made to the suppliers of nuclear fuel as it is fabricated. Large expenditures have been made in the past for this program. Why could there not be some deferrals of payment or delays?

Mr. WATSON. This is a requirement in buying the fuel. If you don't make progress payments, the company manufacturing the fuel is not going to invest funds in providing the fuel.

Mr. EVINS. They couldn't give you a little longer credit when interest rates are high?

Mr. WATSON. The way they look at it, Congressman Evins, is that we can borrow money cheaper than they can, and they would charge us a return that would just increase the overall cost to us.

¹ These distributors have reduced rates twice during the period.

URANIUM MINING RIGHTS

Mr. EVINS. \$18 million is budgeted for "exploration and acquisition of additional uranium mineral and mining rights, if suitable reserves are located and available for purchase." What are the present estimated uranium reserves of TVA?

Mr. WAGNER. The current estimated total uranium reserves owned, under option, or in which TVA has rights to the production, is 15 million to 20 million pounds. These are not presently classifiable as a mining reserve, as additional work would be required to place them in this category.

Mr. EVINS. Where are you exploring for uranium?

Mr. WAGNER. TVA has contracts under which exploration is being done in Wyoming, Colorado, and New Mexico.

RESEARCH AND DEVELOPMENT

Mr. EVINS. On page 176, the committee notes TVA has budgeted \$30 million for research and development. This is roughly 3 percent of the total power revenues compared with approximately 1 percent expended by large utilities for this purpose. Please supply the committee with a statement as to why TVA places a higher price on R. & D. than the private utilities.

[The information follows:]

POWER SUPPLY AND USE

Of the \$30 million shown for R. & D., \$18.7 million, about 62 percent total, is for continuing installation of the demonstration sulfur dioxide scrubber on Widows Creek unit 8. This expenditure is listed as R. & D. because of the as-yet experimental nature of scrubbers. A number of private utilities are installing scrubbers but may not be showing them as R. & D. facilities.

TVA believes it is imperative that R. & D. in all areas of utility industry concern be pursued with increasing vigor. Through the Electric Power Research Institute, the utility industry is mounting such an R. & D. program. TVA believes even greater support will be necessary to gear the industry program to our national energy R. & D. needs.

TVA's contribution to the Electric Power Research Institute is based on the formula for utility subscription at the rate of one-tenth mill per kilowatt-hour of electricity sold by TVA and the distributors of TVA power to the ultimate consumer. The subscription in a given calendar year is based on electricity sales in the second preceding calendar year; for example, the contribution in 1974 is based on sales in 1972. The fiscal year budget figure is an allocation based on calendar year contributions.

ELECTRICAL POWER RESEARCH INSTITUTE

Mr. EVINS. The Tennessee Valley Authority will contribute about \$6 million through the Electric Power Institute. That sounds pretty high to me.

Mr. WAGNER. We will supply a statement for the record, but let me say the Electric Power Research Institute is a new organization which has just been formed and we helped to form it, and Mr. Watson is now chairman of its board.

It is an instance where the electric utilities are pooling their research funds so that we don't all spend money doing the same thing and it is in the interests of all consumers of the country, including ours.

Mr. EVINS. I have a letter here from the officials of White County, Tenn., in which they say they have been in recent conference with the Tennessee Valley Authority about a plan for a municipal water supply. They haven't been able to get the Corps of Engineers or the Soil Conservation Service to be of any assistance to the community. Can you and will you be of some assistance to White County in this problem?

Mr. WAGNER. Mr. Chairman, we sent a letter to them in response to their request just 2 or 3 days ago and we said we will be able to assist them under section 22 of the Tennessee Valley Authority Act in a demonstration program. We will first have to make an environmental assessment of the project, but we hope we can help them with this.

Mr. EVINS. I commend you for that. If you can do this, you can make the assessment within available funds?

Mr. WAGNER. Yes, sir.

Mr. EVINS. You can supply us with an estimate of your needs as time progresses.

Mr. WAGNER. We can do that.

PAYMENTS IN LIEU OF TAXES

Mr. MYERS. With regard to payments in lieu of taxes on a tract of land you purchased, on every site that you have built a plant or have an operation, do you continue to make payments in lieu of taxes to local government?

Mr. WAGNER. Let me explain it briefly and if I make mistakes I would like to ask our General Counsel to straighten me out, but in general we pay 5 percent of our gross revenues from the sale of power in lieu of taxes to State and local governments. Five percent of our sale excluding sales to the Federal Government. Then we pay directly to the counties concerned the amount of taxes that were paid on property at the time we bought it. The balance of the funds—

Mr. MYERS. Every year as long as you operate in that county?

Mr. WAGNER. That is right. The balance of the funds are then divided among the States in which we sell power or have generating facilities, or powerplants—power land would be included as powerplant—and it is divided half in accordance with power sales in that State and half in accordance with the amount of investment we have.

Mr. MYERS. How do you determine your payments into the Treasury?

Mr. EVINS. Put in the record page 181, payments into the Treasury and, Mr. Chairman, review for the record briefly payments into the Treasury and how much you are paying annually.

[The information follows:]

PAYMENTS TO THE TREASURY

Payments to the Treasury for fiscal year 1975 are estimated at \$90,020,000. This will bring total cumulative payments from TVA to the Treasury to \$1,273,187,611 of which \$1,231,541,137 is from power proceeds and \$41,646,474 from nonpower proceeds. Of the payments from power proceeds, \$65,072,500 represents retirement of bonds issued prior to 1942, \$410,059,019 represents reduction of the appropriation investment in power facilities, and \$756,409,618 represents a return on that investment in the nature of dividends.

PAYMENTS FROM POWER PROCEEDS

Prior to August 6, 1959, payments to the Treasury from power proceeds were made pursuant to Section 26 of the TVA Act and Title II of the Government

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

As amended on August 6, 1959, the Tennessee Valley Authority Act provides for payments, beginning in fiscal year 1961, of stipulated minimum annual amounts as reductions of the appropriation investment in TVA power facilities until a total of \$1,000,000,000, in addition to previous payments, shall have been repaid. The amended act also provides for payments to the Treasury of a return on the unrepaid 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 through fiscal year 1975 under the provisions of the amended TVA Act total \$981,409,618.

Mr. WAGNER. At the time TVA was authorized to sell revenue bonds to finance future capacity growth, there had been appropriated for power plant about \$1,200 million which had not been repaid yet. We had made some repayments, but we had not repaid the \$1,200 million. The law, as it was passed in 1959, provided we should repay \$1 billion of that at specified rates: \$10 million for 5 years, then \$15 million for another 5 years, and after that \$20 million a year until \$1 billion had been repaid. In addition to that we pay into the Treasury each year a dividend on the unpaid balance which is calculated at the average cost of money to the Federal Government upon its total marketable obligations at the end of the preceding fiscal year.

Because of that, on page 182, you will see a listing of the amounts we have repaid each year.

The first column, total payment, shows we paid last year \$73,-784,451. This year it will be \$83 million and some odd dollars, and we estimate in 1975 it will be \$90 million, at which time we would have paid a total of \$981 million into the Treasury.

This relates to appropriations that had been made in the past and it has nothing to do with our local tax equivalent payment.

Mr. EVINS. They are required by law to pay \$1 billion into the Treasury plus interests payments. \$90 million is the estimated payment to the Treasury for fiscal year 1975.

In addition they also pay in-lieu-of taxes to the cities and counties, so TVA is a pretty efficient operating organization. They have done a great job over the years. They were created with a low-cost yardstick image along with REA to serve the Nation, but they have lost this low yardstick image in the last few years. This is the only thing we are complaining about. We are commending them on navigation, flood control, the attraction of new industry, agriculture, but they are losing out in the low-cost yardstick image. They are still paying into the Treasury but they are raising the rates to the people. I have a pile of letters 8 inches thick complaining of these increases.

Mr. WAGNER. There isn't a section in the country that wouldn't be glad to get their electricity for a cent and a half a kilowatt hour.

Mr. EVINS. We will insert the justification material at this point. The committee is adjourned.

[The justifications follow:]

TENNESSEE VALLEY AUTHORITY

BUDGET PROGRAM

JUSTIFICATION OF PROGRAMS AND ESTIMATES

FOR THE

FISCAL YEAR ENDING JUNE 30, 1975

SUBMITTED TO THE CONGRESS

JANUARY 1974

CONTENTS

<u>Page</u>		<u>Page</u>
1	WATER RESOURCES DEVELOPMENT (CAPITAL OUTLAY)	PRELIMINARY SURVEYS AND ENGINEERING . 49
2	DUCK RIVER PROJECT	MULTIPURPOSE RESERVOIR OPERATIONS (Schedule B-1)
10	BEAR CREEK MULTIPURPOSE WATER CONTROL SYSTEM	61
15	TELLICO DAM AND RESERVOIR	62
19	ADDITIONS AND IMPROVEMENTS AT MULTIPURPOSE DAMS	69
21	NAVIGATION FACILITIES	73
21	Railway Bridge Alterations, Decatur, Alabama	74
23	Yellow Creek Port Project	77
25	Additions and Improvements at Navigation Facilities	79
26	FLOOD CONTROL FACILITIES	80
27	RECREATION FACILITIES	81
28	INVESTIGATIONS FOR FUTURE FACILITIES ..	83
29	WATER RESOURCES DEVELOPMENT (OPERATING EXPENSES)	LAND BETWEEN THE LAKES
29	NAVIGATION OPERATIONS	CAPITAL OUTLAY
34	FLOOD CONTROL OPERATIONS	OPERATING EXPENSES
38	REGIONAL WATER QUALITY MANAGEMENT ..	FERTILIZER AND MUNITIONS DEVELOPMENT ... 97
41	RECREATION DEVELOPMENT	CHEMICAL FACILITIES (CAPITAL OUTLAY) ... 100
45	FISHERIES AND WATERFOWL RESOURCES DEVELOPMENT	FERTILIZER AND MUNITIONS DEVELOPMENT (OPERATING EXPENSES)
		105

CONTENTS—Continued

<u>Page</u>		<u>Page</u>	
FERTILIZER RESEARCH AND DEVELOPMENT	105	POWER SUPPLY AND USE (OPERATING EXPENSES AND INCOME)	158
FERTILIZER INTRODUCTION	112	Schedule B-3	160
POWER SUPPLY AND USE (CAPITAL OUTLAY)	121	POWER OPERATIONS	175
GENERATING CAPACITY ADDITIONS	121	BORROWINGS	176
CUMBERLAND STEAM PLANT—UNITS 1-2	125	POWER RESEARCH AND DEVELOPMENT ACTIVITIES	179
BROWNS FERRY NUCLEAR PLANT—UNITS 1-3	127	POWER INVENTORIES AND DEFERRED ITEMS	181
SEQUOYAH NUCLEAR PLANT—UNITS 1-2	130	PAYMENTS TO THE TREASURY	183
RACCOON MOUNTAIN PUMPED-STORAGE PROJECT	133	GENERAL SERVICE ACTIVITIES	183
WATTS BAR NUCLEAR PLANT—UNITS 1-2	136	RENO BRIDGE—GREAT FALLS RESERVOIR	190
BELLEFONTE NUCLEAR PLANT—UNITS 1-2	139	GENERAL FACILITIES	192
HARTSVILLE NUCLEAR PLANT—UNITS 1-4	142	VALLEY MAPPING AND REMOTE SENSING	193
NUCLEAR PLANTS 7 AND 8	144	OTHER EXPENSES	194
TRANSMISSION SYSTEM FACILITIES	145	REIMBURSABLE SERVICES	
LAND AND LAND RIGHTS	152	ADMINISTRATIVE AND GENERAL EXPENSES (Schedule B-4)	
ADDITIONS AND IMPROVEMENTS AT POWER FACILITIES	153		
NUCLEAR FUEL	157		
INVESTIGATIONS FOR FUTURE POWER FACILITIES	157		

PREFACE

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 and for providing a low-cost supply of electric power to the Tennessee Valley region; for chemical research, and the introduction of experimental fertilizers useful in agriculture; 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:

	1973 Actual	1974 Estimate	1975 Estimate
Expenditures (accrued):			
Appropriations	\$58,215,880	\$72,013,959	\$74,847,000
Power proceeds and borrowings	1,094,306,321	1,372,582,000	1,576,626,000
Nonpower proceeds	30,931,501	36,871,000	38,478,000
Total expenditures	<u>1,183,453,702</u>	<u>1,431,466,959</u>	<u>1,639,951,000</u>
Payments to the Treasury	<u>73,813,128</u>	<u>83,434,211</u>	<u>90,020,000</u>
Appropriations (budget authority)	<u>64,550,000</u>	<u>45,676,000</u>	<u>74,600,000</u>
Income (accrued):			
Power proceeds	776,937,156	991,001,000	1,152,283,000
Nonpower proceeds	32,033,929	36,368,000	38,339,000
Total income	<u>808,971,085</u>	<u>1,027,369,000</u>	<u>1,190,622,000</u>
Proceeds from borrowings	<u>400,000,000</u>	<u>420,000,000</u>	<u>480,000,000</u>

iv

Summary of Budget Financed from Appropriations
(For fiscal years ending June 30, 1973, 1974, and 1975)
Obligation Basis

Page Reference		1973 actual	1974 estimate	1975 estimate
	CAPITAL OUTLAY			
	REGIONAL DEVELOPMENT PROGRAM			
1	Water resources development			
	Multipurpose facilities			
2	Duck River project			
	Normandy dam and reservoir	\$8,906,483	\$8,494,000	\$9,388,000
	Columbia dam and reservoir	1,113,932	1,913,000	3,612,000
10	Total Duck River project	10,020,415		13,000,000
15	Bear Creek multipurpose water control system	1,431,918	3,368,000	2,945,000
	Tellico dam and reservoir	2,919,003	7,531,000	16,960,000
19	Lima Ford dam and reservoir	1,250,711		440,000
	Additions and improvements at multipurpose dams	524,414	614,000	
21	Navigation and locks			
	Railway bridge alterations at Decatur, Alabama		249,000	275,000
23	Yellow Creek Port project	3,608,151	1,199,000	
25	Additions and improvements at navigation facilities	882,422	203,000	
26	Flood control facilities	1,096,197	298,000	480,000
27	Recreation facilities	320,407	594,000	
28	Investigations for future facilities	96,336	52,000	150,000
	Total water resources development capital outlay	\$22,447,955	\$25,072,000	\$34,400,000
85	Land Between The Lakes			
	Total regional development capital outlay	1,848,112	2,497,000	2,041,000
100	FERTILIZER AND MUNITIONS DEVELOPMENT			
	Chemical facilities	24,296,067	27,569,000	36,441,000
	Total	3,155,577	4,262,000	2,959,000
183	GENERAL SERVICE ACTIVITIES			
183	Reno Bridge—Great Falls reservoir		2,200,000	300,000
	General facilities	-934,056	369,959	
	Total capital outlay	26,517,588	2,569,959	300,000
	Total		34,400,959	39,700,000
	EXPENSES			
	REGIONAL DEVELOPMENT PROGRAM			
29	Water resources development			
29	Navigation operations	1,008,143	1,057,000	1,123,000
34	Flood control operations	955,502	957,000	954,000
38	Regional water quality management	1,529,151	1,456,000	1,456,000
41	Recreation development	694,580	692,000	763,000
42	Fisheries and waterfowl resources development	483,081	553,000	590,000
49	Preliminary engineering	460,775	400,000	309,000
52	Multipurpose reservoir operations	6,203,279	7,144,000	6,481,000
	Total water resources development expenses	11,334,511	12,257,000	11,575,000

(Continued)

Summary of Budget Financed from Appropriations (Continued)
(For fiscal years ending June 30, 1973, 1974, and 1975)
Obligation Basis

Page Reference	EXPENSES (Continued)	1973 actual	1974 estimate	1975 estimate
61	General resources development			
62	Agricultural projects	1,495,181	1,650,000	1,738,000
69	Forest and wild land resources development	1,355,308	1,513,000	1,805,000
73	Minerals resources projects	274,009	275,000	275,000
74	Environmental quality projects	1,490,338	1,600,000	1,600,000
77	Developmental projects	1,530,038	1,607,000	1,665,000
79	Demonstrations in education and manpower development	803,133	801,000	801,000
80	Regional development planning	476,132	560,000	592,000
81	Townlift community improvement	723,374	735,000	747,000
83	Interagency health service demonstrations		104,000	155,000
82	Multipurpose reservoir operations		139,000	122,000
	Total general resources development expenses	124,922	7,602,000	8,322,000
90	Land Between The Lakes			
	Land Between The Lakes operations	2,097,200	2,292,000	2,322,000
	Total regional development expenses	20,644,151	22,351,000	22,219,000
105	FERTILIZER AND MUNITIONS DEVELOPMENT			
112	Fertilizer research and development	5,486,534	5,761,000	5,830,000
	Fertilizer manufacturing	7,975,433	7,025,000	6,587,000
	Total fertilizer expenses	13,462,017	12,786,000	12,426,000
190	GENERAL SERVICE ACTIVITIES			
192	Valley mapping and remote sensing	456,256	415,000	395,000
	Other expenses	51,761	145,000	160,000
	Total general service expenses	508,017	563,000	555,000
	Total expenses	34,614,185	35,700,000	35,200,000
	INVENTORIES AND PROPERTY TRANSFERS			
	GENERAL SERVICE ACTIVITIES			
	General inventories	31,009		
	Property transfers	21,140		
	Total inventories and property transfers	9,869		
	Total budget financed from appropriations	61,141,642	70,100,959	74,900,000
	FINANCING			
	Appropriations	64,550,000	45,676,000	74,600,000
	Balance brought forward	21,316,601	23,723,959	300,000
	Balance carried forward	24,224,959		
	Total financing	61,141,642		74,900,000

Summary of Budget Financed from Power Proceeds and Borrowings
(For fiscal years ending June 30, 1973, 1974, and 1975)
Accrued Expenditure Basis

Page Reference	CAPITAL OUTLAY			
	1973 actual	1974 estimate	1975 estimate	
POWER SUPPLY AND USE				
125	Cumberland Steam Plant units 1-2	\$48,761,398	\$17,876,000	-
127	Browns Ferry Nuclear Plant units 1-3	95,271,108	93,677,000	\$54,019,000
130	Shively Nuclear Plant	21,760,000	21,760,000	82,673,000
133	Raccoon Mountain pumped-storage project	33,670,761	58,234,000	4,111,000
136	Watts Bar Nuclear Plant units 1-2	29,341,645	93,879,000	195,808,000
139	Belleville Nuclear Plant units 1-2	7,614,477	22,374,000	80,040,000
142	Hartsville Nuclear Plant units 1-4	697,039	3,554,000	8,206,000
144	Nuclear plants 7 and 8	-	152,000	1,105,000
	Allen Gas Turbine Plant units 1-16	39,928	93,000	-
	Allen Gas Turbine Plant units 17-20	412,008	544,000	-
	Colbert Gas Turbine Plant units 1-6	9,648,000	11,500,000	-
145	Transmission system facilities	68,727,422	73,658,000	72,400,000
152	Land and land rights	9,648,437	19,678,000	21,695,000
153	Additions and improvements at power facilities	29,717,137	65,177,000	109,936,000
157	Nuclear fuel	29,229,596	30,213,000	43,740,000
157	Investigations for future power facilities	1,882,008	834,000	825,000
	Total power supply and use	\$477,724,709	\$577,151,000	\$711,461,000
GENERAL SERVICE ACTIVITIES				
	General facilities	4,961,156	5,751,000	3,317,000
183	Total capital outlay	482,685,865	582,902,000	714,778,000

(Continued)

Summary of Budget Financed from Power Proceeds and Borrowings (Continued)
 (For fiscal years ending June 30, 1973, 1974, and 1975)
 Accrued Expenditure Basis

Page Reference	EXPENSES	1973 actual	1974 estimate	1975 estimate
	POWER SUPPLY AND USE			
158	Power operations	573,340,413	740,341,000	802,715,000
52	Allocation of multipurpose reservoir operations	3,364,326	3,971,000	3,516,000
	Total expenses	576,704,739	744,312,000	806,235,000
	INVENTORIES AND DEFERRED ITEMS			
	POWER SUPPLY AND USE			
179	Power inventories	31,448,678	8,299,000	3,670,000
179	Deferred charges	3,397,955	3,601,000	1,913,000
179	Deferred credits	69,084	66,000	30,000
	Total inventories and deferred items	34,915,717	4,632,000	5,613,000
	Total budget financed from power proceeds and borrowings	1,094,306,321	1,322,582,000	1,526,626,000
	FINANCING			
	Balance brought forward	-26,249,833	-17,403,449	-12,406,690
	Proceeds from borrowings	400,000,000	420,000,000	480,000,000
	Current proceeds:			
	Power operations	772,593,813	988,370,000	1,150,183,000
	Sale of retired plant	664,758	1,183,000	1,375,000
	Miscellaneous receipts	3,678,585	1,448,000	725,000
	Total current proceeds	776,937,156	991,001,000	1,152,283,000
	Payments to Treasury:			
	Repayment of appropriation investment	-20,000,000	-20,000,000	-20,000,000
	Dividend (return on appropriation investment)	-53,784,451	-63,422,241	-70,000,000
	Total payments to Treasury	-73,784,451	-83,422,241	-90,000,000
	Balance carried forward	17,403,449	12,406,690	-3,250,310
	Total financing	1,094,306,321	1,322,582,000	1,526,626,000

Summary of Budget Financed from Nonpower Proceeds
(For fiscal years ending June 30, 1973, 1974, and 1975)
Accrued Expenditure Basis

EXPENSES	1973 actual	1974 estimate	1975 estimate
REGIONAL DEVELOPMENT PROGRAM			
Water resources development			
Multipurpose reservoir operations	\$325,001	\$278,000	\$258,000
General resources development			
Agricultural projects	89,665	153,000	153,000
Total regional development expenses	414,666	431,000	411,000
FERTILIZER AND MUNITIONS DEVELOPMENT			
Fertilizer introduction	20,424,357	25,934,000	30,294,000
GENERAL SERVICE ACTIVITIES			
Reimbursable services	10,092,478	10,506,000	7,773,000
Total budget financed from nonpower proceeds	30,931,501	36,871,000	38,478,000
FINANCING			
Balance brought forward:			
Continuing fund	\$1,000,000	\$1,000,000	\$1,000,000
Other	-558,243	515,508	538
Total brought forward	441,757	1,515,508	1,000,538
Current proceeds:			
Multipurpose reservoir operations	325,001	278,000	258,000
General resources development	89,665	153,000	153,000
Land Between The Lakes operations	193,762	260,000	327,000
Recreation and tourism development	19,956,870	24,500,000	29,500,000
Reimbursable services	10,092,478	10,506,000	7,773,000
Sale of retired plant and miscellaneous receipts	1,376,143	534,000	464,000
Total current proceeds	32,033,929	36,368,000	38,339,000
Payments to Treasury	-28,677	-11,970	-20,000
Balance carried forward:			
Continuing fund	-1,000,000	-1,000,000	-1,000,000
Other	-515,508	538	158,462
Total carried forward	-1,515,508	-1,000,538	-841,538
Total financing	30,931,501	36,871,000	38,478,000

WATER RESOURCES DEVELOPMENT
(CAPITAL OUTLAY)

Capital outlays for water resources development in fiscal year 1975 will for the most part be applied to continuation of work on multipurpose projects begun in prior years and for which funds have been previously appropriated. Final statements describing and assessing the environmental impacts of these continuing projects have been filed with the Council on Environmental Quality as required by NEPA and have been sent to the Public Works Subcommittees of the Appropriations Committees of both the Senate and the House, the Office of Management and Budget, and a number of other agencies. There have been no changes in the nature or scope of these projects subsequent to the preparation of the final environmental statements.

DUCK RIVER PROJECT

1973 actual	\$10,718,396
1974 estimate	10,407,000
1975 estimate	13,000,000

Location and Description

The Duck River project will control about 1,181 square miles of drainage area in Maury, Marshall, Bedford, and Coffee counties in Tennessee. The project consists of two dam and reservoir units. The Normandy dam site is about eight miles north of Tullahoma, Tennessee, on the Coffee-Bedford county line. The Columbia dam site is about two miles east of Columbia, Tennessee, in Maury County.

Benefit Cost Ratio-1.3:1

Summarized Financial Data

	<u>Normandy</u>	<u>Columbia</u>
Actual to June 30, 1973	\$10,660,000	\$2,575,000
Estimate for fiscal year 1974	8,494,000	1,913,000
Estimate for fiscal year 1975	9,388,000	3,612,000
Estimate to complete	6,458,000	45,400,000
Estimated Federal cost	<u>35,000,000</u>	<u>53,500,000</u>

Project Status and Plans for 1975

Planning for the project was completed in September 1968. The process of assessment and review of environmental impacts as required by the National Environmental Policy Act was completed with the publication of the final environmental impact statement in April 1972. Minor preliminary land acquisition work was done in 1971. In 1972, engineering and design began, land acquisition was resumed, and a construction start was made on Normandy following completion of the review of environmental impacts. Land acquisition and engineering and design continued for both projects in 1973 and construction was accelerated at Normandy. In 1974, activity at Normandy continued and construction began at Columbia. The 1975 estimate of \$13,000,000 provides for continued construction at both sites with funds applied as follows:

	Normandy	Columbia
Continuation of land acquisition	\$1,700,000	\$1,100,000
Construction of highway, bridge, and other relocations:		
continuation at Normandy; begin at Columbia	4,000,000	600,000
Continue dam and spillway construction	1,800,000	700,000
Begin miscellaneous structures and improvements		
at Normandy	900,000	
Construction plant, equipment, and inventories	-200,000	150,000
Construction supervision and services	912,000	309,000
General engineering and design	400,000	500,000
General administration	76,000	53,000
Changes in unpaid undelivered orders	-200,000	200,000
Total obligations	<u>9,388,000</u>	<u>3,612,000</u>

Purpose and Scope

The Duck River project is a multipurpose water control system for development of the Upper Duck River area in middle Tennessee. The system is a central element in a coordinated plan for the unified development and utilization of the resources in this tributary area. It will control floods in urban, agricultural, and potential industrial areas; improve the quality and quantity of water available for municipal and industrial use; create a broad range of new recreation opportunities; enhance land values; and provide more productive employment of the local labor force in construction of the project and in water-using industries it will make possible.

4-Duck

The two reservoirs will provide about 340,000 acre-feet of storage volume for flood control. Floods equal to the record flood of 1948 at Columbia, Tennessee, will be reduced to essentially a nondamaging stage. Shelbyville and Centerville, Tennessee, will also receive flood control benefits. Flood damages will be significantly reduced for almost 10,000 acres of agricultural and potential industrial land downstream from the dams and for roads and bridges in the area. The reservoir storage capacity also will assist in controlling floods along the Tennessee River downstream from Kentucky Dam and along the lower Ohio and Mississippi rivers.

The water control system will furnish a reliable source of water supply for present and future municipal and industrial requirements in the four counties of the Upper Duck River basin. The availability of raw-water for the unified water grid distribution system now being developed in these counties will be greatly improved. Storage releases will supplement streamflow so that the residual load of municipal and industrial waterborne wastes after secondary treatment will not exceed the assimilative capacity of the river.

The reservoirs will provide excellent opportunities for a variety of water-oriented recreation activities now deficient in the watershed. They will be readily accessible from several regional population centers and will be only a day's travel time from metropolitan areas of the Midwest. Both reservoirs will offer attractive boat and bank fishing, and reaches of the river immediately downstream from the dam sites could also be developed for fishing.

Approximately 18,000 acres of project land will surround the two reservoirs. The project will enhance the value of approximately 9,000 acres of this land and some 1,500 additional acres of adjoining land remaining in private ownership.

Construction of the Duck River project and its operation and maintenance will aid in economic development of the Upper Duck River area by providing additional higher paying jobs in the subemployed group. A long step toward permanent relief of the subemployment problem in the region can be provided by the creation of more jobs in industrial and related trades and services enterprises. Significant industrial growth will occur on sites located downstream from the dams, which will be benefited by an assured water supply of high quality and by increased flood protection.

Local Cooperation

Leaders in the Upper Duck River area have been working with TVA for several years to identify and correct some of the basic problems impeding economic progress. The first step was taken in 1964 with formation of a citizen organization, the Upper Duck River Development Association, made up of some 1,700 people. Next, in March 1965, the Tennessee Legislature created the Tennessee Upper Duck River Development Agency, an organization with broad legal powers and one with official recognition in the governmental structure of the area, and gave it broad responsibilities for formulating and carrying out plans

and programs for developing the resources of the area. The Tennessee State Planning Commission in 1966 designated the four Upper Duck River counties as a planning region and created the Upper Duck River Regional Planning Commission as an arm of the development effort.

Thus, three different organizations, each performing a separate but vital task, have been created to plan, guide, and support the overall economic development effort in the Upper Duck River valley. Effective coordination of effort is achieved through a deliberate overlapping of membership on the boards of directors of the three organizations and through the use of a common staff.

The five principal cities of the Upper Duck River area are already demonstrating their ability and willingness to cooperate in projects to improve the development opportunities of their region. They are participating in the construction of a water grid distribution system which, when completed, will tie the five municipal water systems with a four-county network of distribution lines to supply almost every suburban and rural community, along with a number of industrial sites. Upon completion of TVA's Duck River project, supplies to the area water distribution system will be greatly strengthened.

The local participation contract between the Upper Duck River Development Agency and TVA was executed in July 1971. Under its terms the Agency agreed to:

1. Promote the implementation of the pioneering developmental planning concept to guide and optimize future development of the area.
2. Obtain the investment of \$50,000,000 in area development projects.
3. Assist in the planning, development, and utilization of the project shorelands.
4. Repay the \$16,200,000 project costs attributed to the water supply benefits.

The five municipal water systems of the Upper Duck area subsequently executed a contract with the Agency to underwrite the \$16,200,000 obligation through additions to their rate schedules and are presently making payments into an agency managed trust fund in accordance with contract provisions.

6-Duck

Project InformationPhysical Data

	Normandy	Columbia
Drainage area, square miles	195	1,181
Reservoirs:		
Normal maximum pool elevation		
Length, miles ^a	875	630
Length of shoreline, miles ^a	17	54
Area, acres ^a	72	236
Volume, acre-feet ^a	3,230	12,600
Controlled flood storage, acre-feet	117,000	294,000
Dams:		
Type	Earthfill and concrete	Earthfill
Length, feet	2,710	2,075
Height above foundation, feet	110	105
Spillways:		
Type	Concrete oggee	Concrete chute
Length, feet	94.5 ^b	250
Gates	Radial(2)	Radial(5)
Land acquisition:		
Agricultural and rural residential lands with improvements consisting of farm buildings and residences		
Relocations and protections:		
Highways	9,300 acres	31,900 acres
Highway bridges	\$4,300,000 ^c	\$8,500,000 ^d
Utilities, cemeteries, and other structures	2,400,000(4)	5,200,000(10)
Utilities, cemeteries, and other structures	1,000,000	3,900,000
Total	7,700,000	17,600,000

a. At normal maximum pool.

b. Spillway length is included in length of dam.

c. Approximately 17 miles.

d. Approximately 36 miles.

Status of Construction

	Estimated		Completion Date
	Percent Complete		
	June 30, 1974	June 30, 1975	
NORMANDY			
Total project	50	80	June 1976
Land acquisition	60	95	July 1975
Reservoir	30	75	December 1975
Dam	65	85	January 1976
COLUMBIA			
Total project	3	10	June 1979
Land acquisition	5	15	June 1978
Reservoir	-	2	December 1978
Dam	2	10	January 1979

Summary of Construction Program

	Actual to 6-30-73	In Thousands Estimate			Total Cost
		1974	1975	To Complete	
NORMANDY					
Land acquisition	\$2,094	\$1,700	\$1,700	\$206	\$5,700
Reservoir adjustments and clearing	926	1,800	4,000	1,674	8,400
Dam and spillway	2,461	5,100	1,800	1,239	10,600
Public-use facilities and miscellaneous structures and improvements	-	-	900	2,400	3,300
Construction plant, equipment, and inventories	577	-	-200	-377	-
Construction supervision, general engineering and design, and general administration	2,785	1,511	1,388	1,316	7,000
Total expenditures	8,843	10,111	9,588	6,458	35,000
Changes in unpaid undelivered orders	1,817	-1,617	-200	-	-
Total obligations	10,660	8,494	9,388	6,458	35,000
COLUMBIA					
Land acquisition	1,002	600	1,100	10,198	12,900
Reservoir adjustments and clearing	67	100	600	19,833	20,600
Dam and spillway	-	300	700	8,200	9,200
Public-use facilities and miscellaneous structures and improvements	-	300	-	2,700	3,000
Construction plant, equipment, and inventories	-	150	150	-300	-
Construction supervision, general engineering and design, and general administration	1,320	649	862	4,969	7,800
Total expenditures	2,389	2,099	3,412	45,600	53,500
Changes in unpaid undelivered orders	186	-186	200	-200	-
Total obligations	2,575	1,913	3,612	45,400	53,500

Cost Estimate. The estimated total cost of \$88,500,000 for the Duck River project includes an increase of \$10,000,000 over the previous estimate. The increase applies to the Normandy estimate and reflects (1) land and construction price escalation, extended supervision and overheads, and other costs associated with a two-year delay in the construction schedule and (2) project scope and design changes including a change in the type of dam and spillway, changes in highway relocation plans, and foundation problems encountered during construction. Closure of the Normandy Dam has been rescheduled to January 1976. The Columbia estimate remains unchanged pending development of a revised construction schedule.

BEAR CREEK MULTIPURPOSE WATER CONTROL SYSTEM

1973 actual	\$1,431,918
1974 estimate	3,368,000
1975 estimate	2,945,000

Location and Description

Construction of the Bear Creek water control system began in 1967. This is a multipurpose project consisting of four dams—Bear Creek, Cedar Creek, Little Bear Creek, and Upper Bear Creek—and nine miles of floodway on Bear Creek. Bear Creek begins in northwestern Alabama and flows through part of northeastern Mississippi before emptying into Pickwick reservoir at Tennessee River mile 244.7.

Benefit Cost Ratio—1.2:1

Summarized Financial Data

Actual to June 30, 1973 (planning, design, and construction)	\$11,532,000
Estimate for fiscal year 1974 (design and construction)	3,368,000
Estimate for fiscal year 1975 (design and construction)	2,945,000
Estimate to complete (design and construction)	<u>24,155,000</u>
Estimated Federal cost	<u>42,000,000</u>
Estimated value of non-Federal commitments	<u>11,700,000</u>

Project Status and Plans for 1975

Bear Creek Dam was closed in March 1969, channel improvements were substantially completed in 1973, and construction of Little Bear Dam was begun in 1973. The effort in 1975 will be directed toward completion of Little Bear Dam, with application of the 1975 estimate of \$2,945,000 as follows:

Completion of reservoir adjustments and clearing, public-use facilities, general yardwork, and roadway on dam	\$900,000
Completion of spillway, sluiceway, and earthfill dam	1,500,000
Construction plant equipment and inventories	100,000
Construction supervision and services	349,000
General engineering and design	100,000
General administration	48,000
Changes in unpaid undelivered orders	-52,000
Total	<u>2,945,000</u>

Purpose and Scope

The project is designed to provide flood relief for agricultural lands and a measure of control of Bear Creek's contribution to lower Tennessee River floods. It will afford increased industrial and municipal water supplies and will provide new shoreland resources which will significantly affect future development of the Bear Creek area. With the closure of the Bear Creek unit and the completion of the floodway, substantial flood damage was averted during last spring's unusually intense rainfalls. New recreation facilities have been constructed and are receiving heavy use. The project is a key element in a cooperative comprehensive economic development program for the entire Bear Creek region, which has generated significant industrial and economic growth. Dozens of new manufacturing plants have not only provided new employment but placed a new level of demand on the region's water supply systems. To meet these demands a regional water grid system which will use the Upper Bear Creek unit as a water source was designated, funded jointly by local governments and EDA, and will be under construction soon.

The scope of state and local participation has been agreed to and includes major assistance by the state in highway relocations in the reservoir areas; local assumption of selected project responsibilities such as floodway maintenance; operation and management of shoreline lands; and commitments for long-range area development activities.

12-Bear

Project InformationPhysical Data

Channel improvements:				
Bear Creek channel—actual length improved				18 miles
Floodway, length—actual length of floodway constructed				9 miles
Reservoirs:				
Drainage area—square miles	Bear Creek	Cedar Creek	Little Bear Creek	Upper Bear Creek
Normal summer level—elevation	232	179	61	113
Area—acres	576	580	620	797
Shoreline length—miles	670	4,200	1,560	1,850
Minimum pool—elevation	39	64	38	100
	565	560	603	787
Dams (earth embankment with concrete spillway):				
Length—feet (including spillway)	1,385	3,160	2,425	1,585
Maximum height—feet (above foundation)	84	96	94	87
Land acquisition:				
Agricultural and rural residential lands with improvements consisting of farm buildings and residences				24,100 acres
Relocations and protections:				
Highways and bridges				\$650,000 ^a
Utilities, cemeteries, and other structures				2,000,000
Total				2,650,000

a. Construction of major relocations is to be performed and financed by the State of Alabama. This estimate provides for TVA participation in engineering and design for State construction of relocations and design and construction of minor tertiary road relocations.

Status of Construction

	<u>Estimated</u>		<u>Completion Date</u>
	<u>Percent Complete</u>	<u>June 30, 1975</u>	
	<u>June 30, 1974</u>		
Total project	35	45	June 1978
Land acquisition	30	30	July 1977
Reservoirs	15	20	December 1977
Dams	35	45	January 1978
Floodway	100	100	October 1973

Summary of Construction Program

	In Thousands				
	Actual to 6-30-73	Estimate			Total Cost
		1974	1975	To Complete	
Land and land acquisition	\$1,948	\$100	-	\$6,652	\$8,700
Reservoir adjustments and clearing	688	400	\$600	6,012	7,700
Dams, spillways, and sluices	2,669	1,600	1,500	7,531	13,300
Floodway	1,558	142	-	-	1,700
Other structures and improvements	652	100	300	848	1,900
Construction plant, equipment, and inventories	92	100	100	-292	-
Construction supervision and services, general engineering and design, and general administration	3,888	901	497	3,414	8,700
Total expenditures	11,495	3,343	2,997	24,165	42,000
Changes in unpaid undelivered orders	37	25	-52	-10	-
Total obligations	11,532	3,368	2,945	24,155	42,000

14- Bear

Cost Estimate. The estimated project cost of \$42,000,000 reflects an increase of \$8,000,000 over that presented in the Budget Program for fiscal year 1974. The previous cost estimate of \$34,000,000 was first reported in the Budget Program of 1971. The increase of \$8,000,000 provides for (1) land and construction price escalation, extended supervision and overheads, and other costs associated with a two-year prolongment of the construction price schedule (\$2.2 million); (2) project scope changes, including additional public-use facilities (\$1.5 million); and (3) revision of estimates for features of the three remaining dams to reflect current design and construction quantity information and experience encountered in the construction of Bear Creek Dam (\$4.3 million).

TELLICO DAM AND RESERVOIR

1973 actual	\$2,919,003
1974 estimate	7,531,000
1975 estimate	16,900,000

Location and Description

Tellico dam and reservoir, under construction since 1967, is a multipurpose water resources and regional economic development project. The Tellico dam site is in Loudon County, Tennessee, near Lenoir City, at mile 0.3 on the Little Tennessee River. Fort Loudoun Dam, on the Tennessee River, is immediately upstream of the confluence of the Tennessee and Little Tennessee rivers. The Tellico Dam will create a reservoir extending upstream approximately 33 miles and connected by means of a short canal with the Fort Loudoun reservoir. Because of this canal, the navigation and power features of the project are attained without construction of a navigation lock or powerhouse, and a valuable flexibility is achieved in TVA flood control operations.

Benefit Cost Ratio—1.7:1

Summarized Financial Data

Actual to June 30, 1973 (planning, design, and construction)	\$35,514,000
Estimate for fiscal year 1974 (design and construction)	7,531,000
Estimate for fiscal year 1975 (design and construction)	16,900,000
Estimate to complete (design and construction)	<u>9,055,000</u>
Estimated Federal cost	<u>69,000,000</u>

Project Status and Plans for 1975

The project was started in 1967, the concrete portion of the dam completed in 1969, and by the end of fiscal year 1973 land acquisition and reservoir adjustments were 80 percent and 25 percent complete, respectively. Repeated yearly funding limitations and continuing litigation have prolonged the project long beyond the contemplated and efficient construction period. The 1974 estimate of \$7,531,000 and the 1975 estimate of \$16,900,000 will provide for continuation of effort leading to closure of the dam in January 1977. Application of the 1975 estimate will be as follows:

Continuation of land acquisition	\$3,500,000
Continuation of design and construction of highway and bridge relocations	6,500,000
Continuation of railroad bridge relocation	2,300,000
Continuation of reservoir utility relocations	700,000
Beginning of reservoir rim treatment	400,000
Continuation of main earth dam	900,000
Completion of auxiliary dams	300,000
Resumption of construction of interreservoir canal	100,000
Construction supervision and services	625,000
General engineering and design	200,000
General administration	95,000
Changes in unpaid undelivered orders	1,280,000
Total	16,900,000

Purpose and Scope

The project will add 126,000 acre-feet of flood storage to the TVA system and will extend navigation to an important rail and highway crossing of the Little Tennessee River. It will add an average of about 200,000,000 kWh annually to the Fort Loudoun power generation. The project will stimulate the lagging economy of the area by providing industrial sites with access to river transportation and by providing a water and shoreline resource with great potential for recreational and homesite development. TVA estimates that the wages from the industries expected to take advantage of the improved sites, and from the expansion in related trades and services type employment, will total \$43,000,000 annually by the end of a 25-year period. After deducting alternative earnings of those likely to be employed and averaging the effects of this 25 years of growth over the life of the project, it is estimated that the annual equivalent of this increase in wage incomes will be \$3,650,000. Net proceeds from the sale of shoreline lands, as industrial and recreational uses develop, will result in a partial recovery of the Federal investment in the project.

Project InformationPhysical Data

Drainage area below Fontana Dam	1,056 square miles
Reservoir:	
Length at elevation 813 (normal maximum pool):	
Little Tennessee River	33.2 miles
Tellico River	20.0 miles
Length of shoreline at elevation 813	310 miles
Volume at elevation 813 (16,500 acres)	414,600 acre-feet
Controlled flood storage	126,000 acre-feet
Dam:	
Type	Concrete gravity nonoverflow dam and spillway and earth embankment
Length (main dam)	3,237 feet
Height above foundation (at deepest excavation)	129 feet
Spillway	Three radial gates 40- by 42-feet
Canal to Fort Loudoun reservoir	1,000 feet long by 500 feet wide
Navigation lock	Use Fort Loudoun lock
Extension of 9-foot navigable channel	30 miles (Little Tennessee River)
Power facilities (none):	
Increase in average annual energy at Fort Loudoun powerhouse	200 million kWh
Land acquisition:	
Agricultural and rural residential lands with improvements consisting of farm buildings and residences	38,000 acres
Relocations and protections:	
Highways (81 miles total—73 miles by TVA)	\$13,100,000
Highway bridges (12 total—7 by TVA)	7,400,000
Railroad (3 miles)	1,200,000
Railroad bridge (1)	2,400,000
Utilities, cemeteries, and other structures	2,200,000
Total	<u>26,300,000</u>

Status of Construction

	Estimated		Completion Date
	Percent Complete June 30, 1974	June 30, 1975	
Total project	55	75	December 1977
Land acquisition	85	95	June 1976
Reservoir	35	65	June 1977
Dam	60	75	January 1977 (closure)

Summary of Construction Program

	Actual to 6-30-73	In Thousands			Total Cost
		1974	1975	Complete	
Land acquisition	\$16,931	\$2,300	\$3,500	\$869	\$23,600
Reservoir adjustments, clearing, and rim treatment	8,572	2,300	9,900	7,128	27,900
Main dam, spillway, and auxiliary dams	4,030	1,400	1,200	1,270	7,900
Interreservoir canal, channel improvements, public-use facilities, and other structures	109	-	100	1,291	1,500
Construction plant, equipment, and inventories	809	-100	-	-709	-
Construction supervision and services, general engineering and design, and general administration	4,957	831	920	1,392	8,100
Total expenditures	35,408	6,731	15,620	11,241	69,000
Changes in unpaid undelivered orders	106	800	1,280	-2,186	-
Total obligations	35,514	7,531	16,900	9,055	69,000

Cost Estimate. The estimated total project cost of \$69,000,000 remains unchanged from that presented in the Budget Program for fiscal year 1974.

ADDITIONS AND IMPROVEMENTS AT MULTIPURPOSE DAMS

	1973 Actual	1974 Estimate	1975 Estimate
Operational facilities and equipment	\$334,249	\$423,000	\$351,000
Visitor facilities and improvements	167,304	174,000	76,000
Distribution of administrative and general expenses	22,861	17,000	13,000
Total	<u>\$524,414</u>	<u>\$614,000</u>	<u>\$440,000</u>

Operational Facilities and Equipment

This category includes replacement equipment used in operating the multipurpose system of dams and reservoirs and improvements which contribute to the operating efficiency of existing facilities.

The 1975 estimate includes \$75,000 for installation of roadway railing and to make other roadway improvements across Norris Dam; \$6,000 to install at various locations a low-voltage power supply to heat spillway gate motors to ensure their operation; \$30,000 for an automatic hydrologic data collecting system to be used to collect rainfall data; and \$116,000 for equipment such as mowers, tractors, and other equipment and small tools for maintenance of dam reservations.

The 1975 estimate also provides \$99,000 for floating bulkheads at Nickajack and Melton Hill dams to facilitate maintenance of spillway gates and assure reliable gate operations and \$25,000 for design of a floating bulkhead for use at Boone Dam.

Visitor Facilities and Improvements

Visitors to TVA's multipurpose dam reservations totaled almost 13.2 million in calendar year 1972. Five projects had over one million visitors individually, and five others had over one-half million visitors each. Many of these visitors come primarily seeking information about TVA and its programs. Others seek the enjoyment of outdoor activities such as picnicking, sunbathing, boating, and fishing which TVA reservations and reservoirs provide.

20-A&I.

Facilities installed years ago in connection with the construction of TVA's multipurpose dams are now inadequate to serve a more growing mobile population. A continuing program of additions and improvements to existing facilities is essential for safe and sanitary accommodations for the level of visitors being experienced. The 1975 estimate of \$76,000 provides for additions and improvements at Pickwick, Fort Loudoun, Douglas, and Chickamauga dams where present facilities are inadequate. Work planned includes shoreline improvements, boat launching ramps, more adequate parking, improved roads for better access, picnic tables and grills, and sanitary facilities.

NAVIGATION FACILITIES

Railway Bridge Alterations, Decatur, Alabama

1973 actual	-
1974 estimate	\$249,000
1975 estimate	275,000

Location and Description

The Southern Railway bridge across the Tennessee River at Decatur, Alabama, has long been a serious hazard, causing frequent delays and damages to both rail and river traffic. At present, tows must pass beneath a bridge span supported by two unprotected piers about 180 feet apart, a little more than half the 350 feet of horizontal clearance which TVA regards as the minimum for safe navigation. To create further difficulties, there is an offset in the sailing line. Tows must pass through two highway bridges immediately upstream. The sailing line under the railway bridge is on the south side of the river and under the highway bridges near the middle of the river.

Benefit Cost Ratio—1.6:1Summarized Financial Data

Estimate for fiscal year 1974	\$249,000
Estimate for fiscal year 1975	275,000
Estimate to complete	<u>3,576,000</u>
Estimated Federal cost	<u>4,100,000</u>
Estimated value of non-Federal commitments	<u>120,000</u>

The proposed improvement provides for replacing three spans of the existing bridge with a modern vertical lift span which will increase the horizontal clearance from about 180 feet to about 400 feet and will provide an improved sailing line more nearly in line with the two highway bridges immediately upstream.

Detailed project design is scheduled to start in fiscal year 1974 and continue in 1975 with construction to begin in 1976. The project will be completed in 1977. Benefits consist of savings in time and related operating costs by tows using the waterway, decreases in accidents, avoidance of the possible loss of life, and reduced insurance rates.

Yellow Creek Port Project

1973 actual	\$3,608,151
1974 estimate	1,199,000
1975 estimate	-

Location and Description

The Yellow Creek Port project is a public river port terminal and related industrial area on the Yellow Creek embayment of Pickwick reservoir (opposite Tennessee River mile 215.1) in the northeast corner of Mississippi.

Benefit Cost Ratio—6.1:1

Summarized Financial Data

Actual to June 30, 1973	\$5,870,000
Estimate for fiscal year 1974	1,199,000
Estimate for fiscal year 1975	-
Estimate to complete	-19,000
Estimated Federal cost	<u>7,050,000</u>
Estimated value of non-Federal commitments	<u>1,650,000</u>

Project Status

Engineering and design began in 1971 and on-site construction started in fiscal year 1972 following completion of a review of the environmental impacts. The project is scheduled for completion late in calendar year 1973.

Purpose and Scope

TVA, the State of Mississippi, and local governmental agencies have joined in a cooperative effort to make the benefits of low-cost barge transportation available to northeast Mississippi and thus to promote industrial development in the area.

Northeast Mississippi is a portion of the Tennessee Valley characterized by a low standard of living and underutilization of human and natural resources. The Yellow Creek Port will provide a river terminal for this section of Mississippi which at present does not have one on the Inland Waterway System. It will have these major impacts on the economic growth of the area: (1) water-transportation-using industries that will locate in the industrial area adjoining the project are typically high wage firms and (2) significant savings in transportation costs will be available to existing and future industries in the vicinity.

Summary of Construction Program

	Actual to 6-30-73	In Thousands		Total Cost
		1974	Estimate To Complete	
Access railroad	\$2,793	\$1,577	-	\$4,370
Terminal dock and structures	802	498	-	1,300
Construction supervision and services, engineering and design, and general administration	1,250	149	\$-19	1,380
Total expenditures	4,845	2,224	-19	7,050
Changes in unpaid undelivered orders	1,025	-1,025	-	-
Total obligations	5,870	1,199	-19	7,050

Cost Estimate. The \$7,050,000 estimate for TVA's share of the project includes an increase of \$1,050,000 over the estimate reported in the Budget Program for 1974. The increase results primarily from requirements, disclosed during construction of the access railroad, for greater quantities of earthwork, more extensive drainage structures, and higher cost for track placement. The total estimated cost of the project, including land acquisition and work to be financed by the State of Mississippi, is \$8,700,000.

Additions and Improvements at Navigation Facilities

1973 actual	\$482,422
1974 estimate	396,000
1975 estimate	203,000

Additions and improvements to the navigation system to accommodate increasing traffic barge and tow size, to correct the normal effects of aging, and to facilitate change in operating standards are necessary to maintain the safety, efficiency, and effectiveness of the navigable waterway.

The estimate of \$203,000 provides \$178,000 to design and begin construction of four mooring cells at Chickamauga lock (two upstream and two downstream) to provide tieup facilities for the increasing traffic awaiting lockage, and \$25,000 for employee compensation benefits related to injuries incurred on navigation projects completed in prior years.

FLOOD CONTROL FACILITIES

Local Flood Damage Prevention Projects

1973 actual	\$1,096,197
1974 estimate	662,000
1975 estimate	400,000

Local flood damage protection projects at Duffield, Virginia, and Oliver Springs, Tennessee, were completed in 1971. The Duffield project, described in the 1971 President's budget, provided flood control for a new industrial area which was created as part of a multicounty development program in southwest Virginia. The Oliver Springs project, first described in the 1969 President's budget, provided the flood control necessary to trigger a comprehensive community development program in a small coalfield town in eastern Tennessee. The concept of each of the projects was innovative, and the patterns of Federal, state, and local relationships involved in each were unusually extensive. Both are successful demonstrations of how a traditional Federal function such as provision of flood control works can be better integrated into comprehensive development programs.

The 1975 estimate provides a level of funding for continuing TVA assistance to local agencies in constructing the smaller flood damage prevention projects. Such projects are products of cooperative planning of Federal, state, and local agencies with private firms and local development associations. TVA's objective in these projects is to stimulate comprehensive development programs. A series of local flood damage prevention projects has been constructed in Valley towns over the past 10 years. TVA's experience with these projects strongly suggests that the normal processes for planning and funding them are too time-consuming and too inflexible. Such programs typically include a number of elements, having diverse sources of funding, and each involving its own decision-making procedures. Flexibility is needed in the decision-making procedures for the flood control element. The \$400,000 estimate provides that flexibility. The financing authority would be limited to those situations involving not more than a \$1,000,000 TVA outlay. The interagency reviews required by the Environmental Policy Act and the Intergovernmental Cooperation Act of 1968 would be secured prior to initiation of any projects selected.

RECREATION FACILITIES

1973 actual	\$320,407
1974 estimate	594,000
1975 estimate	87,000

The 1975 estimate of \$87,000 provides \$50,000 for development of a public-use area on TVA-owned land at Little Foster Falls southeast of Tracy City in Marion County, Tennessee. Little Foster Falls has been used for swimming, fishing, and viewing for many years and offers unique recreation potential for further development of its scenic beauty. Partial development of selected sites along TVA reservoirs will continue. The estimate for this work is \$37,000.

INVESTIGATIONS FOR FUTURE FACILITIES

1973 actual	\$96,336
1974 estimate	52,000
1975 estimate	150,000

Investigations for future water resources development facilities determine the scope and evaluate the economic benefits and environmental aspects of possible projects in sufficient detail for decision on whether to recommend construction and provide basic information needed for project design. The 1975 estimate includes \$50,000 to complete flood studies for Gatlinburg, Tennessee, and to initiate studies for Duffield, Virginia, and Newport, Tennessee; and \$100,000 to begin design of the South Chickamauga Creek flood control project at Chattanooga, Tennessee.

Gatlinburg, Tennessee, a resort town at the northern entrance to the Great Smoky Mountains National Park, is exposed to a unique and extreme flood problem. Not only is there the usual property damage involved, but an unusual threat exists to human safety from suddenly rising waters. A number of protection plans have been investigated, the most practicable appears to be a 6,000-foot long tunnel through Crockett Mountain to divert floodwaters around the city. Preliminary planning investigations have been coordinated closely with city officials who have agreed that the city would fund approximately one-fifth of the cost.

Phase I of a two-phase project at Duffield, Virginia, designed to bring significant economic progress to a segment of "hard core" Appalachia has been completed. The 330 acres of industrial land developed in Phase I is now anticipated to be fully utilized by 1977 and the Phase II increment of 645 acres of additional industrial land will be required. To meet this need, flood relief improvements should be extended four to five miles downstream. Channel improvement is being planned for flood relief within the context of a planning report prepared by a consultant for the Economic Development Administration.

Newport, Tennessee, is located on the Pigeon River in the foothills of the Smoky Mountains. A three-mile section of Sinking Creek, which flows through the Newport area, has developed into an industrial and tobacco warehouse area with other commercial property and is subject to frequent flooding. The feasibility of structural or other measures to provide flood relief will be investigated. If warranted, a planning report and environmental statement will be prepared in 1976.

South Chickamauga Creek flows into the Nickajack reservoir at Chattanooga, Tennessee. The Brainerd area of Chattanooga lies along the west bank of the creek and is subject to flooding. The flood relief plan consists of a levee system, stream channel improvements, and related drainage facilities. The project will provide flood relief for over 1,200 acres in this growing area of Chattanooga involving 1,500 residences, 2 schools, and 155 commercial establishments. The 1975 estimate of \$100,000 will provide for field surveys, foundation investigations, and other preliminary design work.

WATER RESOURCES DEVELOPMENT
(OPERATING EXPENSES)

NAVIGATION OPERATIONS

1973 actual	\$1,008,143
1974 estimate	1,057,000
1975 estimate	1,123,000

The nine-foot draft navigation channel from Knoxville, Tennessee, to Paducah, Kentucky, presently carries more than 28 million tons of commercial freight annually. The Corps of Engineers operates and maintains the locks and the channel. The U.S. Coast Guard maintains the channel markers. TVA operates the multipurpose system to provide full depth in the waterway at all times, plans and provides necessary navigation improvements, and provides a wide variety of technical assistance to transportation interest, state agencies, subregional planning and development agencies, and waterfront communities—all toward the end that low-cost water transportation be a highly effective tool in regional development.

The economic impact of the Tennessee River waterway and the primary waterfront industries and terminals is greater than the 40,000 jobs they provide. It extends throughout the Valley region to satellite plants located inland and using waterfront industry products as inputs or specializing in services and products required by waterfront industries.

Navigation Engineering and Investigations

	1973 Actual	1974 Estimate	1975 Estimate
Engineering investigations	\$329,865	\$348,000	\$372,000
Transportation economic studies	220,207	221,000	228,000
Cooperative development work with state and local agencies	372,354	382,000	401,000
Total	<u>922,426</u>	<u>951,000</u>	<u>1,001,000</u>

Engineering Investigations

Engineering investigations are made in order to keep the Tennessee River navigation system adequate to meet the need of modern-day transportation; to coordinate the operation and maintenance efforts of the U.S. Coast Guard, the Corps of Engineers, and TVA; to protect individual safety and the natural environment; and to promote waterway use to maximize the economic and social benefits of the Tennessee River navigation system.

A major physical problem on the waterway at present is the hazardous turn span in the Southern Railway bridge at Decatur, Alabama, described on page 21. Other problem areas of lesser immediate consequence and their remedial treatment are being studied in order to protect and strengthen the regional transportation system. The overall activity includes land-use planning, planning and making channel extensions, studying the need for additional public-use terminals, and coordinating with other agencies. Examples of these activities included in the 1975 estimate are (1) increased planning for the main lock at Pickwick Landing Dam; (2) assisting communities such as New Johnsonville, Tennessee, to plan potential public-use terminal sites; and (3) beginning an intensive study aimed at reducing the growing congestion at Kentucky lock.

TVA navigation charts are sold at the rate of nearly 40,000 copies annually. They are the only maps that show water depths of the lakes along with shoreline features. These charts are used by individuals, private industry, and local planning groups in development of transportation improvements, industrial parks, river terminals, and marinas. They are used internally in planning for navigation channels and facilities, location of navigation aids, public-use terminals, and recreational boat docks. To be most effective they must show up-to-date land and water conditions. In 1975 four charts will be revised. There are more than 200 commercial recreational boat docks that serve the general public on the 10 lakes connected by navigation locks. These lakes are the permanent base for about 30,000 recreational boats, and an additional 10,000 boats are brought to the lakes annually by trailer. Recreational boaters depend on well-marked secondary channels to reach boat docks where they can get supplies and services, find favorite fishing spots and access points where they can launch boats, picnic and camp, or enjoy a day's outing. The commercial boat docks also depend on these channels to provide them the main-lake access and customers. More than 1,200 buoys are required to mark the 260 miles of secondary channels. TVA established the secondary channel marking system and maintains it.

Transportation Economic Studies

Economic studies are undertaken to establish the benefits to be derived from improvements to the system. For example, a study concerning a proposed barge terminal was completed in fiscal year 1973. The study defined the service area and estimated the potential traffic.

The economic well-being of the region is heavily dependent on trade with other regions. Eighty-five percent of the traffic on the waterway originates or terminates in other regions. Thus the health of its transportation system, the understanding of the relationships among types of carriers, and the early assessment of the results of proposed changes are all of prime importance to the full development of the region's resources.

The changes taking place in the relative costs of using barging and other modes of transportation bring new opportunities for shippers, both in the use of existing plants and the establishment of new production facilities. Helping them to analyze their transportation options creates a continuing need for commodity rate studies. These changes also require the evaluation of the feasibility of establishing additional public-use terminals, coordinating with local planning agencies in these studies.

Cooperative Development Work with State and Local Agencies

To assure that the Tennessee River waterway renders a maximum contribution to industrial development and economic growth in the Tennessee Valley region, TVA assists state, subregional, and local development organizations to plan for and capture the development opportunities the waterway and other resources offer. For example, TVA provides development organizations with technical assistance and research services concerning the area's resources, industrial growth trends, industrial location characteristics, and identification of suitable industrial areas. Emphasis is on promising or emerging industrial opportunities for the region based on the changing industrial mix in the Southeast, new interindustry relationships, and forecasts of market growth. Working relationships are maintained with various state offices of the seven Tennessee Valley states, 39 multicounty organizations, 52 community organizations (including waterfront counties), and six other public and private development groups.

To date, 75 communities have requested specific assistance in land-use planning for industrial sites. Approximately one-half of these have already taken affirmative action ranging from buying land for industrial development to full development of industrial parks. Twenty-three of the industrial parks are now occupied by 85 firms, employing more than 15,000 people.

Other Navigation Expense

1973 actual	\$32,972
1974 estimate	49,000
1975 estimate	64,000

The 1975 estimate of \$64,000 includes \$17,000 for power furnished to the Corps of Engineers for lock operations; \$20,000 for miscellaneous engineering inspection, activities related to locks, channels, mooring cells, and other navigation facilities; and \$27,000 for unwatering and inspection of the lock at Pickwick Landing Dam.

Summary of Navigation Operations Expenses

	1973 Actual	1974 Estimate	1975 Estimate
Navigation engineering and investigations	\$922,426	\$951,000	\$1,001,000
Other navigation expense	32,972	49,000	64,000
Distribution of administrative and general expenses	52,745	57,000	58,000
Total appropriation estimate	1,008,143	1,057,000	1,123,000
Allocated from multipurpose reservoir operations	2,103,299	2,501,000	2,203,000
Total expenses before depreciation	3,111,442	3,558,000	3,326,000
Depreciation (no funding required)	2,848,366	2,860,000	2,860,000
Total expenses	5,959,808	6,418,000	6,186,000

Program and Performance

TVA's program for navigation improvement of the Tennessee River and its tributaries began in 1933 and by 1945 a dependable nine-foot channel for the full length of the Tennessee River was essentially complete. The nine-foot channel was completed in all respects in 1952. Commercially navigable channels extend up a number of tributaries, and 130 miles of these channels are used by commercial tows. Private industry has invested more than \$2.1 billion in waterfront plants, terminals, and distribution facilities. Ninety-nine percent of this investment has been made since 1945.

Tennessee River traffic volume continues to grow with movement of 28.5 million tons in calendar year 1972, a 3 percent increase over 1971 and a new tonnage record for the eleventh consecutive year.

Savings on transportation charges to shippers are estimated at \$65.6 million in calendar year 1972. This is the difference between the 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 97 percent of the transportation savings estimate.

Operation of the Tennessee River navigation channel involves TVA, the Corps of Engineers, and the Coast Guard. Total cost to the three agencies in 1972 for operation and maintenance of the waterway, including provision for depreciation, was about 13 percent of the public benefits in the form of transportation cost savings in the same year.

FLOOD CONTROL OPERATIONS

1973 actual	\$955,502
1974 estimate	955,000
1975 estimate	954,000

The TVA system of multipurpose dams and reservoirs affords a substantial degree of flood protection along the Tennessee River and its tributaries, and contributes significantly to the reduction in flood heights along the lower Ohio and Mississippi rivers. However, flooding recurs frequently along unprotected tributary streams throughout the Valley. Continual assessment and updating of current flooding and future flood damage potential is done in order to plan and operate a comprehensive effort to prevent flood damages.

Flood control operations involve (1) assessment of flood damages through the collection and analysis of flood data, (2) studies to improve the operation of the existing multipurpose dam and reservoir system during future flooding, (3) assistance to communities in planning and implementation of flood damage prevention measures, and (4) operation of local flood control facilities.

Operation of the TVA multipurpose dam and reservoir system prevented flood damage totaling approximately \$630 million from storms that occurred in December 1972; March, May, November, and December 1973; and January 1974. This includes over \$550 million at Chattanooga, Tennessee; \$56 million elsewhere along the Tennessee River and below the major storage reservoirs on the tributaries; and \$16 million along the lower Ohio and Mississippi rivers. Total damages averted on the lower Ohio and Mississippi rivers does not include those prevented by TVA system operation during the January 1974 flood. This total is more than twice the original cost of all TVA flood control facilities plus the cost to date of operating and maintaining these facilities.

System Flood Control Studies and Investigations

1973 actual	\$350,077
1974 estimate	382,000
1975 estimate	425,000

This program includes (1) collecting data on current floods, (2) engineering studies to guide current flood operations and appraise results, (3) development and dissemination of flood information, (4) review of plans which affect the

Tennessee River system submitted for approval under Section 26a of the TVA Act, (5) evaluating the hydrologic safety of TVA dams, and (6) appraisal of potential flood damages.

The 1975 estimate provides for data collection and operating studies expected in an average year. Information obtained in these studies is used in establishing logical flood damage reduction objectives in local flood studies. A major emphasis in 1975 will be to accelerate review of hydrologic safety of TVA dams and the appraisal program of potential flood damages. Initiation of a reappraisal of Chattanooga, Tennessee, last studied in 1961, is planned. The workload, particularly that of collecting data on current floods, varies from year to year depending on the number and severity of floods. Accurate flood data are necessary for evaluating the effectiveness of existing facilities and their operation and to appraise flooding problems on unprotected tributaries.

Local Flood Damage Prevention

1973 actual	\$436,510
1974 estimate	464,000
1975 estimate	472,000

Most of the towns and cities in the Valley are growing. As they expand, pressure to use floodplains increases. TVA encourages state and local governments to assume responsibility for solving local flood problems and provides them flood data and technical assistance in planning for floodplain use in developing codes and ordinances for regulating floodplain use and in promoting other measures to reduce flood losses. Local officials are helped to develop and select from alternatives the best means to meet their community's needs.

In the past 20 years, TVA has prepared comprehensive flood reports for 137 Valley communities and partial data to meet current needs have been furnished to 20 others. In recent years considerable effort has been devoted to revising past flood reports and extending them to encompass areas of future urban expansion. In 1973, over 200 requests were handled for flood information at specific sites being considered for schools, post offices, hospitals, residences, commercial buildings, industries, or other developments. TVA makes special investigations of such situations when the information is not available. The use of this information helps reduce developments at elevations subject to flooding, reduces future flood damages, and demands for future flood protection projects. Executive Order 11296 dated August 10, 1966, directs all Federal executive agencies to evaluate flood hazards to preclude uneconomic, hazardous, or unnecessary use of floodplains. TVA provides other agencies the flood information necessary to implement this Executive Order in the Tennessee River basin.

The ultimate test of the usefulness of this information is the action taken to reduce flood hazards and prevent development of potential hazards. Eighty-nine Valley communities have formally adopted floodplain regulations using TVA engineering and other technical assistance. During the current period of rapid industrial development, about 25 industrial plants per year are prevented from locating in hazardous flooding areas.

Many communities in the Tennessee Valley are developing comprehensive programs that will permit best land use. Local committees consider flood control works, floodproofing of buildings, flood forecasting, zoning, subdivision regulations, building codes, policies in controlling extension of utilities, streets, open spaces, and parks to determine the combination providing the best solution to flood problems. TVA provides them technical assistance. In many cases a satisfactory degree of flood damage prevention can be effected through local action without resort to substantial Federal capital outlay. Where facilities are needed to complete a plan, TVA may work out cost-sharing arrangements with local officials and request funds for Federal participation.

TVA also assists communities in establishing eligibility for flood insurance under the National Flood Insurance Program. In cooperation with the National Weather Service, TVA assists in establishing flash flood warning devices and locally operated flood forecasting procedures.

Operation and Maintenance of Local Flood Control Facilities

1973 actual	\$140,031
1974 estimate	77,000
1975 estimate	25,000

TVA participates in the operation and maintenance of local flood control facilities at Bristol, Tennessee-Virginia. The 1975 estimate will provide for collection of hydrologic data and for the analysis of operations.

Summary of Flood Control Operations Expenses

	1973 Actual	1974 Estimate	1975 Estimate
System flood control studies and investigations	\$350,077	\$382,000	\$425,000
Local flood damage prevention	436,510	464,000	472,000
Operation and maintenance of local flood control facilities	140,031	77,000	25,000
Distribution of administrative and general expenses	28,884	32,000	32,000
Total appropriation estimate	955,502	955,000	954,000
Allocated from multipurpose reservoir operations	2,476,517	2,934,000	2,603,000
Total expenses before depreciation and flood control improvements	3,432,019	3,889,000	3,557,000
Local flood control improvements and writeoffs ¹	357,610	-	-
Depreciation	1,313,665	1,297,000	1,297,000
Total expense of flood control operations	5,103,294	5,186,000	4,854,000

1. These are mainly charges to operating expenses of writeoffs of flood protection studies and investigations at projects which have been abandoned. Like depreciation they require no financing and are included here in the interest of completeness of reporting.

REGIONAL WATER QUALITY MANAGEMENT

1973 actual	\$1,529,151
1974 estimate	1,456,000
1975 estimate	1,355,000

TVA water quality management activities have as their objective the maintenance of surface and groundwater sufficient to permit their optimum development for

- municipal, industrial, and agricultural water supplies;
- propagation of fish and wildlife;
- water-contact recreation; and
- aesthetic satisfaction.

To achieve these objectives TVA works with state and local governments, industries, Federal agencies, and private citizens to protect and enhance the water quality of the Valley.

Funds for water quality management are allocated as follows:

	1973 Actual (Rounded)	1974 Estimate	1975 Estimate
Water quality planning	\$272,000	\$77,000	\$77,000
Water quality inventory	258,000	803,000	718,000
Pollution abatement activities	543,000	173,000	173,000
Special studies and demonstration projects	456,000	403,000	387,000
Total	<u>1,529,000</u>	<u>1,456,000</u>	<u>1,355,000</u>

TVA's regional water quality management program may be divided into four principal areas of activity. The first is water quality planning. A comprehensive report on the water quality situation throughout the Valley has been prepared to assist Valley states in preparing detailed water quality management plans for each major subbasin in the Valley and for the main stem of the Tennessee River. These basin plans are required of the states by the Federal Water Pollution Control Act Amendments of 1972. TVA assists the states by providing technical input to their plans which varies according to the needs of the individual states. When completed, each subbasin plan will (1) project domestic and industrial waste loads, stream reach by stream reach, to at least the year 2000 by 10-year increments; (2) evaluate water quality conditions, reach by reach, that would normally be expected to exist during these time periods; (3) specify degree of waste treatment required to allow for growth and yet meet state and Federal standards; (4) recommend other means of achieving acceptable water quality conditions; and (5) include a plan of implementation for securing needed pollution abatement. During 1973, considerable water quality data, hydrologic data, and direct staff assistance in determining stream assimilative capacities was provided the State of Tennessee for use in preparing basin plans for the Elk River and Duck River basins. Technical assistance was also provided Alabama in preparation of the Tennessee River basin plan for north Alabama. In 1974 and 1975 TVA assistance to the Valley states will be limited to providing water quality and hydrologic data and reviewing and commenting on draft basin plans prepared by the states.

The second element of water quality management is water quality inventory. This is an inventory of water quality conditions based on monitoring water quality, either periodically or continuously. The objective is to maintain an up-to-date inventory of water quality conditions that will adequately meet the needs of TVA, EPA, state and local governmental agencies, industries, and the general public. In 1973 a water quality monitoring network was developed that includes about 44 sampling stations at "key" locations in the Valley. This network is basically the existing temperature and dissolved oxygen monitoring network expanded to include additional water quality measures and additional stations. This activity will be fully implemented in 1974 and 1975. Detailed water quality studies were carried out in 1973 on one mainstream reservoir and one major subbasin. In 1974 and 1975 these monitoring programs will be increased in planned stages to provide additional aerial coverage and to provide significant additional parameter coverage. Assistance will continue to be given to the Environmental Protection Agency in the operation of its national monitoring system and all data obtained will be made available to Federal, state, and local agencies.

The third feature is pollution abatement activities. In the past, TVA's pollution abatement activities included (1) detailed engineering review of plans to determine adequacy of water pollution abatement measures at new installations where Section 26a permit or TVA land rights are involved; (2) biological and water quality surveys in the vicinity of existing industries, municipalities, etc., that are sources of significant pollution in the Valley; and (3) biological and water quality surveys in the vicinity of new industrial sites both before operation and after the industry has been in operation for some time. Future activities will be limited to (1) maintaining a water use and waste discharge (and potential pollutant discharge) inventory; (2) investigating fish-kills, accidental spills of oil and other hazardous materials, and pollution discharges associated with treatment plant malfunctions; and (3) special studies related to water pollution problems, e.g., the mercury problem.

During 1973, twenty fish-kills or other pollution incidents were investigated. In addition, surveillance monitoring of mercury concentrations in fish flesh, water, and sediment were continued for Chickamauga, Pickwick, and Kentucky reservoirs and the North Fork Holston River. Surveillance of the mercury problem will be continued in 1974.

Special studies and demonstration projects will be performed to support the water quality management program. Many of these studies will be done in response to problems arising in water quality management, while others are continuing efforts to solve problems of a persistent nature. The continuing investigations are: (1) field documentation of water quality and biological conditions associated with depletion of dissolved oxygen in TVA reservoirs in such a manner to facilitate a more complete understanding of reservoir water quality changes during storage; (2) computer documentation of existing ecologic models and development of improved water quality models; (3) development of methods for predicting the effects of reservoirs on water quality in tailrace streams; (4) pilot-scale studies of oxygen injection at Fort Patrick Henry Dam and the design, construction, and testing of a full-scale reaeration system at this dam; (5) continue review of possible reaeration methods at 10 other TVA dams including the design of a full-scale system for the most problematic case; and (6) perform field studies and utilize temperature monitoring data to improve methods for predicting the rate at which receiving waters will lose excess heat.

RECREATION DEVELOPMENT

1973 actual	\$694,580
1974 estimate	692,000
1975 estimate	763,000

The objective of TVA's recreation program is to identify resources of potential value for recreation and demonstrate their best alternative uses and conservation, recognizing the social nature of recreation needs. TVA activities in this field include demonstrations and cooperative projects.

TVA offers technical assistance to states, towns, communities, local development groups, and individuals in defining and undertaking their role in Valley recreation resource development. Growth in recreation demand has made it necessary for TVA also to take a more direct role in providing basic recreation opportunities. Direct TVA development remains a relatively minor part of total reservoir recreation development. Since 1969, TVA has developed 80 sites along the shorelines of 15 reservoirs. Nearly 100 public parks (including 17 state parks), over 400 public access areas, 22 state wildlife management areas, and 300 boat docks and marinas have been provided by others on TVA's reservoirs.

A comprehensive land capability analysis of reservoir shorelands will be essentially completed in fiscal year 1974. During fiscal year 1975, information from this analysis will provide a basis for recreation development assistance. New ways of expressing the values of recreation development and use will continue to be studied. Research problems of recreation travel economics will be investigated. Attention will be given to scenic and recreation rivers and trails in the Tennessee Valley.

Special Studies

Increased emphasis on recreation has generated a substantial need for information to answer questions on activity and facility preferences and needs; the market for commercial recreation developments in the Valley; and the benefits, costs, and economic impact of recreation resource development.

Specific activities for fiscal year 1975 will include:

- Economic data and technical information support for implementation of a comprehensive Valley-wide recreation plan.
- Technical assistance in recreation economics and market analysis to both TVA and outside organizations.
- Survey of recreation investment and visitation on TVA lakes.
- Development of information on recreation economics and market analyses for a boat dock and marina improvement program.
- Input to a study of a systems approach to land management.
- Participation in special studies initiated by outside organizations such as Water Resources Council and Corps of Engineers.

Recreation Planning

Recreation planning provides the basis for sound judgment in the development and utilization of the Valley's recreation resources. Activities included under this function for fiscal year 1975 will be:

- Continuation of the comprehensive Valley-wide recreation plan, especially the capability analysis for resources in nonreservoir counties.
- Additional planning and site selection for access facilities on TVA reservoir shorelines (page 27).
- Preparation of prospectus for needed commercial recreation developments identified in the comprehensive Valley-wide recreation plan.
- Additional studies on classification and use of the Valley's scenic and recreation streams.
- Initiate implementation of scenic and recreation trails program.
- Evaluation of recreation development proposals submitted to TVA.

Technical Assistance

In fiscal year 1973 TVA assistance programs reached 38 different cities and communities in the Valley; 12 separate counties; 17 Federal, state, or local agencies; and several quasipublic and development groups. This assistance ranges from furnishing basic information to preparation of site investigation, development, and program usage plans. Specific activities in technical assistance for fiscal year 1975 anticipate responding to a growing number of requests. More attention will be given to followup on implementation of plans and programs. Additional support will also be provided toward implementing the comprehensive Valley-wide recreation plan.

Maintenance of Recreation Facilities

The estimate of \$90,000 is for cyclic maintenance of TVA's facilities in the reservoir public access areas. Work involved is nonroutine such as repaving or regaveling roads and parking areas, repainting and roof replacement for sanitary facilities, and shoreline improvements. No major cyclic maintenance has been performed, except for flood damage repairs in fiscal year 1973, due to the newness of the facilities in question.

Summary of Recreation Development Expenses

	1973 Actual	1974 Estimate	1975 Estimate
Special studies	\$196,638	\$218,000	\$199,000
Recreation planning	228,970	228,000	232,000
Technical assistance	199,011	189,000	184,000
Operation and maintenance of facilities	17,216	-	90,000
Distribution of administrative and general expenses	52,745	57,000	58,000
Total appropriation estimate	694,580	692,000	763,000
Allocated from multipurpose reservoir operations	1,623,463	1,709,000	1,675,000
Total expenses before depreciation	2,318,043	2,401,000	2,438,000
Depreciation	149,331	156,000	156,000
Total expense of recreation development	2,467,374	2,557,000	2,594,000

FISHERIES AND WATERFOWL RESOURCES DEVELOPMENT

1973 actual	\$483,081
1974 estimate	553,000
1975 estimate	590,000

There are 639,000 acres of reservoir, 9,600 miles of streams, and many small lakes and ponds in the Tennessee Valley. The complex biological system of fishes, waterfowl, water-oriented mammals, and other kinds of aquatic life dependent on these waters serves the people of the Valley in many ways. Some are important to the economy of the region, some offer significant opportunities for leisure time, and some are a source of food. Each species contributes to a healthy, balanced aquatic biosystem. TVA has aided in the increase and improved quality of the region's fisheries and waterfowl resources base. Maintenance of the existing resource and its expansion and improvement require research, informed development and management, and promotion of good conservation practices. Increasing pressures on fisheries and waterfowl resources accompany the growing demands of an urban industrial society on the region's lands and waters. TVA's objective is to aid in the effective management, protection, and use of lakes and streams and reservoir lands to assure that the fisheries and waterfowl resource makes its optimum contribution to the region's economic, social, and environmental well-being.

Fisheries Investigations

1973 actual	\$219,751
1974 estimate	200,000
1975 estimate	198,000

Over the years TVA's limited fisheries investigations have led to significant changes in fisheries management policies in the Tennessee Valley and have contributed to the body of knowledge of reservoir management. Elimination of closed seasons on game fish, removal of size limits on most species, and more liberal creel limits for many species are the result of TVA studies and persuasive efforts with Valley states. TVA studies also led to stabilization of reservoir water levels during the game fish spawning periods. TVA conducted some very successful stocking experiments to introduce, among other new species, (1) the white crappie, one of the Valley's most popular game fish, and (2) the threadfin shad, a forage fish. Native species have been successfully transplanted to new reservoirs.

TVA's policy decisions regarding the management and use of the Valley's fisheries resources must have a sound scientific base. To provide basic information and knowledge TVA collects fisheries data to answer questions about populations, species composition, reproduction, fishing pressure and success, and to provide other information to guide fisheries management and use decisions.

Studies of the Valley's streams and reservoir tailwaters are being conducted to identify opportunities to improve stream fisheries, determine the impact of environmental modifications on the stream fisheries resources, develop criteria to regulate competing and compatible use, and determine stream habitat requirements for the more important species.

Studies of the Valley's reservoir fisheries resource are being conducted to identify and describe opportunities to improve reservoir fisheries, determine habitat requirements for specific reservoir species, and develop analytical and predictive ecological models for TVA's reservoirs. The information should help TVA make improved reservoir management decisions. TVA is also conducting studies to determine the effects of environmental disturbances on the Valley's fisheries resources.

Fisheries Resource Management and Use

1973 actual	\$148,635
1974 estimate	179,000
1975 estimate	218,000

Each fisheries management and use activity is selected for its direct contribution to the regional objectives of increasing recreation, generating economic activity, creating jobs, producing more food, and protecting the aquatic system.

Efforts are currently concentrated on Norris and Melton Hill reservoirs, the tailwaters of Norris and Wilson dams, on four streams, and on the aquaculture industry.

The Norris reservoir work will demonstrate the benefits of a comprehensive management and use effort. The project will include determining and informing the public about the location, movement, and feeding habits of important species; installing and marking fish attractors; evaluating and improving reservoir access; and increasing bank fishing opportunities.

At Melton Hill, a relatively new TVA reservoir within reach of 400,000 people, the fisheries resource seems to be underutilized. Reasons for this will be determined and an appropriate management and use program will be developed and implemented.

TVA is cooperating with the U.S. Fish and Wildlife Service and the Tennessee Game and Fish Commission to develop a trout fishery in the tailwaters of Norris reservoir. By 1976 an optimum stocking scheme will be established and management is expected to continue without TVA participation. The Wilson Dam tailwater is known nationally for its outstanding smallmouth bass fishery. TVA is beginning efforts to develop a management plan to ensure its perpetuation and determine how such a fishery might be duplicated in other TVA tailwaters.

Sources of pollution have been eliminated on two Tennessee Valley streams—the North Fork Holston River and the Tuckasegee River. TVA is evaluating the fisheries resource capabilities of these rivers and will prepare and implement reclamation plans to achieve a healthy fisheries resource in each.

The Upper Clinch-Powell rivers are prime spawning grounds for several important reservoir species, most notably the walleye pike. TVA is evaluating the fishery in these rivers and will prepare and implement a plan to appropriately manage and use the resource. This river system also contains the best remaining habitat in the eastern United States for certain species of mussels, and TVA is assessing both populations and habitat in an effort to find ways to preserve this unique resource.

TVA will continue to promote a healthy Valley-wide food fish production industry and provide technical assistance to those now in the business in an effort to secure the full economic benefits of the industry. Particular attention is given to the use of heated water in intensive culture systems.

Waterfowl Management and Use

1973 actual	\$114,695
1974 estimate	174,000
1975 estimate	174,000

Migratory waterfowl, once very rare in the Tennessee Valley, have increased in numbers and popularity as a result of waterfowl habitat developed by TVA. Waterfowl areas on TVA reservoirs annually provide about 40,000 man-days of hunting and over two million man-days of other outdoor recreation. For the most part, the Valley's waterfowl increases have been concentrated near the Mississippi Flyway in northern Alabama and west Tennessee and Kentucky. There are outstanding opportunities to manage lands and waters for migratory ducks and geese in east Tennessee, and the U.S. Fish and Wildlife Service has expressed interest in the possibility of a cooperative venture to develop facilities in this area to attract waterfowl from crossover flights. As a start TVA is developing the 635-acre Nolichucky reservoir to demonstrate this possibility. Nolichucky was originally built by a private power company and was operated for many years for power production. Now

obsolete, the generating equipment is being retired, and the reservoir will be dedicated to other public service. Water level management and food plantings on Nolichucky will attract an estimated 10,000 migratory ducks and geese to the reservoir each fall. In addition, substantial numbers of resident ducks and geese will be established to provide year-round opportunities for study and observation. The development will also serve as a demonstration of how similar reservoirs throughout the United States can be developed to provide additional public benefits.

TVA's migratory waterfowl work also includes surveillance and development of waterfowl habitats throughout the Valley that are critical to the well-being of Valley populations. TVA cooperates with the states of Tennessee, Kentucky, and Alabama to supplement and complement the region's migratory populations with resident species of ducks and geese that will remain in the region year-round. This work can have several benefits. First, it can supplement the production of northern breeding grounds which have been declining. Second, ducks and geese can be introduced in areas where they are not now found. And third, if ducks and geese can be kept in the region throughout the year, they will be of more benefit to more people.

PRELIMINARY SURVEYS AND ENGINEERING

Preliminary surveys and engineering provide background information and analyses, development of planning procedures, and long-range plans to aid in the determination of the need for more detailed water resources development. Engineering assistance is given to communities and multicounty planning organizations to help them assess needs and to develop possible solutions to water supply and waste water disposal problems. In addition, the program includes research associated with watershed investigations with current emphasis on urban watersheds.

	1973 Actual	1974 Estimate	1975 Estimate
Research on soil-water relationships			
Preliminary investigations	\$129,305	\$102,000	\$85,000
Regional water supply and liquid waste disposal	129,053	106,000	90,000
Valley-wide assessment of water needs	139,339	115,000	99,000
	63,078	77,000	35,000
Total	<u>460,775</u>	<u>400,000</u>	<u>309,000</u>

Research on Soil-Water Relationships (\$85,000)

This subprogram includes the collection and analysis of basic hydrologic information on small experimental watersheds to determine the effects of land-use changes and management practices as urbanization, timber harvesting, reforestation, and land reclamation upon the amount and quality of streamflow. This information is used in the development and refining of mathematical models which relate the characteristics of a watershed to its streamflow and water quality. The models are used as planning tools to predict the effects of proposed localized changes in land use or management practices. The models also can simulate streamflow information in areas where historical records are lacking. For example, models based on data now being collected on four urban areas in Knoxville can be used by city planners and engineers to assess and control the problems of flooding, urban drainage, and water pollution which are created by urban development.

Preliminary Investigations
(\$90,000)

Work under this subprogram includes: (1) cooperation with the Water Resources Council in interagency activities related to water resources planning criteria and procedures; (2) limited studies to develop workable improvements in evaluation procedures, with emphasis on environmental comparisons for alternative plans; (3) preparation of basic population and economic projections and analyses; and (4) preliminary studies of potential modifications in reservoir system operations necessary to meet changing conditions.

Regional Water Supply and Liquid Waste Disposal
(\$99,000)

The urbanization and industrialization of small and intermediate-sized towns in the region, together with a proliferation of utility districts to provide service in rural or suburban areas, have created problems in water supply and liquid waste disposal. Because many communities have planned and acted independently and concentrated on short-range needs, the quality of better service and lower costs which are attainable from larger systems have not been realized. To encourage broader planning, TVA provides technical assistance to communities and multicounty planning and development organizations in assessing current and future needs based on urban and industrial growth forecasts. The engineering concept plans provided by TVA are useful to affected communities in contracting with private consultants for detailed planning and design of appropriate water supply and liquid waste disposal facilities. Technical assistance on groundwater and related geology is also made available. Funding in 1975 is for continuation of these activities based upon an existing backlog of requests for assistance.

Valley-wide Assessment of Water Needs
(\$35,000)

A systematic assessment of current and future water needs and problems in the Valley is under way to provide information for use in guiding TVA water resources programs and to provide basic data periodically called for by the Water Resources Council and other organizations. It is a limited effort designed to draw mostly from ongoing planning by TVA

PS&E-51

program divisions and other agencies in the region. Therefore, it concentrates on developing a consistent set of planning criteria, assumptions, and time horizons for use in the ongoing work so that it can be summarized on a comparable basis. Although an initial and somewhat incomplete assessment is to be assembled in 1974, a continuing effort over time at a reduced level of funding is planned to improve and update the information. This work complements the Water Resources Council 1975 water assessment by providing data which would not otherwise be available because a framework study was not funded for this region.

Schedule B-1. Multipurpose Reservoir Operations
(For fiscal years ending June 30, 1973, 1974, and 1975)

	1973 actual	1974 estimate	1975 estimate
Income	\$325,001	\$278,000	\$258,000
Expenses			
Development of water resource management methods	\$256,133	\$270,000	\$200,000
Water control operations	1,309,063	1,367,000	1,370,000
Investigation of water resources	1,332,272	1,401,000	1,380,000
Plant protection and services to visitors	1,573,370	1,639,000	1,008,000
Operation and upkeep of dam reservations	1,424,793	1,347,000	1,740,000
Reservoir land management	2,209,147	2,264,000	1,368,000
Maintenance	1,335,984	2,457,000	2,286,000
Other expense	296,516	394,000	1,549,000
Distribution of administrative and general expenses	390,586	426,000	355,000
Total expenses before depreciation	6,328,201	7,283,000	6,603,000
Financed from appropriations	3,364,326	3,971,000	3,516,000
Financed from nonpower proceeds	325,001	278,000	258,000
Total	10,017,528	11,532,000	10,377,000
Depreciation	3,407,826	3,426,000	3,426,000
Total expenses	13,425,354	14,958,000	13,803,000
Net expense of multipurpose reservoir operations	13,100,353	14,680,000	13,545,000
Allocation to Programs			
Water resources development			
Net expenses before depreciation	6,203,279	7,144,000	6,481,000
Depreciation	2,078,760	2,090,000	2,090,000
Total	8,282,039	9,234,000	8,571,000
General resources development			
Net expenses before depreciation	124,922	139,000	122,000
Depreciation	99,046	103,000	102,000
Total	224,570	242,000	225,000
Power operations			
Net expenses before depreciation	3,364,326	3,971,000	3,516,000
Depreciation	1,229,418	1,233,000	1,233,000
Total allocation	13,100,353	14,680,000	13,545,000

MULTIPURPOSE RESERVOIR OPERATIONS (Schedule B-1—Operations and Maintenance)

Fiscal year 1975 expenses for multipurpose reservoir operations are estimated at \$10,377,000 before depreciation, of which \$6,603,000 will be financed from appropriations, \$3,516,000 from power proceeds, and \$258,000 from directly related income.

Multipurpose reservoir operations involve the management, operation, and maintenance of TVA's system of 23 multipurpose projects. These activities assure public benefits from the primary functions of navigation, flood control, and power and from the many other values created by a reservoir system with more than 10,000 miles of shoreline and 347,000 acres of surrounding lands under TVA ownership or control. Operating costs for the system are collected in a single program category and net costs are distributed to the programs benefited.

Development of Water Resource Management Methods

1973 actual	\$256,133
1974 estimate	270,000
1975 estimate	200,000

Scientific progress in recent years makes it possible to develop and use improved reservoir operating methods to deal more efficiently and effectively with the multiple objectives and variables in TVA's complex system. New and better procedures make possible current evaluation of changes to guide day-to-day decisions. TVA will develop a mathematical model of the Tennessee River system incorporating all the variables, constraints, and interrelationships which need to be considered for optimal operations.

Development of such a model is a long-term task, and two preliminary steps begun in 1972 will be completed by 1975. In fiscal year 1972 perfection of methods of investigating the effects of scheduled flow for specific purposes on quantitative system water management, the power economy of the system, and on water quality were begun. When completed in 1974 this step will allow evaluation of the impact of thermal discharge standards on the system operation. Concurrently, and continuing into fiscal year 1975, available mathematical methods for water resource optimization are being tested for potential use in the final basinwide water management scheme. A river subbasin has been selected as a specific application example. Also the needs for research, data, and further method development will be identified.

Water Control Operations

1973 actual	\$1,309,063
1974 estimate	1,367,000
1975 estimate	1,370,000

Water control operations require the collection and evaluation of data on rainfall throughout the watershed, waterflow in the Valley streams, and water storage and releases. To support these activities, TVA maintains a network of about 400 rain gages, 4 evaporation stations, about 160 stream gaging stations, and a VHF radio system for transmission of rainfall and streamflow data from selected remote areas in the Valley. In addition, other agencies maintain about 110 rain gages and the U.S. Geological Survey maintains 149 stream gages in the Valley from which data are supplied to TVA on a regular basis or upon request. TVA pays part of the operating costs for 94 of the USGS gages that are essential to TVA operations. Installation and operation of the gages are closely coordinated between the various agencies to prevent duplication and unnecessary installation. The General Weather Center, a private forecasting concern under contract to TVA, furnishes daily and extended forecasts of rainfall as well as information on expected light intensities, temperatures, and other meteorological factors needed in system operations.

Data from a portion of the overall network, consisting of 200 rain gages, and from about 60 of the stream gages are provided daily or more often, as required, to a central water control office in Knoxville. These data are analyzed, together with data on reservoir elevations, discharges, and power generation schedules, and a plan of operation for several days in advance is formulated for each reservoir. Instructions are then issued to the operators at each dam for storing or releasing water as needed. A daily river bulletin, giving data observed for the previous day and anticipated data for the current and two succeeding days at each principal reservoir, is published in cooperation with the National Weather Service and is distributed to persons and firms concerned with the effects of reservoir elevations and discharges. Data are exchanged regularly and frequent consultations are held with the Corps of Engineers in scheduling Tennessee Valley reservoir system outflow to provide benefits to the lower Ohio and Mississippi rivers during low-flow and flood-flow periods.

Water Control Investigations

1973 actual	\$189,684
1974 estimate	167,000
1975 estimate	71,000

Water control investigations include such activities as measurement of sedimentation in streams and reservoirs; checks on the operation of the spillways, sluices, and other hydraulic facilities; basic hydraulic research; investigation of damage claims arising from the operation of multiple-purpose reservoirs; and investigation of applications by others to build structures along the river or its tributaries.

The 1975 estimate of \$71,000 provides for (1) continuation of sedimentation surveys and related investigations on the mainstream and tributary reservoirs, (2) continuation of coordination of a wide variety of hydrologic and hydraulic information with other governmental or private organizations, and (3) investigation of damage claims arising from operation of the multipurpose reservoir system.

Investigations and Control of Reservoir Ecology

	1973 Actual	1974 Estimate	1975 Estimate
Insect control	\$604,883	\$676,000	\$569,000
Aquatic weed control	627,389	525,000	439,000
Total	<u>1,232,272</u>	<u>1,201,000</u>	<u>1,008,000</u>

Insect Control

This activity is directed primarily toward the control of a mosquito that carries malaria. In specific areas limited efforts are made to control floodwater mosquitoes, biting flies, and ticks.

Natural methods are emphasized for mosquito control. Lake water levels are fluctuated to interfere with mosquito production. Water is pumped or drained from low areas. Shoreline vegetation is mowed. Larvicide is applied only when required to supplement these measures. Planned control measures in 1974 and 1975 for the lower river reservoirs are shown below.

	Fiscal Year 1974	Fiscal Year 1975
Plant growth control (mechanical and herbicidal)	5,187 acres	3,818 acres
Drainage maintenance	133,750 linear feet	130,600 linear feet
Application of larvicide	29,000 acres	29,000 acres
Operation and maintenance of dewatering projects	18,800 hours	18,800 hours

The two woody plants in TVA reservoirs of most concern to mosquito control are willow and buttonball. In relatively broad, flat areas and in some protected embayments and sloughs, dense stands afford an extensive habitat for mosquito production. Where the shoreline is steep, they form a narrow bank of little importance. In some cases the plants grow so tall and the canopy is so dense that application of larvicide would be both ineffective and hazardous. They dampen wind and wave action and tend to reduce the effect of water level fluctuation for mosquito control. For these reasons, growth of the plants must be controlled by mechanical mowing. Approximately 3,818 acres of shoreline are scheduled for growth control during fiscal year 1975.

All control work scheduled for fiscal year 1974 will be performed on Kentucky, Pickwick, Wilson, Wheeler, Gunterville, Nickajack, and Chickamauga reservoirs. Water level management is expected to provide satisfactory mosquito control on all other reservoirs.

Aquatic Weed Control

Eurasian watermilfoil has become the most troublesome weed in TVA reservoirs. TVA experience during the past decade has resulted in the development of two methods of controlling watermilfoil; water level management to dry the plant by dewatering or by otherwise disturbing its habitat, and application of 2,4-D herbicide. Neither method has produced permanent control and they must be employed together or separately on an annual basis to keep present colonies within a tolerable level.

Herbicide, 2,4-dichlorophenoxyacetic acid, is applied to large watermilfoil colonies by two-man crews in boats specially equipped for the work and employed exclusively for search and treat operations. Small colonies of watermilfoil or individual plants in sparsely infested reservoir areas are treated with liquid or granular herbicide, applied manually from a boat or while wading.

TVA also applies herbicide by helicopter after evaluating the location, extent, and density of the watermilfoil infestation; the operational costs involved; and the potential danger to nontarget shoreline vegetation.

Watermilfoil continues to be a major problem in Wilson, Gunterville, Nickajack, and Melton Hill reservoirs and a lesser problem in Wheeler, Chickamauga, and Watts Bar reservoirs. In 1975 search and treat operations will be continued on all these reservoirs where limited treatment will be made as necessary in areas of high public use.

Plant Protection and Services to Visitors

1973 actual	\$1,573,370
1974 estimate	1,639,000
1975 estimate	1,740,000

As of June 30, 1973, TVA multipurpose projects represented an initial investment of more than a billion dollars. Many projects are in rural, isolated areas and all major projects are considered essential to national defense. All must be protected from fire damage, theft, vandalism, sabotage, and civil disorders. The major projects are open to the public. In calendar year 1972, over 13 million people visited them creating attendant problems of crowd and traffic control, visitor safety, maintenance of law and order, emergency first aid, and accident investigations.

Property protection is the major function of this activity. Receiving and protecting visitors and enforcement of Federal and state laws and project regulations are important subsidiary functions. The 1975 estimate of \$1,740,000 provides for the necessary protection to property and persons by uniformed employees on duty at all times at major projects. The extent of protection is based on location, size, and type of project; current security information; recommendations from periodic surveys by U.S. military forces; and visitor load.

Operation and Upkeep of Dam Reservations

1973 actual	\$1,224,793
1974 estimate	1,347,000
1975 estimate	1,368,000

TVA's multipurpose dam reservations include about 14,000 acres of land, 105 miles of roads, extensive parking areas, walks and paths, maintenance and visitor buildings, and picnic areas with tables, benches, fireplaces, and grills. Additional facilities are placed in service annually to serve increased public demand. About 60 percent of the reservation acreage is in natural or forest cover; about 15 percent is maintained as meadow or pasture; and about 25 percent (3,500 acres) is maintained for intensive public use. A variety of operations is necessary for the upkeep of these grounds and the roads serving them to meet operating requirements of dams, locks, and other major installations, and to receive and safeguard the visiting public. Maintenance standards are designed to provide a clean and attractive appearance of all public grounds

commensurate with intensity of use in the interest of public health, safety, convenience and economy. In recent years, to alleviate the general inflationary trend, a program of maintenance changes has been initiated to reduce acreage requiring intensive maintenance and improve the safety and economy of the entire program. Changes in the types of plant material and increased use of approved chemicals and more efficient maintenance equipment are being used in this effort.

Maintenance work for nonintensive public-use areas consists of prevention and control of fires and erosion; control and removal of dead or diseased timber; and improvements to plantings of seedlings. Wherever feasible, meadow and pasture areas are maintained by local farmers under agricultural license agreements which relieve TVA of maintenance costs and provide modest cash income.

Income expected to be realized from the operation of dam reservations is \$17,000 in fiscal year 1975 derived principally from land rentals, water system revenues, leased village properties, and boat dock licenses.

Reservoir Land Management

	1973 Actual	1974 Estimate	1975 Estimate
Land operations	\$1,684,195	\$1,654,000	\$1,666,000
Operation of backwater protection facilities	44,697	59,000	61,000
Land sales expense	45,084	50,000	50,000
Operation of reservoir recreation facilities	435,171	501,000	509,000
Total	2,209,147	2,264,000	2,286,000

This activity relates primarily to the management of land and land rights acquired and held by TVA on a narrow 10,000-mile strip along the shores of its major multiple-use reservoirs. As of June 30, 1973, TVA owned about 232,000 acres of such lands and held easement rights on an additional 115,000 acres above full-pool lake levels. These lands are used by individuals, agencies, and private groups for recreation, boat docks, wildlife refuges, agriculture, and other purposes. Continuous surveillance is necessary to ensure that trespass is controlled and that authorized uses do not conflict with the primary purposes of the reservoirs and are consistent with full public uses of the reservoirs. Every effort is made to promote public understanding of the overall functioning of the reservoir system to avoid misunderstandings based on a lack of information. Engineering surveys are made to install and maintain boundary and maximum reservoir level markers and to

record changes in land ownership and physical developments on reservoir lands which are related to TVA's program responsibilities. The lands held by TVA are reviewed periodically in the light of changing program requirements; lands no longer necessary for program purposes are sold. Selling costs are included in this activity.

Some reservoir lands are licensed for agricultural purposes, involving public offering of available lands, establishment of minimum rental rates, review of applications, issuance of licenses, collection of rentals, and enforcement of license provisions. Approximately 885 licenses will be in effect in 1975 for the use of 19,500 acres of land for agricultural purposes, with estimated revenues of about \$77,000.

Reservoir land operations also include forest fire protection, reforestation of selected areas, and marketing of timber and other forest products. Approximately 3,900 cords of pulpwood and 4,278,000 board-feet of timber are projected for sale in 1975 with a total estimated sales price of \$127,000. Revenues from miscellaneous reservoir land operations, leased or licensed boat docks, cabin sites, and group camps are estimated at \$28,000.

Increasing use of TVA lands by visitors and increasing private development in areas adjacent to TVA properties require constant surveillance and control by TVA of land in its ownership. Other activities included are a variety of "housekeeping" duties such as continuation of cooperative effort with the Department of Interior in sponsoring the Johnny Horizon program in the Tennessee Valley; promoting the establishment of sanitary landfills in counties adjacent to TVA reservoirs; removal of drift, debris, and clutter along TVA shorelines; protecting forested lands from fire, primarily under contracts with Valley state forestry divisions; operation and maintenance of backwater protection facilities such as dikes; and maintaining public-use facilities provided along the reservoir shorelines by TVA to assure safe, sanitary, and convenient access to the lakes.

Maintenance

1973 actual	\$1,335,984
1974 estimate	2,457,000
1975 estimate	1,549,000

The average age of TVA's major dam and reservoir projects is more than 26 years. Norris Dam, the first, was completed March 4, 1936. All but six of these projects antedate 1950. Maintenance work is becoming more significant in operation of the facilities. Routine maintenance activities consist mainly of painting spillway gates, maintaining spillway gate operating devices and other equipment and structures at multipurpose dams; maintaining visitor buildings located on the

reservations; and resurfacing, resealing, and major repairs to roads, walks, and parking areas. Maintenance of certain earthfills is required under the terms of contracts entered into with the owners of the highways and railroads when TVA dams were built.

Extraordinary maintenance sometimes requires immediate attention. Such a situation presently exists at Fontana Dam. Cracking in certain concrete portions of the dam which was first discovered in October 1972 poses a potentially serious stability problem. Work began in late fiscal year 1973 to determine the extent and nature of remedial measures required. The preliminary estimate for the total investigations and repairs is \$2.0 million with approximately \$1.5 million required in 1974 and \$0.5 million in 1975.

Major maintenance scheduled in 1975 is shown below.

Cherokee Dam	Paint spillway gates
Douglas Dam	Paint spillway gates
Fontana Dam	Exploratory drilling and repairs on abutment
Kentucky Dam	Paint spillway gates and guides
	Miscellaneous highway and bridge embankment maintenance
Norris Dam	Repair concrete roadway over dam
Pickwick Dam	Repair spillway gates
Wilson Dam	Inspect, repair, and paint spillway gates
	Spillway apron repairs
	Roadway and sidewalk repair on bridge over dam

The estimate also includes resurfacing about 94 miles of roads at 10 locations. In addition to these major items, the regular inspection activity will be expanded to provide better information on repair needs so that extraordinary maintenance can be kept to a minimum.

Other Expense	
1973 actual	\$296,516
1974 estimate	394,000
1975 estimate	355,000

The estimate for 1975 covers operation and maintenance of the dams in the Beech River watershed project; two dams in the Bear Creek watershed system; and the Tims Ford Dam. Activities include vector control work, checking the flood detention features, maintaining access roads to all dams and earthfills, and minor surveying and mapping work.

Schedule B-2. General Resources Development
(For fiscal years ending June 30, 1973, 1974, and 1975)

	1973 Actual	1974 Estimate	1975 Estimate
<u>Income</u>			
Income from sale of fertilizer materials	\$89,665	\$153,000	\$153,000
<u>Expenses</u>			
<u>Agricultural projects:</u>			
Appropriations	1,495,181	1,650,000	1,738,000
Nonpower proceeds	89,665	153,000	153,000
Total agricultural projects	1,584,846	1,803,000	1,891,000
Forest and wild land resources development	1,355,308	1,513,000	1,805,000
Minerals resources projects	274,009	275,000	275,000
Environmental quality projects	430,333	418,000	418,000
Development of tributary areas	1,530,038	1,607,000	1,669,000
Demonstrations in education and manpower development	803,143	801,000	801,000
Regional development planning	476,132	560,000	592,000
Townlift community improvement	723,374	735,000	747,000
Interagency health service demonstrations	104,000	155,000	155,000
Total	7,177,183	7,816,000	8,353,000
Allocated from multipurpose reservoir operations	124,922	139,000	122,000
Total expenses before depreciation:			
Financed from appropriations	7,212,440	7,802,000	8,322,000
Financed from nonpower proceeds	89,665	153,000	153,000
Total	7,302,105	7,955,000	8,475,000
Depreciation	550,962	121,000	121,000
Total expenses	7,853,067	8,076,000	8,596,000
Net expense of general resources development	7,763,402	7,923,000	8,443,000

GENERAL RESOURCES DEVELOPMENT

TVA has developed the Tennessee River system for navigation, flood control, and power purposes. Additional recreation, wildlife, water supply, and water quality benefits have resulted, and the total effect has been a major contribution to the economic and social development of the region. The general resources development program described below includes activities through which the diverse capabilities of the TVA organization are brought to bear upon special problems or additional development opportunities principally related to the land and its products and to the people of the region and their institutional resources.

AGRICULTURAL PROJECTS

	1973 Actual	1974 Estimate	1975 Estimate
Financed from appropriated funds:			
Development program	\$1,110,256	\$1,109,000	\$1,112,000
Special projects	253,553	389,000	472,000
Program planning and analysis	87,329	105,000	106,000
Administrative and general expenses	44,043	47,000	48,000
Total	<u>1,495,181</u>	<u>1,650,000</u>	<u>1,738,000</u>
Financed from nonpower proceeds:			
Development program	89,665	153,000	153,000

Primary objectives of the cooperative agricultural resource development program are to promote increased income from agriculture and help those workers not needed in or fully employed in agriculture to find off-farm work. Specific program goals are to (1) change land use to its highest long-range economic capability, (2) consolidate farms into larger units and improve tenure arrangements, (3) upgrade and expand marketing systems, (4) improve farm management, (5) improve the standard of living of rural people, (6) introduce new higher income-producing agricultural enterprises, and (7) recognize as soon as possible the hindrances to full development. Activities largely involve research and development and the use of findings in demonstrations and educational projects aimed at introducing improved practices and systems to farmers.

Development Program

	1973 Actual	1974 Estimate	1975 Estimate
Financed from appropriated funds:			
Valley agricultural resource development	\$988,303	\$997,000	\$998,000
Special agricultural investigation and technical assistance	121,953	112,000	114,000
Total	<u>1,110,256</u>	<u>1,109,000</u>	<u>1,112,000</u>
Financed from nonpower proceeds	<u>89,665</u>	<u>153,000</u>	<u>153,000</u>

Agricultural resource development is oriented to major problems and opportunities of regional scope. The program is an educational one in which new and improved fertilizers produced by TVA are often a principal input in a developmental process. Help is given in farm management, introducing new farm enterprises, and developing related marketing systems. These activities are conducted with the land-grant universities of the seven Valley states, practical farmers, and in appropriate circumstances local development organizations, including tributary area associations. They are designed for the particular resource opportunities and problems of the areas in which they are conducted. Program activities conducted in agricultural resource development include fertilizer trials and field demonstrations, resource management farms, rapid adjustment farms, and garden demonstrations with low-income farm families.

Fertilizer trial demonstrations, usually no larger than one acre, are used to introduce new TVA fertilizers and to evaluate them. TVA generally supplies the fertilizer at its expense, including freight charges. These demonstrations give professional agricultural workers experience with new TVA fertilizers under actual farming conditions.

Field demonstrations show the proper practices for fertilizing and producing specific crops. They are especially useful in introducing new enterprises. They use an entire field or a sizable portion. Crop yields or animal products are evaluated by comparison with conventionally fertilized areas. Fertilizer oriented field demonstrations are well suited for work with both commercial farmers and part-time farmers. TVA fertilizers are supplied at partial-pay prices. During fiscal year 1973 emphasis was on demonstrations to show potentials for increasing farm income by using grain and forage in livestock production and to introduce new specialty crops or solve fertility problems associated with low yield, as shown in the following table.

Forage, pasture, and feed grains	283
Specialty crops (vegetables, fruits, nuts, and shrubbery)	333
Field crops	82
Evaluation of TVA fertilizers	33
Total	<u>731</u>

Resource management farms are whole-farm demonstrations showing the changes needed in managing land, labor, and capital resources for maximum income. These farms have replaced an earlier program element known as farm test demonstrations. The resource management farm involves the operator, the land-grant university of his state, and TVA in developing for his specific farm a concept of organizing and managing all resources to increase family income. Farmers in this program range from commercial farmers to those typical of the low-income farm group. Experience gained on program farms is useful in guiding developments on other farms with similar resources and capabilities.

Rapid adjustment farms are used to explore and demonstrate ways to accelerate realization of potential income and changes on a commercial scale. Introduced in the early 1960's the rapid adjustment farm has become an exceptionally effective device for both research and teaching. Operators of rapid adjustment farms become innovators and provide leadership to other farmers in making needed adjustments to the changing agricultural situation. Rapid adjustment farms show on an accelerated time schedule what Valley farmers need to do if they are to have successful commercial operations. The magnitude and rate of changes on rapid adjustment farms are great, as are capital requirements and risks to the farmer. TVA helps by furnishing fertilizer required in the demonstrations at no cost to the farmer except for freight and handling charges. Qualified college personnel give special attention to each rapid adjustment farm.

Home garden demonstrations are conducted with low-income families in depressed rural areas of the Valley to show the economic value of a home garden in supplying food and improving nutrition. Low-income families are taught to plan a vegetable mix related to their dietary needs. They are advised on production and cultural methods and on preparing and preserving food. TVA provides seed, insecticide, fertilizer, sprayer, and technical help to conduct the demonstrations.

The following table shows the number of demonstrations by type to be conducted in fiscal year 1975, compared with the number in earlier years.

	1973 Actual	1974 Estimate	1975 Estimate
Fertilizer trials and field demonstrations			
Resource management farms	731	770	780
Rapid adjustment farms	631	650	675
Home garden demonstrations	38	40	45
	292	325	350

Special Areas of Interest—Illustrations

In the mountainous areas of western North Carolina, more than \$12 million worth of trellised tomatoes, strawberries, ornamental shrubbery, and Christmas trees are produced annually. These enterprises have been introduced into north Georgia, southwest Virginia, and eastern Tennessee. At the time demonstrations to accelerate production of these crops begin, activities to develop an adequate marketing structure are started. Blueberries will be introduced as an enterprise in southwest Virginia to increase agricultural income and to help renovate strip mined soils.

In the middle portion of Tennessee, many farms have enough acreage for efficient livestock production. Activities are conducted to intensify forage and feed grain production. On many large farms, dairying is highly profitable. Swine production offers an opportunity to intensify output on smaller acreages, while beef cattle has a potential for many farms and fits particularly well on part-time farms. In western Tennessee and Kentucky, programs emphasize efficient livestock production through double cropping and improved beef-forage systems.

In northeast Mississippi and the western portion of north Alabama labor intensive enterprises, such as feeder pigs, pimiento peppers, and cucumbers are emphasized because of the limited acreage of productive soils. Other high value enterprises such as peaches and strawberries are being introduced and evaluated. With the completion of the Yellow Creek Port and its grain handling facilities, more emphasis will be placed on market hog and broiler production.

In the middle portion of north Alabama, emphasis will continue on soybean production to coincide with construction of a soybean processing plant at Decatur, Alabama. In the Sand Mountain area or eastern portion of north Alabama, introduction of high value horticultural crops with related marketing facilities will be intensified and demonstrations will be continued to show profitability of supplemental irrigation.

Special Investigations and Technical Assistance

TVA conducts special studies in specific watersheds (subregional areas) to determine the need for water control methods beneficial to agriculture and to determine environmental effects on agriculture of such projects. Land-use studies are carried out to determine (1) areas most suited for continued agricultural production, (2) areas having the capability of joint uses such as crop production and industrial waste disposal, and (3) areas which are not essential for agricultural production. Other studies are conducted to provide information for planning and initiating intensive agricultural activities. On a more general basis, technical planning aid is given to subregional planning groups to help them recognize agricultural development opportunities, to solve problems necessary to achieve agricultural development potentials, to conduct agricultural development activities, and to evaluate their results.

Special Projects

	1973	1974	1975
	Actual	Estimate	Estimate
Agribusiness development	\$56,160	\$87,000	\$94,000
Land tenure and use problems	16,041	-	-
Research on forage fertilization and utilization	65,417	-	-
Development of new enterprises and opportunities for the rural poor	-	141,000	144,000
Tennessee Valley rural life conferences	29,066	31,000	32,000
Evaluation of livestock waste disposal systems	-	22,000	87,000
Studies of agricultural uses of heated water	86,869	108,000	115,000
Total	253,553	389,000	472,000

Agribusiness development is designed to expand the productive capability and profitability of Valley agriculture through improved marketing and farm-supply systems. Activities include joint market feasibility studies and technical assistance. TVA provides a unique function in agribusiness development in the Valley region by (1) coordinating the planning of projects too large for individual local and state agencies, (2) coordinating activities of many separate agencies, and (3) providing leadership on projects of larger than state size necessary to promote change in the basic market structure. For

example, TVA recently completed an interregional study of soybean processing facilities needed within the Valley region. A private firm used the findings to initiate the building of one of the largest soybean processing plants in the world on the Tennessee River. A present study is examining the interrelationships among farm supply, farm production, and farm product marketing and will show how change in one element involves changes throughout the entire farm and farm dependent sectors. Information from this study will be used to identify the location of proposed farm service centers within the 125 Valley counties. A future study will identify the types and kinds of facilities needed to service the marketing needs of grain and soybean producers.

Development of new enterprises and opportunities for the rural poor will be emphasized in a continuing attack on rural poverty. Low income in the rural areas of the Tennessee Valley is more prevalent than in urban centers and in many other rural areas of the U.S. For many farm families age, educational level, and lack of skills make a transfer to nonfarm employment impossible. Many of these families lack the resources to become successful farmers, yet farm income can be increased substantially through improved production and marketing of high-income agricultural enterprises on existing land. Methods for starting such activities were delineated in a workshop on "Methods of Working with Limited Resource Farmers" sponsored by TVA, the 14 land-grant institutions in the region, Tuskegee Institute, and USDA. This new program activity will emphasize education and provide training in opportunities to increase technical skills related to production of selected agricultural enterprises.

Tennessee Valley rural life conferences involving agribusiness leaders, farmers, bankers, and other community leaders promote a better understanding of farm and agribusiness problems and opportunities in the Valley region and provide for exchange of information and ideas for improved decision making affecting rural economies and quality of rural living. Two conferences will be held during fiscal year 1974 dealing with regional soybean production and marketing and improving rural living on limited resources. During 1975 two conferences will cover opportunities for hog production and marketing and providing quality housing for the rural poor.

An economic evaluation of livestock waste disposal systems in the Tennessee Valley will be accomplished to ensure that future development and expansion of the livestock industry within the region is compatible with an expanding urban and rural population. This work will establish costs associated with the types of waste disposal systems being used by livestock producers in the Tennessee Valley and will integrate these disposal costs into the production functions of specific livestock enterprises. Results from this study will aid in establishing guidelines for farmers who plan to develop livestock facilities. It also will provide guidelines or recommendations for residential and industrial developments on land adjacent to livestock enterprises already in operation. In 1975 this evaluation will be completed and a new project, biological recycling of nutrients from livestock waste, will be initiated. Beneficial effects of livestock wastes within a closed system will be evaluated from agronomic and economic viewpoints.

Studies of agricultural uses of heated water are developing technology for using the energy in heated water discharges from major power plants. A prototype greenhouse has been constructed at Muscle Shoals, Alabama. Special emphasis will be to study plant growth under temperature, humidity, and light relationships existing in north Alabama in greenhouses heated and cooled by heat exchangers designed by Oak Ridge National Laboratory. Production-related economic studies will evaluate the operating efficiency of the pilot greenhouse in preparation for construction and operation of a demonstration greenhouse. This will be built at Browns Ferry where great quantities of heated water will be available from a nuclear power plant. A crop production plan adapted to seasonal marketing conditions for greenhouse horticultural production in the Southeast will be developed. In addition, field experiments have been established in the forage research area to determine the effect of heated soil as a preliminary investigation of hot water utilization.

Program Planning and Analysis

	1973 Actual	1974 Estimate	1975 Estimate
Total	<u>\$87,329</u>	<u>\$105,000</u>	<u>\$106,000</u>

To plan, direct, and evaluate effectively a program for encouraging development of agricultural resources in the Valley and of the industries directly related to agriculture, TVA continuously appraises regional rural and agricultural trends. These studies include farm size and value, land use, farm expenditures and product sales, farm type, operator tenure, changes in marketing facilities, and regional rural and farm migration.

Specific objectives of these studies are to (1) improve understanding of changing conditions in the Valley, (2) define more sharply the emerging problems of rural people, (3) appraise the influence of program activity in bringing about desired changes, and (4) improve planning guidelines for long-range Valley resource development.

FOREST AND WILD LAND RESOURCES DEVELOPMENT

	1973 Actual	1974 Estimate	1975 Estimate
Forest and wild land investigations	\$294,925	\$348,000	\$322,000
Forest and wildlife management and wildlife use	287,777	366,000	366,000
Forest industry development	256,185	284,000	301,000
Improvement and establishment of wild land vegetation	332,595	305,000	301,000
Strip mine reclamation	124,802	146,000	450,000
Administrative and general expenses	59,024	64,000	65,000
Total	<u>1,355,308</u>	<u>1,513,000</u>	<u>1,805,000</u>

Forest and Wild Land Investigations

Forest and wild land resource surveys are conducted systematically to appraise the quality and quantity of the resource; its location, ownership, and use; ecological and hydrological conditions; and the recreational, scenic, and wildlife potential of the Valley's forest and wild lands. From these inventories, performed on a county-unit basis at the rate of eight a year, current conditions are determined, results of past programs are evaluated, trends are predicted, and new program directions are established. These surveys provide the data for answering requests from the public for resource information. Major expansion of the Valley forest products industry has resulted from and will continue to depend on the availability of resource inventory data gathered and analyzed by TVA. Special investigations are made to develop improved techniques for getting information on the resource. Investigation of remote sensing applications (e.g. color-infrared photography) will be continued in 1975 in cooperation with Oak Ridge National Laboratory, USGS, and NASA.

Hydrologic studies are made to determine forest and wildland soil-water relationships. This knowledge is necessary to proper management and use of Valley land and water resources. A pilot study is being undertaken to evaluate the capability of forest lands to assimilate waste water effluents from sewage treatment plants.

A comprehensive guide for land-use planning is being developed and methods of evaluating the impacts of alternative programs, projects, and land-use decisions on wild land resources are being improved.

Ecosystems surveys and analyses are made to improve the understanding of the structure and function of specific ecosystems and the effects of changes on them. This work is done in cooperation with the departments of Agriculture and Interior, National Science Foundation, and Atomic Energy Commission.

Forest and Wildlife Management and Wildlife Use

The efficient management of forests and wild lands to balance timber and wildlife production with recreation, aesthetics, and watershed environmental protection is dependent on up-to-date technology and decision-making tools. TVA is now developing a new resource management technique. The program, called "WRAP" (Wild Land Resource Allocation Procedures), is expected to speed the application of modern management practices significantly, especially on the Valley's 18 million acres in 350,000 private holdings. The program will be fully operational in fiscal year 1975. Various other forest and wildlife management technologies, such as forest fertilization, even-aged hardwood management, and wild turkey and deer management, are being tested and demonstrated.

Use of wildlife in forests and uplands for hunting and general enjoyment is far below the potential. TVA is working to determine current use, needs, and opportunities. Specific areas (including TVA lands) are being developed to demonstrate opportunities for fuller use. TVA works with the owners of private land to promote fee-hunting and the development of shooting preserves. Selected TVA properties— islands, reservoir lands, and tracts held for future power plant sites—are being examined to assess their present and potential use as wildlife areas available to the public.

Aesthetic improvement of forests, wild lands, and waterways offers significant contributions to an overall quality of life. Demonstrations on the use of vegetation for screening have been established and fuller development of scenic resources on TVA lands is planned. As the Valley's population becomes more urban, the need to increase opportunities for natural beauty and outdoor recreation in and near the city becomes greater. Discrete use of vegetation and the addition of wildlife and fishery resources can provide amenities for both young and old in cities and communities and around factories and industrial areas. TVA will demonstrate some of the more promising opportunities. TVA will also set aside and preserve several small wild areas on TVA lands for public enjoyment and study. TVA's forest and wild lands are also being examined to develop management plans which ensure maximum public benefits.

Forest Industry Development

The forest products industry is one of the top contributors to the Valley economy, with a plant investment of \$768 million, a payroll of some \$250 million a year, and an annual product value of around \$1 billion. TVA maintains close surveillance of the resource base as described above and close contacts with the industry to detect and forecast changes that reveal unusual forest production and timber utilization problems and opportunities. TVA identifies, evaluates, and promotes those industrial uses that provide the greatest economic, social, and environmental benefits for the Valley to encourage an even greater economic value of the forest resource.

As in most of the East, timber harvesting practices in the Valley are for the most part inefficient and outdated. Logging studies by TVA have shown that Valley loggers using present equipment could reduce annual costs by \$4 to \$5 million through the application of cost control principles. TVA is implementing demonstration projects to help loggers achieve these savings. TVA conducts a modest educational program to encourage adoption of better logging methods and works with the forest industry to promote more efficient utilization of trees as they are cut. The economics of chipping tree crowns in the woods will be studied in an effort to secure utilization of material now left to rot in the forest. As much as 50 percent of the wood fiber in the tree is often lost in this way.

Economic studies will be made of two areas to encourage the development of new forest industries and to upgrade present operations. A second integrated hardwood utilization complex will be planned and promoted.

Recent air pollution laws are placing increasing pressure on industries to dispose of their wood and bark wastes by means other than burning. These two situations combine to create a unique opportunity to increase the utilization of the forest resource and simultaneously reduce pollution associated with timber processing. TVA is working with the U.S. Forest Service and the industry seeking ways to utilize logging waste and plant residues economically.

Typically, marketing wood products is as complex and disorganized in the Valley as it is in most other regions of the United States. Current marketing trends are being analyzed to develop more efficient marketing systems which will expand markets and improve the industry's product mix.

Improvement and Establishment of Wild Land Vegetation

TVA's long-term forest tree improvement program deals with the region's most important pine and hardwood species. In addition, TVA develops genetically improved wildlife food and cover plants and specialty vegetation needed for strip mine reclamation, wildlife habitat, and aesthetic improvement of wild landscapes.

The production of genetically superior trees and specialty vegetation involves nursery work, some of which TVA will do but most of which will be contracted to state or private nurseries, especially as anticipated demand grows. Technology to incorporate superior hardwoods into the Valley forests is being tested. At present, specialty nursery stock either is not available or is too expensive for the large volume needs anticipated. The establishment of wildlife and specialty vegetation will be intensified throughout the Tennessee Valley on strip mines, power line rights of way, reservoir shorelines, roadsides, and other areas with high visual impact and wildlife potential. TVA's 17,000 miles of power line rights of way and 11,000 miles of reservoir shoreline offer particularly unique revegetation opportunities to improve the region's natural environment through direct and substantial increases in wildlife resources. About 200,000 seedlings will be produced in 1975 for use in TVA programs. Efforts will continue to promote reforestation on private lands, the goal being a level of 50,000 acres a year.

Strip Mine Reclamation

Restoration of surface-mined land is a very important part of the overall task of protecting forest, wild land, wildlife, and water resources and of securing a productive and attractive environment. Abandoned surface mines are sources of pollution and they detract from the area's natural beauty. TVA works for the restoration of all abandoned surface mines to assure that reclamation is an integral part of active mining operations. As a major buyer of strip mined coal, TVA requires and enforces effective mined land planning, environmental protection, and a high order of reclamation on all lands disturbed in supplying its coal. TVA is the only purchaser of coal in the Nation which requires that its contractors reclaim the land disturbed. The expense associated with enforcing strip mine reclamation clauses of coal procurement contracts is charged to the power program.

TVA assists Valley states in their efforts to secure and implement effective regulatory legislation for surface mining. Among the Valley states, Kentucky, Virginia, Alabama, Georgia, and Tennessee have adopted such legislation. Demonstrations and studies are conducted in cooperation with the U.S. Forest Service, the states, and with the mining industry and landowners to develop better methods of reclamation. Demonstrations established with these same cooperators

show that substantial areas of strip mined land can be restored to timber and wildlife production, that water runoff can be controlled, that stream pollution from acid and silt can be reduced, and that results will begin to show in a relatively short time.

During fiscal year 1975 TVA will examine alternatives and complete plans for restoring 72,000 acres of "orphan" strip mines that were mined and abandoned in the years before strip mine reclamation was required. Currently no one is legally responsible for their reclamation. Restoration of these 72,000 acres of land in the Valley will provide guidelines on the physical and administrative arrangements needed to reclaim the 1.5 million acres of similar unreclaimed lands in the eastern United States.

TVA will begin rehabilitation of some 225 acres of old surface mines and seal 16 deep mine openings in the Piney Creek area of Tennessee. Piney Creek is a part of the drainage area of scenic Fall Creek Falls State Park. This project, to be conducted in cooperation with the State, will show what can be done on the land to rehabilitate a stream that has been degraded by sediment and acid water runoff.

MINERALS RESOURCES PROJECTS

1973 actual	\$274,009
1974 estimate	275,000
1975 estimate	275,000

TVA cooperates with Valley state and local agencies in a wide range of geological and mineral resources investigations to accelerate the development of the Valley's mineral resources. TVA coordinates investigations and mineral identification procedures; gathers and interprets data from other investigations; establishes standards for both investigative procedures and map or report publication format; conducts research into patterns of minerals distribution and improvement of exploration techniques; and compiles and publishes geologic and mineral resources maps and data.

Cooperative programs for geologic mapping and publication of geologic and mineral resources maps in the 7-1/2-minute quadrangle format were established for Tennessee in 1962, North Carolina in 1968, and Alabama in 1971. Through 1973 a total of 274 geologic and mineral resource quadrangles has been published, principally in Tennessee. Field mapping and editing are in progress for 21 quadrangles in Tennessee, 9 quadrangles in North Carolina, and 6 quadrangles in Alabama. It is expected that 35 quadrangles will be published in 1974 and an additional 35 in 1975. The State of Georgia has shown considerable interest in this cooperative program. Funding limitations in this program, however, are preventing active participation.

Magnetic mapping by ground methods of the Tennessee Valley region by TVA began in late 1970 and through 1973 ten quadrangles have been published with 12 ready for publication. In 1973 transition from ground to airborne surveying was made to substantially reduce the quadrangle average cost. Airborne surveying is under way and data for 6,000 square miles of area have been recorded. The surveying was done on a cost-share basis in Tennessee in 1973 and will continue in Tennessee and be extended into North Carolina and Alabama in 1974 and 1975.

Compilation of the Tennessee minerals industry atlas being prepared jointly by TVA, the State of Tennessee, and the U.S. Bureau of Mines will continue in 1975.

A considerable amount of unpublished information, as well as published mineral resources data has been assembled, verified, and coded into an organized data retrieval system keyed to a detailed map atlas of the region. This is now being made much more valuable by conversion of the data into a computer-based, information-retrieval system (Computer Resources Information Bank or CRIB) of the U.S. Geological Survey. A suitable computer-terminal facility will be established in Knoxville so that this information can be entered and retrieved with rapid turnaround time and made available in response to requests from the large number of sources requesting such information. Full entry into the CRIB system will be accomplished in early 1975. In addition to retrieval upon request, activities will largely include updating and perfecting information in the CRIB file.

ENVIRONMENTAL QUALITY PROJECTS

	1973 Actual	1974 Estimate	1975 Estimate
Solid waste disposal demonstrations	\$297,562	\$267,000	\$266,000
Regional air quality management	111,422	128,000	128,000
Administrative and general expenses	21,349	23,000	24,000
Total	<u>430,333</u>	<u>418,000</u>	<u>418,000</u>

Concern for the quality of the environment is expressed in all TVA projects and programs as an essential part of unified resource development. The environmental quality projects described in this section are in fields TVA has selected for emphasis on the basis of the seriousness of the problem, TVA program responsibility, and TVA technical competence and experience.

Solid Waste Disposal Demonstrations

1973 actual	\$297,562
1974 estimate	267,000
1975 estimate	266,000

TVA works with Valley counties and cities in establishing effective solid waste collection and disposal systems. TVA has filled a need for technical assistance during the development and implementation by the several states of solid waste management plans and the extension of consultant activities into the field of solid waste management. These efforts are directed toward the development of countywide and multicounty solid waste management programs.

TVA provided solid waste management assistance to 34 local governments in fiscal year 1973 and is presently scheduled to provide similar assistance to 35 local governments in fiscal year 1974 and 35 in fiscal year 1975.

A significant element in a program of solid waste management is the organization of rural collection systems for most of the Valley area is rural and many of its people live in the country. Only one Valley county in ten provides solid waste collection services to rural residents. TVA assists counties to prepare collection plans, advises on equipment specifications, and helps in the solution of problems created by random garbage dumps.

Rural cleanup and dump closing are the subject of environmental quality laws. TVA assists Valley counties in closing random dumps by lending equipment and by providing technical assistance, the object being to conduct one demonstration project in each county, accompanied by an educational campaign to make local people aware of the necessity of cooperating with local governments in keeping their neighborhoods clean.

State laws requiring the proper disposal of solid wastes have created an unprecedented demand for assistance on opening and operating sanitary landfills. Existing sources are not able to meet this demand. TVA is providing technical assistance, including feasibility studies and operational plans. Sixteen landfills were planned in fiscal year 1973. This activity will be continued in 1974 and 1975.

New requirements for landfills are creating hundreds of jobs for heavy equipment operators. TVA is assisting local governments in training programs to orient new operators to efficient procedures that comply with state regulations.

Recovering and recycling solid waste components is a partial and permanent solution to problems of solid waste disposal. TVA works with local officials in developing methods of receiving, processing, transporting, and marketing materials suitable for recycling. Two community recycling projects were initiated in 1973. Four more are planned for fiscal years 1974 and 1975.

Advanced solid waste investigations will continue to seek improvements in disposal and recycling methods. Among the more promising studies are investigations of waste paper utilization as a cattle feed supplement, basic research on landfill sealants, use of strip mine pits as landfills, rubber recycling, and solid waste incineration and pyrolysis.

Tributary area organizations and local governments have continued and expanded efforts begun in fiscal year 1971 to rid the Valley of junked cars. TVA makes available for limited term demonstrations trucks especially adapted for the retrieval of abandoned junk cars. The local governments provide an operating crew and organize a citizen campaign to help locate the hulks and provide the necessary title clearance. These demonstrations have been very successful in encouraging local governments to begin continuing programs. TVA provides plans so that local governments may construct their own junk car retrievers. At the end of 1973 over 20,000 junked cars had been collected in 40 Valley counties by trucks built by local governments using plans provided by TVA.

Regional Air Quality Management

1973 actual	\$111,422
1974 estimate	128,000
1975 estimate	128,000

TVA conducts one of the largest known monitoring and research efforts related to atmospheric emissions from steam power plants. TVA is also conducting extensive in-house research on the removal of SO_2 from flue gases and is performing research of this character for the Air Pollution Control Office of the Environmental Protection Agency as discussed on pages 110 and 193, respectively.

Recognizing the necessity for effective air pollution control at all governmental levels, TVA also contributes to regional air quality management. Basic to regional air quality management is the operation of five air quality trend stations, remote from the influence of large urban and industrial pollution sources, for obtaining a systematic record of air quality trends in the Tennessee Valley watershed. A low-cost bioindicator air quality monitoring network employing white pine ramets to monitor long-term trends in air pollution effects is being developed. Air quality and meteorology data and technical information on control technology derived from TVA studies are made available to state and local agencies and industry.

TVA requires that industries include effective air quality controls in new plants at sites involving TVA lands and land rights.

Regional environmental quality assessment is a new activity proposed for this program. The need has been established by implementation of the National Environmental Policy Act, recent plant siting studies, movement toward establishing of a National Land Use Policy Act, and resource management legislation proposed in the President's legislative program, all of which emphasizes the need for a TVA activity to relate environmental quality, land use, and proposed development on a Valley-wide or regional basis.

Development of criteria and methodology is necessary to better guide environmental evaluation of sites proposed for TVA power plants, industry, recreation, and other uses. An information system is proposed to include a regional environmental resource inventory and methods to relate environmental quality data to land-use information and to display resulting information in a format usable for project and program planning.

DEVELOPMENT OF TRIBUTARY AREAS

1973 actual	\$1,530,038
1974 estimate	1,607,000
1975 estimate	1,669,000

Through the tributary area development program, TVA aids local governments and citizen groups to plan and implement subregional resource development efforts to accelerate social and economic progress. TVA provides a broad range of technical assistance to help these organizations to understand the interrelations of natural resources development and the social and economic growth. The program is based upon the premise that lasting progress comes when local citizens develop ability to control and improve their own futures. Today almost all of the Valley counties participate through citizens associations, special state agencies, multicounty development organizations, and local governmental agencies.

TVA involvement in tributary area development consists of working with the local people of each tributary area and helping them to identify area needs and opportunities. From this understanding a series of cooperative activities or projects is developed to accelerate economic and social progress. Efforts are concentrated on achievement of each project by consolidating inputs from the private sector, local government, state agencies, other Federal agencies, and TVA.

Developmental activities continue to grow in variety and scope. In response to changing conditions in tributary areas and shifts in aspirations, needs, and opportunities, new activities are added. These activities often provide a testing ground for new concepts and approaches to regional problems.

The resource development activities carried out by TVA in tributary area development are largely budgeted for and described in statements of the content of the programs of which they are a part. Thus, agricultural development in tributary areas is discussed under agricultural projects (pages 62-68), demonstrations of solid waste management (pages 75-76), technical assistance in recreation development programs is discussed in the section on recreation (pages 41-44) and assistance in water quality management is described in the section of that title (pages 38-40). The 1975 estimate of \$1,669,000 for tributary area development covers the TVA cost of planning and coordinating activities, the direct cost of which may be charged elsewhere; providing technical advice and assistance to cooperating groups; and conducting development work in selected fields not undertaken regionally. TVA is now working with 42 local organizations in 35 areas covering the entire Tennessee Valley.

Tributary area development includes the development, testing, and demonstration of innovative projects and activities that are either "spun off" to TVA regional programs, to local units of government, or to the private sector. A variety of activities are under way to provide assistance to local governments. One such project is to aid local governments to plan and use automatic data processing applications to such functions as tax records and payrolls. This involves a clearinghouse to allow maximum interchange of programs and conduct of feasibility studies to determine types of computers and programs needed for specific situations. Many small units of government cannot afford to own computers. They can be aided through the organization of computer cooperatives. Using its computer capabilities, TVA is assisting in demonstrations of computer programming of service vehicle routings, such as school buses and garbage collection trucks.

Assistance is also given to local governments in such areas as rural fire protection, whereby TVA will give technical advice on equipment design and the development of systems for providing services promptly. TVA works also in helping provide training programs for public employees. Studies of mass-transit innovations are under way. Technical assistance is offered in development of administrative and accounting procedures for implementing revenue sharing plans. Other activities include programs to develop leadership among young people.

These activities are conducted under contracts and letters of agreement with local government units and other local organizations.

DEMONSTRATIONS IN EDUCATION AND MANPOWER DEVELOPMENT

1973 actual	\$803,143
1974 estimate	801,000
1975 estimate	801,000

Education resources and practices in the Tennessee Valley region influence in large measure the extent to which Valley people assume productive roles as workers, citizens, family members, and participants in cultural pursuits. The goal of TVA's demonstrations in education and manpower development is to improve the breadth, quality, and availability of education and training activities in the region.

The fiscal year 1975 program includes a variety of projects designed to promote improvements in Valley education. TVA is a partner in a cooperative regional educational research and training center for school board members. The center, located at Tuscaloosa, Alabama, provides state school board associations and their members with research, training, information, and technical services on persistent and significant educational problems. The center also serves as a clearinghouse for free exchange of information relating to public school education. The success of this project has led to a recognition of the need to develop the skills of school administrators and the upgrading of curriculum in school administration. TVA will work with college departments of education on this project.

Another cooperative project encourages rural school systems to use modern, pertinent educational planning and management techniques. Materials and educational resources will be selected and a demonstration plan will be designed and carried out in a rural school system.

TVA is assisting state groups, including departments of education, in preparing master plans for environmental education.

Manpower development activities will include a training program for public utilities employees and a demonstration program for training environmental technicians.

REGIONAL DEVELOPMENT PLANNING

1973 actual	\$476,132
1974 estimate	560,000
1975 estimate	592,000

The estimate for regional development covers staff expenses for analyzing and interpreting basic social, economic, and demographic data on the Tennessee Valley and for translating the findings into plans for development concerned with the general economic and environmental quality of life. These plans serve to guide TVA programs and to help Valley institutions determine how far the region has come and how far and how fast it can go in solving its problems and realizing its opportunities.

A major objective of current regional development planning studies is the systematic preparation of overviews of planning and development within the 201-county Tennessee Valley region. These studies are on a subregion basis developed cooperatively with the official state, regional (multicounty), and local planning and development agencies serving the Valley area.

TVA maintains information on population, employment, income, unemployment, and other socioeconomic measures in the region to assist in planning. Changes in geographic distribution as well as regional changes over time are analyzed to determine their meaning and implications for planning and development in the region and their impact on ongoing and planned programs and projects.

Cooperative population and economic studies are conducted to provide basic data and techniques, such as community profiles, retail trade analyses, and regional simulation models, in order to understand the changes in the region. Data and projections from these analyses give important support for meeting requests for assistance in regional and community development plans and for relating TVA water resources development and other programs to city and regional planning efforts, in addition to being used in TVA program planning.

Relationships with state and local governments and their legal powers, willingness to take political and administrative action, and financial resources all impinge upon the ultimate success of many activities carried on by TVA. Moreover, the public sector is one of the larger segments of the regional economy, particularly in employment. Information and technical data are continuously assembled on current developments in the state and local field in the Valley region, with emphasis on public finances and tax trends.

Environmental values and amenities are of paramount concern in regional development planning. TVA conducts environmental resource surveys in conjunction with state, regional, and local planning agencies and environmental groups to provide an environmental "early warning" system, to identify opportunities for improving environmental quality, and to make available needed information for the public. TVA also works with state, regional, and local planning groups to ensure that land-use plans include environmental quality implications.

TOWNLIFT COMMUNITY IMPROVEMENT

	1973 Actual	1974 Estimate	1975 Estimate
Planning improvement of existing towns and investigation of new town opportunities	\$487,106	\$504,000	\$515,000
New community development examples:			
Timberlake	106,668	100,000	100,000
Lower Elk River	100,716	100,000	100,000
Administrative and general expenses	28,884	31,000	32,000
Total	723,374	735,000	747,000

Townlift community improvement activities cover two broad categories of work: improvement of the physical structure and economic base of existing communities, and development of new communities. These activities are conducted to encourage orderly development, attractiveness, and efficiency of urban places in the Tennessee Valley. Particular attention is given to small communities in planning the development of a viable economic base and adequate public service facilities.

With the advent of revenue sharing, communities are increasingly asking TVA to assist in formulating plans for potential projects. During 1974, some 37 project plans will be completed and in 1975 between 40 and 45 project plans will be undertaken. New community development in fiscal year 1975 will continue in four areas.

The emerging recognition of small- and medium-size communities as important alternatives to metropolitan living prompted TVA to work with the Valley's city and regional planning commissions to revitalize older communities and make them better places in which to live and work. Local governments are offered a multidisciplinary team of planners, architects,

engineers, and economists, who have expertise in problem solving within urban areas. Immediate problems, such as deteriorating downtown areas, strip highway congestion, or lack of adequate industrial areas are studied within the context of total community needs. Plans are prepared in cooperation with local citizens and public officials which, when implemented by the communities, will correct the problem and improve the total community. Examples of places where progress is being made include Fulton, Kentucky; Fayetteville, Tennessee; Elkmont, Alabama; and Jonesboro, Tennessee. In addition, townlift assistance helps to provide a basis and an opportunity for other Federal programs to assist in project implementation.

In addition to work in existing communities, the townlift community improvement program provides assistance in planning for new town development opportunities in the Tennessee Valley region. TVA's role in these developments is to cooperate with other governmental and private organizations in developing comprehensive plans and in determining the economic feasibility of new communities. An example is TVA's cooperative work with the North Central Alabama Regional Council of Governments which has led to the proposed new town of Valtaco. We are now working on a similar new town feasibility study for a strip mine area in Muhlenberg, Kentucky.

Timberlake

The Tellico project on the Little Tennessee River will create a grouping of physical relationships (i.e., controlled land base, rail, barge, highway access, etc.) which provides the potential for creating a major regional center for socioeconomic growth. A new community called Timberlake is being planned as an integrated ideal living, working, and recreation environment to achieve realization of this potential and to prevent any further long-run deterioration of the environment.

In fiscal year 1975 studies will be under way to establish development standards and guidelines and environmental quality standards. Specific public-private roles will be identified, criteria for new-town governmental relationships, and requirements for new community services will be established.

The general development concept anticipates a joint arrangement by TVA and a private "master" developer whereby each would have a major role in planning, developing, and managing the new community over a 20-year development period. The projected development program identified for Timberlake indicates that at the end of 20 years the new community will have a population of 32,000, have provided about 10,000 housing units of all types and prices, and fostered 16,000 regional job opportunities.

Lower Elk River

The lower portion of the Elk River area in Lincoln and Giles counties, Tennessee, and Limestone County, Alabama, is a rural area predominately in farms and forests. It is typical of many rural areas with declining population, a limited number of jobs, poor housing, and inadequate public services.

The Lower Elk concept has been developed as a plan to guide area improvement efforts. Presently, development planning concentrates on the interrelated system of existing communities and accompanying potential for completely new small rural village clusters of approximately 2,500 persons each in a permanent setting of agricultural and other open rural type land uses with existing communities slated for special attention.

The area's natural environmental quality is among its greatest assets. Therefore, the Lower Elk concept is an approach to the proper management of the natural environment in a way to assure its continued use and enjoyment. Its design is to achieve rational utilization of rural land and resources while providing for a full range of choices of living conditions within a healthy environmental setting.

Studies and actions in progress will set the frame for maintaining the open space in the area and will provide a regionwide system of services such as water supply, waste disposal, health, and education. A program of specific actions in individual communities will be initiated.

Details for the start of the first of the nine new rural villages planned for the area will be completed. These preparations will include the completion of an environmental impact analysis.

INTERAGENCY HEALTH SERVICE DEMONSTRATIONS

1973 actual	-
1974 estimate	\$104,000
1975 estimate	155,000

As an agency responsible for unified development of regional resources, TVA is concerned with the development of human resources. Within this context, health is viewed as a basic human resource.

As a part of its major program activities, TVA has an occupational health program which provides a broad range of employee health services. Technological aids to medical practice have been adapted to this program as a means of extending quality health services to employees at remote work locations. Many components of this program have been found to have useful application in community health situations, with only minor adaptations. TVA recognizes a responsibility to share the benefits of its health service capabilities with the people of the region and the Nation. To meet that responsibility TVA helps local people to help themselves through use of technology.

During the past few years, the number and magnitude of requests from other regional and local agencies and organizations and community groups for TVA assistance in attacking health problems have increased greatly. Recent and current cooperative interagency projects in which TVA has been involved include demonstrations of: (1) mobile health care facilities in rural areas, (2) emergency medical transportation and equipment, (3) mobile automated multiphasic health testing, (4) regional medical laboratory and automated laboratory systems, (5) computerized electrocardiography, and (6) cooperative health education projects. Upon request, TVA has also provided technical assistance to other agencies in planning and organizing health services and securing facilities.

LAND BETWEEN THE LAKES

CAPITAL OUTLAY

1973 actual	\$1,848,112
1974 estimate	2,497,000
1975 estimate	2,041,000

TVA's Land Between The Lakes project in west Kentucky and Tennessee involves the development of a peninsula lying between TVA's Kentucky Lake and Corps of Engineers' Lake Barkley for outdoor recreation and environmental education.

Conceived as a demonstration in "how an area with limited timber and agricultural and industrial resources can be converted into a recreational asset that will stimulate economic growth of the region," the program is now a vehicle for innovative recreation and education activities. Fiscal year 1975 will mark the beginning of the second decade for Between The Lakes program. During the first 10 years, this 170,000-acre peninsula and the lakes around it have become firmly established as a major public outdoor recreation and education center in middle America. Annual visitation has grown from 12,000 in 1964 to 2.0 million in 1973 and is projected to increase to 2.2 million in 1975.

Visitor Estimates by Calendar Years and Types of Use

<u>Visitor use</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Family campgrounds	224,843	229,844	240,000	260,000
Group camps	45,965	53,504	65,000	72,000
Education centers	167,926	177,744	187,000	210,000
Informal use areas:				
Campers	155,448	147,199	160,000	170,000
Other use	772,866	943,225	940,000	950,000
Hunting	32,420	43,704	45,000	45,000
General and other visitors	590,532	458,780	463,000	493,000
Total	<u>1,990,000</u>	<u>2,054,000</u>	<u>2,100,000</u>	<u>2,200,000</u>

Visitors come from all 50 states and some foreign countries each year, but primarily they come from within a 250-mile radius of the demonstration. A 1973 study by the University of Kentucky found in a sampling of Hillman Ferry campground users the following percentages by state of origin: Kentucky 31; Tennessee 14; Illinois 22; Indiana 11; Ohio 7; Missouri 5; Michigan 4; all others 6. A total of 26 states and Canada were represented in the sample.

The fuel shortage is not expected to reduce use, particularly for camping and other extended stays, since most visitors come from within the region. Visitation from outside the 250-mile radius will likely decline. Because of the energy situation, visitation is estimated to hold at about the 1973 level through 1974 and increase slightly in 1975.

Each year more families are using Land Between The Lakes as a destination vacation spot. Likewise, use by organized groups is growing in number and in distance traveled. Here in relatively uncrowded space the visitor enjoys a variety of outdoor activities including camping, sightseeing, hiking, fishing, hunting, boating, and simply learning about the area's natural resources and their values. The natural resources of the area offer excellent teaching opportunities thereby allowing the demonstration to serve as a pilot plant in environmental education. Its formalized programs have provided experience for more than 22,000 students and a training ground for 2,000 teachers since 1966. Its camping areas, forest, and trails have brought recreation and education to millions more.

To accommodate the present level of use requires a variety of activities for visitors, together with supports that ensure safe travel; provision of water, sanitation facilities, and waste disposal; and reasonable security and protection to life

and personal properties of users. The burden of providing such supports falls heavily in the early years of project development. These include improved roads, stations to receive and inform visitors, places to describe and interpret points of interest, and work space for employees to function efficiently—shops, warehouses, and maintenance bases. These basic supports are being provided through the gradual addition of improvements. Some acceleration will be required in providing major features as the visitor load increases. No new starts on major facilities are provided for in the 1975 estimate.

Conservation and Education Facilities

	1973 Actual	1974 Estimate	1975 Estimate
Upland game and migratory waterfowl			
Education stations	\$40,075	\$50,000	\$90,000
Other facilities	34,652	34,000	35,000
		1,000	62,000
Total	<u>74,727</u>	<u>85,000</u>	<u>187,000</u>

The 1975 estimate of \$90,000 for upland game and migratory waterfowl continues the program of habitat improvement for restoration distribution of wildlife populations and provides for 60 acres of woods openings, 12 water holes, and 3 supplemental ponds.

An estimate of \$35,000 for education stations will be used to continue the development of teaching units vital to support the environmental education program conducted in Land Between The Lakes for resident and day-use school groups and for other visitors.

Other facilities, estimated at \$62,000, include electric service, potable water, and sanitation facilities at the field archery range; increased parking from 15 to 30 vehicles at the Silo Overlook; and a trail and parking areas to improve the observation by visitors at the buffalo range.

Recreation Facilities

	<u>1973</u> <u>Actual</u>	<u>1974</u> <u>Estimate</u>	<u>1975</u> <u>Estimate</u>
Brandon Spring group camp	\$792,992	\$501,000	\$390,000
Rushing Creek campground	-	117,000	81,000
Hillman Ferry campground	111,218	199,000	-
Piney campground	27,716	24,000	28,000
Informal use areas	30,314	181,000	165,000
Major trails system	44,509	49,000	142,000
Miscellaneous additions	28,267	4,000	34,000
Total	<u>1,035,016</u>	<u>1,075,000</u>	<u>840,000</u>

Brandon Spring group camp, with bunkhouse capacity for 128 persons, will be placed in operation in fiscal year 1974. The estimate of \$390,000 in 1975 will provide a realigned and safe access road (1.25 miles), general grading and landscaping, yard lighting, parking space, walkways, and waterfront improvements.

At Rushing Creek the existing 212 campsites originally built to serve tent campers are being renovated in fiscal year 1974 to serve mobile camping equipment. The 1975 estimate of \$81,000 will increase the number of campsites from 212 to 250, incorporating a portion of Jones Creek day-use area, add a sanitary dumping station, and a network of hiking trails.

The estimate of \$28,000 for Piney campground in fiscal year 1975 is to complete work begun in 1974 on a central playground with nearby parking space for 50 automobiles, a maintenance area, and hiking trails.

Work at informal use areas will continue upgrading existing areas to help meet the camping load. The estimate of \$165,000 will increase campsites by 50.

Work will continue in 1975 on the major trails system. It includes (a) general purpose hiking trails and outpost camps and (b) high adventure trails and base camps. At appropriate intervals on both classes of trails there will be essentials such as outpost campsites, water points, and sanitation facilities. The system is being constructed in segments which ultimately may be connected as a longitudinal trail of some 65 to 70 miles. Additions to the Fort Henry historical trail constructed in 1974 will include parking areas, water supply, and chemical toilets at various starting and terminal points.

The high adventure trail designed to serve the experienced hiker will also serve the more skilled program activities of the Boy Scouts of America and others interested and capable of rugged trail camping.

The 1975 estimate for trails work is \$142,000.

General Support Additions

	1973 Actual	1974 Estimate	1975 Estimate
Golden Pond field office	\$12,332	\$305,000	\$375,000
Improvements to Highway 453 (north)	51,484	760,000	-
North entrance traffic control facility	-	108,000	104,000
Other road improvements	259,373	-	196,000
Cleanup and aesthetic improvements	39,085	38,000	110,000
Other general support	376,095	126,000	229,000
Total	<u>738,369</u>	<u>1,337,000</u>	<u>1,014,000</u>

Golden Pond field office. The 1975 estimate of \$375,000 will complete the construction of an operations office building including access, parking, and utilities. The remaining temporary quarters (mobile trailers) housing two-thirds of the operating personnel will be released during 1975 and site scars corrected. Landscaping and yard improvements at the office building will be scheduled for 1976.

North entrance traffic control facility. The site work including grading and surfacing of channelized lanes, revision to the sanitary dumping station, and grading for parking area and reception building site is scheduled for fiscal year 1974. The 1975 estimate of \$104,000 will provide for construction of the visitor reception building, service counter, restrooms, materials storage and communications equipment; adjoining space for weighing and checking game during hunts with provisions for biological samplings; parking for 50 automobiles with adequate turn space for buses and recreation vehicles; and installation of traffic signals.

Other road improvements include the upgrading of 50 miles of existing gravel roads serving as access to informal use areas and other points of visitation to make them safe for recreation vehicular traffic at an estimated cost of \$112,000.

Other work includes completion of studies, surveys, and design for the construction of a permanent access road at the south from U.S. Highway 79 to connect with the Blue Spring Road near its intersection with the Trace (Tennessee Highway 49), \$49,000; and surveys and design for upgrading the heavy-use segments of the secondary road network, \$35,000.

The cleanup and aesthetic improvement program is a continuing effort to obliterate the remains of old building sites, land scars, abandoned car bodies, and litter left from the days of private ownership. Out of a total of 1,050 sites requiring cleanup about 72 percent was accomplished through fiscal year 1973. The estimate of \$110,000 in 1975 will bring the work to 86 percent completion and will provide \$8,000 for stabilizing some of the historical structures in various parts of the project area pursuant to Executive Order 11593.

Other general support includes the installation of guard posts with reflectors on Bards Dam for traffic safety; directional and information signs for the main entrance roads; a sewage lagoon water system near the center of the project to serve campers entering and leaving the Trace at U.S. Highway 68; and miscellaneous equipment and improvements.

OPERATING EXPENSES

Land Between The Lakes is operated to afford maximum opportunities for public outdoor recreation and environmental education consistent with sound ecological management of the area's natural resources. To ensure optimum benefit of the area's land resources, techniques of multiple land-use management are employed to provide food and cover for wildlife, upgrade the quality of the forest, and to improve the area's natural beauty. These developmental steps are transforming an area which formerly contributed little to the region to one that provides programs, services, and facilities responsive to the public's leisure needs and interest in the natural environment.

Summary of Land Between The Lakes Operating Expenses

	1973 Actual	1974 Estimate	1975 Estimate
<u>Income</u>	<u>\$193,762</u>	<u>\$260,000</u>	<u>\$327,000</u>
<u>Expenses</u>			
Conservation and education operations	677,344	788,000	799,000
Recreation operations	509,148	593,000	609,000
Supporting operations	849,172	844,000	846,000
Distribution of administrative and general expenses	<u>61,536</u>	<u>67,000</u>	<u>68,000</u>
Total expenses before depreciation	2,097,200	2,292,000	2,322,000
Writeoffs of abandoned projects ¹	21,641	-	-
Depreciation	<u>380,629</u>	<u>385,000</u>	<u>400,000</u>
Total expenses	<u>2,499,470</u>	<u>2,677,000</u>	<u>2,722,000</u>
Net expense of Land Between The Lakes operations	<u>2,305,708</u>	<u>2,417,000</u>	<u>2,395,000</u>

1. These are charges to operating expenses of writeoffs of abandoned recreation projects at Land Between The Lakes. Like depreciation they require no financing and are included here in the interest of completeness of reporting.

Conservation and Education Operations
(\$799,000)

Environmental education activities are centered in a 5,000-acre segment of the project. Center Station is the reception building for visitors. Here the story and goals of the demonstration are told in display, brochures, and by films. Several nature trails lead out from the Center which visitors may hike. Other points of interest include the ruins of historical Center Furnace and other marks of the iron age, the Silo Overlook, and wildlife observation. Almost 60,000 visitors registered at Center Station in 1973.

The Youth Station, which represents the resident portion of the environmental education program, was built to demonstrate approaches to environmental education in school systems. New schools are being introduced to the program each year. The Station has overnight capacity for 72 people and it serves from 7,000 to 10,000 students and adults annually in residents. In addition, 8,000 to 10,000 students make day-use visits to the Station annually. Income from TVA services is estimated at \$50,000 for 1975.

Empire Farm was developed as an education station in conjunction with the formalized program conducted at the Youth Station. Here school classes are brought into direct contact with the land and farm animals, and with practical lessons in the production and processing of foods and other farm products. The Farm is open also for general public visitation at scheduled hours. Over 46,000 persons registered here during calendar year 1973.

Environmental education extension is a phase of the program conducted in the Environmental Education Center of Land Between The Lakes. The Environmental Education Center staff assists in developing environmental education programs in school systems. Efforts are primarily directed toward working through regional groupings of schools systems. The approach assures strong leadership, lessened financial obligation for the school involved and enables TVA to contribute its professional and technical assistance to a broader base of community leaders and school administrators involved in environmental education. Many schools have been aided in developing environmental study areas at their school sites or on other community owned lands. Other assistance has included teacher training and curriculum development.

Wildlife management activities are directed to achieving optimum wildlife populations. The work program is directed to improving wildlife food and habitat, thus ensuring bird and animal propagation and enhancing recreation and education opportunities for sightseers, organized study groups, and sportsmen. An annual program provides and maintains cover plantings, wood openings, waterholes, and control of reverting lands and of timber harvests. Investigations are conducted on wildlife species, population densities, levels for harvesting, and disease occurrences and their control.

Approximately 10,000 acres of open lands are devoted to wildlife food crops; about 6,500 acres in annual crops and the remainder in perennial pastures. More than half of the acreage is operated by local farmers under crop-sharing arrangements.

Other activities include the operation of subimpoundments and farm ponds for waterfowl and fish management; studies and research on deer, turkey, and other upland game; trapping, tagging, and banding work on upland game, doves, and waterfowl; development of plans for management and distribution to ensure optimum wildlife populations; and management of special features such as the resident flock of Canada geese and the buffalo herd. The herd has increased from 19 young animals in 1969 to 57 animals in 1973.

Managed hunting opportunities are provided on 150 days each calendar year. Hunts are scheduled for deer, wild turkey, ducks, geese, upland birds, and small game. The deer harvest in 1973 was 1,317 animals of which 200 were taken by bow and arrow. Permits for deer hunting were issued to 6,646 persons for bow hunting and 7,425 for gun hunts. For the gun hunt 13,976 persons applied which exceeded the number to be accommodated. The selection was determined by computer.

Cooperative relationships are maintained with representatives of agencies of Kentucky and Tennessee and with other Federal agencies concerned with wildlife resources in this area.

Forest management incorporates the most recent recommendations from research foresters and wildlife biologists. The 145,000 acres of forest serve as a national demonstration of multipurpose management, improving both timber quality and growth, and wildlife habitat. The work includes reforestation, timber stand improvement, timber harvest, and forest fire protection. The latter is accomplished through contracts with the states of Kentucky and Tennessee. Through fiscal year 1973, a total of 2,264,000 seedlings had been planted; about 230,000 pine seedlings are to be planted in fiscal year 1974; and 230,000 pine seedlings in 1975. Long-range plans call for planting 2.1 million more trees in the years ahead. Timber stand improvement work has been completed on 4,237 acres and plans include 900 acres in fiscal year 1974 and an additional 900 acres in 1975. Stand improvement needed on 15,000 acres should be accomplished over the next seven years. Timber sales of 1.9 million feet in 1973 are expected to increase to 2.9 million feet in 1974 and 1975, yielding income estimated at \$40,000 each year.

Other forestry program activities include inventory of timbered areas, growth and quality studies on which to base management plans, checking potentials for disease and insect damage and applying control measures if needed, and developing and implementing plans for forestry educational demonstrations in extension of conservation education activities.

Recreation Operations
(\$609,000)

Recreation operations include management of campgrounds for families and groups and care of day-use areas, overlooks, picnic and lake access areas and associated roads, playgrounds, swimming areas, water supply systems, and sanitary facilities. Services include reception and registration of guests, collection of user fees where appropriate, preparation and distribution of informational materials, conduct of scheduled group recreational activities, and protection of visitors and their property. Maintenance services ensure clean, safe, and attractive conditions. Over 2.2 million visitors are estimated to be served in 1975. During fiscal year 1975 the following major facilities will be in operation and serve an estimated 502,000 campers. Income from the operation of these facilities is estimated at \$235,000 in fiscal year 1975.

- Rushing Creek family camp - 212 campsites, completed in fiscal year 1966; to be upgraded in fiscal years 1974 and 1975
- Hillman Ferry family camp - 310 campsites, completed in fiscal year 1967; 70 to be added in fiscal year 1974
- Piney family camp - 100 campsites completed in fiscal year 1969; and 100 completed in fiscal year 1971
- Camporee area
 - Camp Energy group camp - 400 capacity, opened in calendar year 1968
 - Bivouac group camp area - 700 capacity
- Brandon Spring group camp - 128 capacity, to open in fiscal year 1974
- Informal use areas (28) - 3,000 capacity; up to 500 family groups overnight

Other activities include development of plans for maximizing use of outdoor opportunities and facilities; testing of innovative ideas and practices of possible demonstration values; and encouraging and cooperating with other agencies in the conduct of recreational activities of general economic and social benefit to the region. TVA manages special features such as the Off-Road Vehicle (ORV) area and the Wranglers Camp for horseback riders and a trails system consisting of a 26-mile trail complex, a 17-mile trail, and several lesser trails for hiking and nature walks. Cooperative programs include Project Outward Bound for disadvantaged youths, camporees by youth organizations, tree plantings, and other conservation projects by youth groups; and hike days and cleanup days. An annual reunion of former residents of the Land Between The Lakes area attracts up to 2,000 persons.

A work-study program is conducted for college level students taking recreation related courses. The students are assigned to Land Between The Lakes under an agreement between TVA and sponsoring colleges and universities which provide that the students are eligible for academic credit during the employment period of 12 to 14 weeks. During the summer of 1973, seventeen students from 12 universities participated in the program.

Supporting Operations
(\$846,000)

Supporting operations include diverse activities associated with both the conservation and education and the recreation programs. Major activities include:

Administration and reception. The field office for the demonstration is located at the geographic center of the area adjacent to U.S. Highway 68. The present base, housed in mobile trailers and other temporary structures, will be removed when a permanent office building is completed in fiscal year 1975. The main reception station for visitors is also located in the complex. Over 44,000 visitors were received in fiscal year 1973 at this station. Pending the relocation, special safety precautions are required to protect employees and visitors from the hazards of congested highway traffic and substandard structures.

To assist visitors entering Land Between The Lakes at the north and south, temporary information booths are manned during periods of heavy visitation. A permanent entrance control facility at the north entrance, to be completed in 1975, will fill a real need at the point where nearly half of all visitors enter Land Between The Lakes.

Maintenance and additions. This activity provides maintenance and repair services for roads, grounds and other support facilities; grounds development and beautification, supervision of project additions, application of vector control measures, site planning, and development of plans for general betterments to project facilities. A major function is the upkeep of roads and trails. The road system receiving regular maintenance totals 420 miles, consisting of 95 miles of hard surface roads, 290 miles of gravel surface secondary roads, and 35 miles of fire trails. Constructive maintenance is being applied to upgrade most of the secondary roads to make them adequate for recreation vehicular traffic. All roads which serve visitor use require adequate signs for directional and informational purposes.

-Other maintenance activities include (1) elimination of hazards such as open wells and cisterns, old wire fences, and dead and down trees in public-use areas for protection of persons and wildlife in the area; (2) cleanup of drift and flottage at heavy use points along the 300 miles of shoreline; and (3) operation of shops, warehousing, and maintenance bases for the upkeep of grounds, buildings, and equipment and for the construction of additions.

-Property protection and services to visitors. A well-trained, uniformed patrol force is essential for the security of visitors and of their property. They provide services to visitors, protect government property from theft and vandalism, enforce game laws, and respond to emergency situations on land or water. Collaborative relationships are maintained with other law and conservation officers at local, state, and Federal levels.

FERTILIZER AND MUNITIONS DEVELOPMENT

Fertilizer and munitions development is a nationwide program with these broad objectives:

- To develop new and improved fertilizers and processes for their manufacture and use in order to increase their effectiveness and to lower their cost to the farmer; and
- To demonstrate the value of improved methods of using fertilizers.

The ultimate goal is to help the American farmer produce adequate low-cost food and fiber for the Nation while at the same time enjoying an adequate income for himself. The program promotes a more efficient commercial fertilizer industry by making new technology available. It encourages environmental conservation and enhancement through improved manufacturing and agricultural practices. TVA's chemical research, development, and production facilities and staff are available to aid the Department of Defense in times of war or national emergency.

The fertilizer and munitions development program indirectly contributes to other national objectives. It benefits the small business segment of the fertilizer industry by giving it ready access to advanced technology. Agricultural exports made possible by more efficient fertilizer use improve the Nation's balance of international payments. TVA gives technical advice to developing countries, thus helping them feed themselves. The research and development staff is available to give technical help in the solution of environmental problems associated with chemical emissions to the air and to water.

New fertilizer development in the United States, including materials more compatible with the environment, depends almost entirely on TVA's National Fertilizer Development Center. Fertilizer is a key material for the support of human life in a crowded world. Fertilizer can be substituted for land, labor, and capital, and thus affords operating economy and flexibility. Up to 45 percent of U.S. farm production gains in the past 30 years have been due to greater use of fertilizers. During the same period, agricultural manpower was cut in half and land in cultivation decreased by 11 percent. As a percentage of family income, food cost in the U.S. is lower than in any other country. Fertilizer use is essential to maintaining plant growth and thus in reducing erosion, flooding, sedimentation, and salination.

The fertilizer program contains two elements: (1) research and development and (2) fertilizer introduction. Research and development in this context includes basic agronomic and chemical research; fertilizer processes research and development; and sulfur recovery research, sulfur being a major fertilizer chemical. The National Fertilizer Development Center includes laboratory, greenhouse, pilot-plant facilities, and semicommercial-scale fertilizer production units. Land-grant university experiment stations cooperate in research activities. Fertilizer introduction carries the results of research and development to

the farmer and the fertilizer industry through farm test demonstrations and industry demonstrations. Developmental (prototype-scale) production of new and improved fertilizers is the link between research and development and these demonstrations. Demonstrations are conducted in 38 states and Puerto Rico with the land-grant universities and 221 manufacturers and wholesale distributors and their retail dealers.

TVA works closely with farmers, land-grant universities, the fertilizer industry, and with other Federal agencies such as USAID and the Environmental Protection Agency in the conduct of this program.

IMPACT OF TVA'S FERTILIZER PROGRAM

The effects of the program on the U.S. fertilizer industry and the agricultural economy can be measured by these accomplishments:

1. American fertilizer technology has been revolutionized. TVA pioneered and promoted high-analysis fertilizers, developed the granulation method now widely used in making fertilizers, developed super-phosphoric acid, stimulated the liquid fertilizer industry, and promoted fertilizer bulk blending. Through June 30, 1973, TVA has granted 549 patent licenses to 329 firms for use in 484 plants in 39 states.
2. The farmer's fertilizer cost has been lowered and his efficiency improved. Plant nutrient costs dropped by 45 percent between 1950 and 1970 while all farm costs increased by 52 percent. If fertilizer costs had also gone up at this rate the farmer's bill for fertilizer in 1970 would have been \$5.3 billion, or \$3.4 billion higher than it was.
3. Farm fertilizer use has improved. Demonstrations in nearly every state in the Union have helped solve major soil fertility problems, have determined the best methods of fertilizer application, and have fitted fertilizer into balanced whole-farm programs for greater agricultural efficiency.
4. The small business segment of the fertilizer industry has been preserved. The availability of new methods, materials, and technical help from TVA has been a key factor in keeping small fertilizer businesses alive and competitive and in helping them overcome pollution problems.
5. TVA fertilizer technology has helped to keep the U.S. fertilizer industry competitive in the world market. Two fertilizers introduced by TVA accounted for 51 percent of all fertilizer exports from the U.S. in 1972, and U.S. fertilizer exports amounted to about 12 percent of the world market.

BASIC CHANGES IN TVA'S FUTURE PROGRAM

The estimates for 1974 and 1975 continue to reflect basic changes in TVA's fertilizer program as it in turn affects and is affected by the national fertilizer and agricultural situations.

The importance of wet-process phosphoric acid as a phosphate fertilizer intermediate has increased rapidly since the 1960's. Furnace acid has declined in importance. The cost differential between the two continues to widen in favor of wet-process acid. The reasons for this are: (1) sulfur, a major ingredient for wet-process phosphoric acid manufacture, is in plentiful supply and its price has declined sharply; (2) plant investment for wet-process acid production is only half that for furnace acid; and (3) the cost of furnace acid has become prohibitive for fertilizer manufacture because of higher costs of electricity, coke, operating and maintenance labor, and the like. Wet-process acid is selling at a price below the production cost of furnace acid. The low cost of wet-process phosphoric acid makes it less advantageous to use the nitric phosphate method of producing fertilizers (where phosphate rock is treated with nitric acid rather than with sulfuric acid to make the phosphorus available to plants).

Urea fertilizers made from ammonia and byproduct carbon dioxide are expected to replace nitrates as the dominant nitrogen fertilizer form by the late 1970's. Their analysis is higher, their production involves less pollution, and they are less hazardous to handle and store than is ammonium nitrate, the major solid nitrogen material on the U.S. market today.

Beginning in 1969 TVA set out to modify and improve its basic production facilities and to restructure its program in anticipation of the changes expected to occur, as described above. A new ammonia plant and a urea solution unit were built. In 1971 initial steps were taken to secure a supply of wet-process phosphoric acid to replace the electric-furnace acid made by TVA. As commercial sources of acid become available, electric-furnace operation will be eliminated. To simplify plant operating procedures, including storage, TVA will suspend the production of fertilizers containing nitrates and will concentrate on materials containing urea. The following steps are being taken in the current period of transition which began in 1973:

1. Shift production of basic phosphate raw materials and intermediates from TVA to private producers. This will enable TVA to benefit from industry's larger scale of production and more favorable manufacturing locations. It will eliminate TVA's high operating costs for mining, electric-furnace, and acid unit operations; avoid large expenditures for maintenance and replacement of basic facilities; and large outlays for meeting standards for pollution abatement and worker safety will be avoided. Developments in technology and marketing will be more readily adaptable by industry, being directly related to private production capability, and benefits will be more rapidly available to agriculture.

2. Drop production of solid nitrate and nitric-phosphate fertilizers. TVA is concluding its introduction program for these nitrate materials and processes. Because industry has not expanded for several years, there has been some delay in their adoption by private firms. Adoption of nitric phosphate fertilizers has been limited because the process is most advantageous when sulfur prices are high. This move will reduce operating expense and will limit the need for investment in new facilities including those for abating nitric oxide pollution. It will relieve the necessity of adding storage space for fertilizers containing urea. Urea and nitrates are incompatible in common storage.
3. Modify present facilities to produce urea-containing fertilizers with production to begin with fiscal year 1974. Elimination of solid nitrate fertilizers makes it possible to do this by freeing existing production facilities. This will permit savings of about \$800,000 in investment and six months construction time. Introduction of the new materials can start that much sooner and in time to meet the heavy spring shipping season. Two fertilizers that could not be made in a separate new facility can be produced in the modified existing unit.

Adoption of this operating plan will save about \$6 million in facilities investment through 1978. Appropriation fund requirements for developmental production will decrease in 1975. To make these changes, research and development will heavily emphasize wet-process phosphoric acid use and urea fertilizer technology and sources of wet-process acid supply will be arranged through long-term contracts.

CHEMICAL FACILITIES (Capital Outlay)

1973 actual	\$3,155,577
1974 estimate	4,262,000
1975 estimate	2,959,000

The 1975 estimate for chemical facilities includes no new major starts. This reflects the substantial completion of a plant improvement program begun in 1969 to improve basic production facilities and to revise the fertilizer production and introduction program as described above. These changes primarily concern the substitution of commercial wet-process phosphoric acid for TVA-produced electric-furnace acid as a source of phosphates and a shift from the production of solid nitrates to the use of fertilizers containing urea.

Sulfur-Coated Urea Unit

1973 actual	
1974 estimate	\$500,000
1975 estimate	1,400,000

The 1975 estimate covers the completion of facilities for making sulfur-coated urea (SCU). Design and procurement will be initiated in fiscal year 1974. Total estimated cost of the unit is \$1,950,000. TVA developed SCU, a greatly improved nitrogen fertilizer, made by coating urea granules with molten sulfur to delay release of nitrogen to the soil. A wax may be added to seal cracks in the coating. The coating also improves physical properties of the fertilizer; where slow nitrogen release is not desired, only a light coating of sulfur is sufficient.

Greenhouse and field tests indicate that use of SCU in most cropping systems will reduce leaching of fertilizer nitrogen into natural waters without penalizing yields. SCU is the only known low-cost, slow-release product that can be substituted for today's soluble nitrogen fertilizers in the event that restrictions are placed on their use. SCU has been evaluated on a variety of crops in 48 states, 2 territories, and 33 foreign countries. It has produced superior yields and favorable benefit-cost ratios on rice grown under delayed or intermittent flooding. Large responses were obtained on sugar cane and pineapples. Grass forages benefited, especially when SCU was applied for more than one year on the same land. SCU also is excellent for turfs. Single applications in the spring lasted throughout the growing season, whereas two to four applications of conventional fertilizer were needed for the same result. Crops such as corn, small grains, and cotton—whose major nitrogen needs must be met over a short period—usually have responded advantageously to SCU only when grown on porous soils.

SCU also has several beneficial properties other than its slow-release characteristic. The sulfur coating furnishes nutrient sulfur. The danger that applied nitrogen will "burn" germinating seedlings or foliage is greatly reduced with SCU. Excessive (luxury) consumption of nitrogen by crops is minimized. Losses of nitrogen by volatilization should be less and problems of subsoil acidity resulting from nitrate leaching should be avoided. SCU will be useful in bulk blending because of its larger granule size and because the coating prevents undesirable chemical reactions with such other fertilizer materials as triple superphosphate. It has greater crushing strength and resistance to abrasion. The sulfur coating reduces adsorption of moisture and caking, making SCU easier to store and spread. Sulfur coated urea costs more per ton of nitrogen content than does conventional urea because of a difference in analysis (35 percent for SCU vs. 45 percent for urea). However, the improved efficiency of crop production made possible by the slow release capability of SCU far outweighs its greater cost.

An analysis of potential markets identified four major uses for SCU having important national benefits.

1. To improve efficiency of crop production. Because of its controlled-release property, SCU could be expected to replace soluble nitrogen use on at least 14 million acres of farmland eventually.
2. As a nitrogen product with improved physical properties primarily for blending with other materials, SCU lightly coated with sulfur only should find wide use by bulk blenders. It should eventually replace ammonium nitrate in blending and direct application.
3. For export. Lightly coated SCU should be a valuable export material because of its high analysis and excellent physical properties. The United States so far has been unable to capture much of the nitrogen export market using conventional materials.
4. As a substitute for soluble nitrogen fertilizer to reduce potential nitrate pollution from farmlands. Realization of this benefit and its extent would depend upon whether restrictions are placed on use of nitrogen fertilizers.

Because the product and process are unique and the material untried on the market, the fertilizer industry has been reluctant to invest in facilities to produce SCU until TVA completes a demonstration-scale unit to further perfect the process and to introduce the product.

Primary Pollution Abatement Facilities

1973 actual	\$943,782
1974 estimate	1,407,000
1975 estimate	939,000

Replacement of acid storage tanks will require \$939,000, completing the purchase of six tanks with a combined capacity of 17,600 tons. This is a continuation of a replacement program begun in 1972 and to be completed in 1976. Most of the existing storage tanks were built in the 1930's and 1940's. They leak, often need repair, and are potentially serious pollution hazards. Replacement is needed to provide an adequate supply of wet-process phosphoric acid. Wet-process phosphoric acid is usually not available in the heavy spring fertilizer season and must be obtained in the first part of the fiscal year and stored. There must be enough storage to carry through June.

Improvements and Additions to Production Facilities

1973 actual	\$53,314
1974 estimate	1,180,000
1975 estimate	175,000

The estimate for fiscal year 1974 includes two significant additions to facilities for making combination (multinutrient) fertilizers using wet-process phosphoric acid. Additional equipment will be installed for making ammonium polyphosphate, a high analysis (11-57-0) solid material. Raw materials will be black phosphoric acid and gaseous ammonia, the cheapest forms of acid and ammonia. The second addition is equipment for making a 11-39-0 suspension fertilizer from black acid and anhydrous ammonia, which is accounted a major technical breakthrough in the production of a high-analysis, lower cost material. The ammonium polyphosphate facility will cost \$600,000 and the suspension fertilizer addition will require \$390,000. Both will be begun and completed in 1974, which explains the higher estimate for that year.

Improvements to new production facilities are required to overcome problems and to increase efficiency during preliminary operations. An estimated \$125,000 will be required for improvements in the urea-ammonium phosphate and ammonia facilities. Other minor improvements and additions are routinely necessary in a complex, multiproduct chemical plant to improve operating efficiency and reduce maintenance cost; \$50,000 is included to allow for this.

Urea, Urea-Ammonium Phosphate Facilities

1973 actual	\$1,793,605
1974 estimate	793,000
1975 estimate	-

A project for producing urea and urea-ammonium phosphate fertilizer, initiated in 1970, will be completed in fiscal year 1974, following a delay of some four months. Total estimated cost of the project is \$15,658,000. The total project includes replacement of ammonia production facilities and construction of a urea solution unit, both of which are now in service. An existing granular combination fertilizer unit is being modified and necessary service facilities are being provided.

Urea-ammonium phosphate (UAP) is a high-analysis homogeneous fertilizer, not now commercially available, for which TVA developed a low-cost production process. Its agronomic qualities are superior for many U.S. crops and are outstanding for rice. First production of UAP is scheduled for fiscal year 1974.

Plant Replacements

1973 actual	\$51,584
1974 estimate	97,000
1975 estimate	65,000

This estimate is for necessary replacements within the TVA chemical plant which cannot be identified and scheduled very far in advance of the need. In a plant the size, complexity, and age of the TVA chemical plant, facilities must often be replaced immediately to continue operations or to protect employee health and safety. Emergency replacements ordinarily cannot be anticipated as individual items but can be budgeted on the basis of cost experience. An allowance of \$65,000 is included for emergency plant replacements.

General Equipment, Design Studies, and Administrative Expenses

1973 actual	\$313,292
1974 estimate	285,000
1975 estimate	380,000

This category includes mainly continuing needs for uninstalled equipment and work tools (mostly replacements and spares); chemical and agronomic research laboratory equipment; transportation and rehabilitation of surplus property transferred to TVA at no cost from other Federal agencies; preliminary design studies for future chemical facilities; and applicable administrative and general expenses.

FERTILIZER AND MUNITIONS DEVELOPMENT (Operating Expenses)

	1973 Actual	1974 Estimate	1975 Estimate
<u>Expenditures</u>			
Fertilizer research and development	\$5,486,534	\$5,761,000	\$5,839,000
Fertilizer introduction	28,399,840	32,959,000	36,881,000
Total	<u>33,886,374</u>	<u>38,720,000</u>	<u>42,720,000</u>
<u>Financing</u>			
Appropriated funds	13,462,017	12,786,000	12,426,000
Nonpower proceeds	20,424,357	25,934,000	30,294,000
Total	<u>33,886,374</u>	<u>38,720,000</u>	<u>42,720,000</u>
Income from program	<u>19,956,880</u>	<u>24,637,000</u>	<u>29,364,000</u>

FERTILIZER RESEARCH AND DEVELOPMENT

1973 actual	\$5,486,534
1974 estimate	5,761,000
1975 estimate	5,839,000

The National Fertilizer Development Center at Muscle Shoals, Alabama, is the Nation's major source of advanced fertilizer technology and is the world's principal center for fertilizer research and development. TVA's research and development program is strongly mission oriented, involving basic and applied research and continued development of promising new products and processes in pilot plants. Basic research provides the fundamental knowledge for new advances. Applied research operates on known facts and carries the discovery process through laboratory-scale development and evaluation. Small pilot plants permit the solution of some process and equipment problems and provide sufficient material for

initial agronomic evaluation. TVA has a special interest in the preservation of a quality environment, both in the vicinity of plants making fertilizers and in the waters draining from fields to which fertilizer has been applied. This extends to such investigations as to what happens to fertilizer nitrogen, and to heavy metals (e.g., zinc, chromium, lead) reaching soils as contaminants in fertilizers and in organic wastes, to the uptake of these metals, and to their movement in surface and groundwater. Studies also involve ways of recovering sulfur, a raw material in the manufacture of fertilizer, from industrial emissions in which it is a pollutant.

This program generates a wide range of technical advances and inventions and every effort is made to move them into the economy rapidly. Research results are widely publicized, using a variety of ways to obtain a payoff to the national economy by transfer of technology from laboratory, pilot plant, greenhouse, and field test to commercial fertilizer plants and operating farms. TVA patents its discoveries where possible and issues nonexclusive licenses for their use. Articles in professional and trade journals, presentations at technical meetings and training sessions, and published reports keep the interested public informed. Through correspondence and informal discussions TVA assists technical and scientific inquirers all over the world. On-site research and development demonstrations introduce new products and processes. Fertilizer introduction through tests and demonstrations on practical farms and in commercial fertilizer plants throughout the country spreads the results of TVA research and development nationwide.

Basic Agronomic and Chemical Research

1973 actual	\$2,153,811
1974 estimate	2,423,000
1975 estimate	2,393,000

Basic Agronomic Research

Basic agronomic research is national in scope and is conducted at both the National Fertilizer Development Center and under cooperative arrangements at the agricultural experiment stations at selected land-grant universities. It has these overall objectives:

1. To obtain information on needs for new types of fertilizers and their desired characteristics.
2. To evaluate new fertilizer materials as to their availability to crops, reactions with soils, and uses for which adapted.

3. To study the most efficient ways to use fertilizer.
4. To study basic soil-plant-fertilizer relationships.
5. To investigate basic plant nutrition problems.
6. To study the relationships between fertilizer use, crop plants, and water quality.

During fiscal year 1975 emphasis will continue to be placed on research to answer questions that have been raised publicly on the effect of fertilizer use on the environment, a relationship about which little is known. Cooperative studies by TVA and the land-grant universities will obtain sound research data to define the problem, and to point to solutions if they are required. Extensive use will be made of stable isotopes of nitrogen under field conditions to identify the presence of fertilizer nitrogen in water. TVA, AEC, EPA, USDA, and selected land-grant universities will cooperate in these studies. The movement of toxic heavy metals into crops and water as influenced by fertilization practices will be studied. Development of new controlled release fertilizers by TVA, such as sulfur-coated urea, can be a key to continued high fertilizer use without risk to the environment.

Laboratory and greenhouse studies are conducted at Muscle Shoals to determine fundamental relationships among crop response, nutrient uptake, and fertilizer and soil characteristics. This research is concerned with micro and secondary nutrients as well as with nitrogen, phosphorus, and potash. Scientists engaged in basic agronomic research work in close cooperation with chemists and chemical engineers engaged in fertilizer research and development and with TVA professional personnel involved in water management, environmental research and development, and forestry.

Soil relationships. These lines of research will be followed during 1975: (1) nitrogen reactions in soils and their relationship to water quality; (2) heavy metals in soils and the degree to which they enter the food chain and water supplies; (3) fertilizer-soil-root and nutrient loss relationships; (4) fertilizer use and nutrient enrichment of surface and groundwater; and (5) fundamental phosphorus-soil relationships.

Cooperative work will be in progress at five to eight land-grant university experiment stations concerned with the more fundamental aspects of soil fertility and environmental problems related to fertilizer use and technology, with emphasis on use of nitrogen isotopes and on management of soils with high accumulations of phosphates. Selected small watersheds, calibrated and instrumented for precise measurements, will be used to determine relationships between fertilizer use and water quality.

Basic Chemical Research

Basic chemical research is conducted to obtain new knowledge pertinent to the development of fertilizer processes and products in immediate problem areas and in areas that will support continuity of advances in fertilizer technology commensurate with advances in other fields.

Major research efforts for development of fertilizer materials and processes will be in support of the shift from electric-furnace acid to economical wet-process phosphoric acid, with emphasis on the separation and utilization of impurities. Cleaning up wet-process acid is a high priority goal related to the preparation of stable liquid fertilizers. Methods will be sought for the production of concentrated solid ammonium polyphosphates with physical properties that make them suitable for use in solid form and solubilities suiting them for use in liquid preparations.

Basic studies will continue on the coating of urea with sulfur. Potassium phosphates have highly desirable properties as liquid fertilizers. Incorporation of the potassium with phosphate rather as a chloride enhances the solubility and allows use of more concentrated but stable fertilizer solutions. An added benefit is the absence of the chloride especially on irrigated fields with high evaporative losses. Study will be continued on electrolytic production of potassium polyphosphate fertilizer materials from impure potassium chloride.

Measurements will be continued on the fundamental physical and chemical properties of fertilizer materials. Means will be sought for control of effluents from fertilizer processes of possible hazard to environmental quality. The behavior and fate of flourine and heavy metals present in fertilizer raw materials will be investigated.

Fertilizer Processes Research and Development

1973 actual	\$3,143,156
1974 estimate	3,141,000
1975 estimate	3,245,000

The objectives of applied research and process development work are:

1. To develop more efficient fertilizers and methods for their manufacture.
2. To encourage adoption of the developments by industry with resultant saving to the farmer and increased supply of low-cost food for the consumer.

3. To produce new and improved fertilizers in quantities sufficient for testing of their efficiency in greenhouses and fields.
4. To encourage the adoption by industry of improved manufacturing technology that lessens environmental pollution.

Effort will be concentrated on fertilizer processes that utilize wet-process phosphoric acid or urea or combinations of the two materials because of their inherently favorable economics. Processes for improving the quality of wet-process acid, of urea, and of products from them will be emphasized. This will include producing urea fertilizers with controlled rates of nitrogen release. Processing methods that avoid pollution will be given high priority. Continuing work on wet-process acid technology will include means of purification of the acid, lowering the cost of its production, and abating pollution associated with its processing and use.

Major projects with wet-process phosphoric acid will include production of better quality and lower cost fluid fertilizers. One promising approach for production of liquid fertilizers largely free of the impurities contained in wet-process acid involves reaction of merchant-grade acid with urea to produce urea phosphate in a relatively pure form suitable for processing into clear, stable fertilizer solutions containing polyphosphates which enhance storage qualities. A large pilot plant will be built to continue studies of this system. Preliminary operation of demonstration-scale units for production of high-analysis suspension fertilizers and ammonium polyphosphate entirely from merchant-grade wet-process acid will be carefully studied for possible process improvements. Work on preparation of urea-ammonium nitrate suspension fertilizer will be continued.

Exploratory studies will be started on controlled-release N-K combination products. Sulfur coating of these materials and of potassium chloride will be evaluated as a means of improving efficiency of utilization and decreasing pollution. Development of low-cost coatings of urea to improve its resistance to atmospheric moisture and its compatibility with other materials will be continued. Pilot studies will be made of the inclusion of urea in conventional granulation formulations as a means of decreasing dust and fume. Studies will be continued of means of reducing the volatilization losses from urea applied to the soil surface. One approach involves incorporation of an inhibitor against hydrolysis.

Use of fertilizers tagged with isotopes will be expanded. Tagged nitrogen fertilizers will be used for research on crop utilization and for field research on the extent of fertilizer nitrogen transport into streams, lakes, and groundwater. Extensive effort will be made to find types of fertilizers effective in minimizing problems of pollution of surface and groundwaters as these problems are defined.

Studies of more economical granulation processes and of granulation formulations designed to decrease pollution will involve continued studies of melt-type processes that do not require any drying operation. Since dust-free fertilizers are needed to conform with stringent pollution regulations, increasing attention will be given to measures for alleviating dusting during processing.

Sulfur Recovery Research

1973 actual	\$189,567
1974 estimate	197,000
1975 estimate	201,000

Reduction of sulfur oxide emissions has become a major goal in the worldwide effort to improve air quality. As a result of air quality standards set by both Federal and State regulatory agencies, the utility industry is installing gas-cleaning facilities based on technology considered by many to be immature. The process design is not adequately supported by the logical development program that normally is associated with new technology. Fundamental and applied research studies are needed to provide a better understanding of processes being installed if the large-scale facilities are to be efficient and reliable. Moreover, improved processes are needed to recover the sulfur in a useful form to eliminate a major problem of solid waste disposal and to conserve an important natural resource.

TVA is working in cooperation with EPA on development of processes for removal of sulfur oxides from power plant stack gas; this work is described on page 193. In a separate effort, TVA is studying processes which would utilize the sulfur products. Sulfur is a major raw material in fertilizer manufacture and is an essential plant nutrient. TVA is particularly well qualified to do this work, because the agency is involved in both power production and fertilizer research and development.

TVA has under way or has planned several projects related to sulfur recovery:

1. Fundamental studies of solubilities, vapor pressures, rates of reaction, and solids properties for intermediates and products of recovery processes. Modern instrumental techniques are used.
2. Computer simulation of processes to provide guidance on variables to be tested experimentally. This is a low-cost method for screening processes.

3. Basic studies of promoting or inhibiting, at choice, oxidation of products from the absorption of sulfur dioxide. The choice depends upon the particular method of recovery.
4. Development studies of a process for production of sulfur by reducing an alkaline sulfite with low-cost carbon and reacting the resulting sulfide with sulfur dioxide.
5. Small-scale studies of ammonium sulfate crystallization. In ammonia scrubbing processes, oxidation results in production of ammonium sulfate, a useful fertilizer material. Methods for crystallization are being studied. A fundamental study of the properties of solutions in the process is planned.
6. Economic study of recovery of uranium as a byproduct of the production of phosphoric acid. A practical process of recovery would extend greatly the energy resources of the United States.

FERTILIZER INTRODUCTION

	1973 Actual	1974 Estimate	1975 Estimate
<u>Expenses</u>			
Farm test demonstrations	\$968,525	\$1,038,000	\$1,003,000
Fertilizer industry demonstrations	21,039,395	24,652,000	29,748,000
Developmental production	6,391,920	7,269,000	6,130,000
Total	<u>28,399,840</u>	<u>32,959,000</u>	<u>36,881,000</u>
<u>Financing</u>			
Appropriated funds	7,975,483	7,025,000	6,587,000
Nonpower proceeds	20,424,357	25,934,000	30,294,000
Total	<u>28,399,840</u>	<u>32,959,000</u>	<u>36,881,000</u>
<u>Income from program</u>			
Farm test demonstrations	192,021	240,000	197,000
Fertilizer industry demonstrations	19,094,490	22,624,000	27,567,000
Developmental production	643,613	1,768,000	1,595,000
Total	<u>19,930,124</u>	<u>24,632,000</u>	<u>29,359,000</u>

Following the completion of research and development and technical demonstrations of fertilizer processes and production on a pilot-plant scale, fertilizer introduction requires two steps. The first is developmental production of more efficient fertilizers on a semicommercial scale. Pilot plants have low output and product cost is high. They are essential to research and development but are inadequate for assuring the transfer of R&D results into the economy. The second step in fertilizer introduction is a nationwide educational program to carry the results of development to the land-grant universities, the fertilizer industry, and the American farmer. The educational program is made up of two basic components, farm test demonstrations and industry demonstrations.

Developmental Production

	1973 Actual	1974 Estimate	1975 Estimate
Total expenditures for developmental production	\$26,715,003	\$31,105,000	\$34,861,000
Less materials transferred at market prices to educational programs	20,323,083	23,836,000	28,731,000
Remaining expenditures to be financed	<u>6,391,920</u>	<u>7,269,000</u>	<u>6,130,000</u>
Financing:			
From appropriations	5,253,895	4,199,000	3,600,000
From nonpower proceeds	<u>1,138,025</u>	<u>3,070,000</u>	<u>2,530,000</u>
Total	<u>6,391,920</u>	<u>7,269,000</u>	<u>6,130,000</u>

Objectives of developmental production are:

1. To demonstrate practicality and economics of more efficient fertilizer products and processes by scaling up from small pilot plant to semicommercial-scale operation.
2. To provide sufficient quantities of new and improved fertilizers for introduction through educational programs to industry and farmers.

Prototype-scale production of new fertilizers provides an essential link between fertilizer research and development and educational programs. The cycle of research and development, developmental production, field introduction, and phase-out of fertilizers in this national program continues. In 1974, new urea-based fertilizers will enter the program. It is planned that highly concentrated phosphate-nitrogen combination fertilizers, both fluid and solid, will be fully converted to demonstrate the use of low-cost, wet-process phosphoric acid in their production as commercial sources of acid become available. Operation of the remaining phosphorus furnaces is planned to be discontinued at that time, making possible substantial reductions in operating and facilities expenditures. Total distribution of fertilizer materials in 1975 will be 295,360 tons.

Urea-ammonium phosphates (28-28-0) will be produced and distributed in 1974 for the first time. Another grade, 36-18-0, will be introduced in 1975. These are high-analysis homogeneous fertilizers, not now commercially available, for

which TVA has developed an efficient production process. Their agronomic qualities are superior for many U.S. crops and are outstanding for rice. Their introduction will contribute much to fertilizer technology and to farm efficiency, will help overcome the world food deficit, and likely will improve the U.S. position on the nitrogen fertilizer export market now dominated by other countries. Production of these materials will be increased in steps to a level adequate for their introduction.

Granular urea (45-0-0) and urea-ammonium sulfate (40-0-0-4S) are other new fertilizers made from the new "building block" urea, which will meet needs for introduction of more efficient solid straight nitrogen and nitrogen-sulfur fertilizers. These two products will be available in the program, beginning in 1974 and 1975, respectively, and continue into subsequent years.

In 1975 developmental production will be initiated of a high-analysis ammonium phosphate suspension fertilizer (11-39-0) made from the lowest cost feed materials, ammonia and black wet-process orthophosphoric acid. It is made in relatively simple and low-cost equipment. It should be a major breakthrough in lowering the cost of fertilizer to the farmer. It is low in cost, high in analysis, has good storage qualities, and is suitable for easy blending with other fertilizer ingredients.

The net expense of developmental production is affected by many constraints, some of which are external in nature and some stem from its experimental nature. The seasonal nature of fertilizer use requires large storage capacity and expense. Industry shortages and surpluses in capacity and markets greatly affect prices for raw materials and fertilizers. The effect of weather extremes on fertilizer demand is unpredictable. The fertilizer use seasons are short, whereas process facilities must operate continuously. TVA experimental production units are of small size and are prototypes. TVA ships nationwide in short seasons and small quantities from one plant, which is not located near raw and intermediate materials sources. During phase-in and phase-out of new fertilizers TVA fertilizer distribution is low in volume. Planned restructuring of the program and shifting to full use of low-cost, wet-process phosphoric acid as commercial sources of acid become available will overcome the last-mentioned constraint and will eliminate the high cost of operating, maintaining, and replacing old phosphorus and auxiliary facilities. An upturn in industry conditions, the receptivity of industry and farmers to new developments, and the new fertilizers and processes coming into developmental production promise an effective lower cost program to help meet the national goals of adequate low-cost food and fiber for consumers and a better economic position for farmers.

The following table lists the fertilizers to be distributed in 1975.

Developmental Production 1975

	Year Introduced	Plant Nutrient Content (N-P-K)	1975 Distribution—Tons			
			Fert. Intro.	Agri. Prods.	Other	Total
Ammonium polyphosphate	1967	15-62-0	39,473	25	2	39,500
Liquid fertilizer	1959	11-37-0	85,700	-	-	85,700
Liquid fertilizer	1970	12-44-0	12,000	-	-	12,000
Suspension fertilizer	1973	11-39-0	44,000	-	-	44,000
Urea-ammonium phosphate	1974	28-28-0	13,399	-	1	13,400
Urea-ammonium phosphate	1974	36-18-0	14,160	150	-	14,310
Granular urea	1974	45-0-0	18,949	650	1	19,600
Urea-ammonium sulfate	1974	40-0-0-4S	9,999	-	1	10,000
UAN solution	1972	32-0-0	40,000	-	-	40,000
Custom blend fertilizers		Various	4,500	1,500	-	6,000
Other			550	50	-	600
Total fertilizers			282,730	2,375	5	285,110
Phosphorus			-	-	800	800
*Phosphoric acid			8,000	-	-	8,000
Ammonia			-	-	350	350
*Nitric acid			-	-	1,100	1,100
Total intermediate products			8,000	-	2,250	10,250
Total all products			290,730	2,375	2,255	295,360

*Tonnage expressed as 100 percent acid.

Farm Test Demonstrations

	1973 Actual	1974 Estimate	1975 Estimate
Fertilizer materials	\$345,127	\$378,000	\$335,000
Educational activities	623,398	660,000	668,000
Total expense	968,525	1,038,000	1,003,000
Less farmer payments for fertilizer (nonpower proceeds)	192,021	240,000	197,000
Net expense financed from appropriations	776,504	798,000	806,000
Participating states and territories	39	42	45
Fertilizer trials and field demonstrations	587	642	764
Test demonstration farms	275	207	167
Fertilizer investigation and use farms	-	21	36
TVA materials (tons)	5,018	4,059	3,272

General Objectives

The nationwide farm test demonstration program was reviewed and evaluated in fiscal 1973. Objectives of the reoriented program are:

1. To investigate specific soil fertilizer use problems of importance to U.S. agriculture.
2. To evaluate new TVA fertilizers and fertilizer technology.
3. To introduce new TVA fertilizers and fertilizer technology to the agricultural sector.
4. To improve fertilizer use efficiency.

Program

The farm test demonstration program is a necessary link between TVA, the state land-grant universities, and the farming community to accomplish rapid evaluation and adoption of new and improved fertilizers and practices. TVA supplies limited amounts of new and experimental fertilizers at a reduced cost for use in state agricultural programs jointly planned by TVA and the universities. Farmers bear all other farm costs and assume the risks involved in conducting the program.

Reflecting changes in American agriculture, the fertilizer industry, and in TVA's research and development and demonstration-scale production activities, priorities for test demonstration activities in the immediate future will be changed. For example, new nitrogen fertilizer materials based on urea instead of ammonium nitrate will be produced by TVA. Because these are new fertilizers to the agricultural sector, greater emphasis will be placed on applied agronomic research on test demonstration farms with careful planning to ensure that sound research principles are followed and reliable information is obtained. Less emphasis will be placed on the demonstration approach on the assumption that increasingly knowledgeable, innovative farmers who produce most of the agricultural output will be more responsive to accurate reports of crop response and economic returns to improved fertilizer use.

Most farm test demonstrations will be conducted on less than a whole-farm basis, usually small plots one acre or less in size. Small plots are very useful for new product evaluation and introduction based on quantitative crop response data. Whole fields will be used when necessary to introduce or evaluate a new TVA fertilizer in combination with all recommended practices for a crop or crop-livestock enterprise. This type program activity will be useful in promoting forage fertilization to increase red meat supplies. Whole farms will be used to obtain information for improving fertilizer use and efficiency. A limited number of farms will be carefully selected to ensure they are representative of large numbers of farms having common fertilizer use problems. These farms will serve as innovators. Reliable input-output information will be collected to which cost and price data can be applied to determine relative levels of profitable fertilizer use. These farms will provide information on levels of fertilizer use that (1) maximize economic returns and (2) minimize adverse environmental effects.

Fertilizer Industry Demonstrations

	1973 Actual	1974 Estimate	1975 Estimate
Fertilizer	\$19,747,459	\$23,213,000	\$28,151,000
Educational activities	1,291,936	1,439,000	1,597,000
Total expense	21,039,395	24,652,000	29,748,000
Less distributor payments for fertilizer (nonpower proceeds)	19,094,311	22,624,000	27,567,000
Net expense financed from appropriations	1,945,084	2,028,000	2,181,000

Fertilizer manufacturers, wholesale distributors, retail dealers, farmers, the land-grant universities, and TVA work together in fertilizer industry demonstrations. A feature of this program is the participation of commercial fertilizer distributors and dealers who instruct farmers in the use of more efficient fertilizers and practices recommended by state agricultural universities. Cooperating dealers use a variety of educational techniques such as meetings of farmers, demonstration plots, field trips and schools, radio and television programs, and printed educational materials.

TVA fertilizers are usually sold at prices slightly lower than those of commercial products to fertilizer manufacturers and distributors for use in special introduction activities. These incentive prices encourage them to provide extra services to the farmer and to assume extra obligations in helping TVA introduce new fertilizers and practices. The use of relatively small quantities of fertilizers in educational programs has exerted a great influence in promoting the use of better commercial fertilizers and helping the fertilizer industry reduce fertilizer costs to the farmer.

TVA chemical engineers advise cooperating fertilizer manufacturers and all segments of the fertilizer industry on problems relating to:

1. Changes in design and operation of plants to use new TVA products and technology.
2. Processing and maintaining the quality of finished products.
3. Controlling water and air pollution in bulk blending, fluid, and granulation processes.

4. Developing new or improved application equipment.
5. Developing formulations for more efficient operations to reduce pollution problems and to lower production costs.

TVA provided technical aid to 200 manufacturers in a number of states in modifying processes, plants, and products during 1973. Some were helped to overcome pollution problems and so to avoid the closure of plants by state regulatory agencies. This has been of particular help to members of the small business sector. New technology applied also has saved them money through more efficient operation.

POWER SUPPLY AND USE
(CAPITAL OUTLAY)

The TVA power program provides the Tennessee Valley region with an ample supply of electric power at low cost—a vital tool for social and economic development. The program requires (1) facilities for producing electric power and delivering it to local distribution systems and to Federal and industrial establishments with large or unusual power requirements, and (2) efficient operation of these facilities. The power program discussed on the following pages is financed from power proceeds and from borrowings secured by future revenues.

	1973 Actual	1974 Estimate	1975 Estimate
Generating capacity additions	\$338,520,109	\$387,581,000	\$462,864,000
Transmission system facilities	68,727,422	73,668,000	72,400,000
Land and land rights	9,648,437	19,678,000	21,696,000
Additions and improvements at power facilities	29,717,137	65,177,000	109,936,000
Nuclear fuel	29,229,596	30,213,000	43,740,000
Investigations for future power facilities	1,882,008	834,000	825,000
Total capital outlay	477,724,709	577,151,000	711,461,000

GENERATING CAPACITY ADDITIONS

Capital outlays during fiscal year 1975 for generating facilities to supply the expected future electric power requirements of the area served by TVA are estimated at \$462,864,000. TVA system loads are estimated to increase from 18,888 MW in January 1973 to about 29,300 MW by the winter of 1979-1980 and to further increase to about 36,000 MW by the winter of 1983-1984. The rapid buildup of the Atomic Energy Commission's power requirements in addition to the continued growth in farm, home, and industrial use account for these increases during this period. Nuclear generating facilities must be planned eight to ten years in advance of needs and major construction expenditures must begin some six to seven years in advance of operating dates.

To meet the estimated increase in power requirements, the program for expanding power supply for the period fiscal year 1974 through fiscal year 1977 provides for an additional 8,727,160 kilowatts of nameplate capacity. An additional 15,603,800 kW is under construction or planned to meet the requirements through 1984.

The following table summarizes capacity, schedule, and financial data for the major generating capacity additions now scheduled to be made to the TVA power system.

	Fiscal Year Construction Started	Scheduled Commercial Service Date	Nameplate Capacity kW	Actual to 6-30-73	Expenditures (In Thousands)			
					1974	1975	To Complete	Total Cost
Cumberland Steam Plant units 1-2	1968	Mar. 1973 Nov. 1973	1,300,000 1,300,000	\$392,377	\$17,876	-	\$-253	\$410,000
Browns Ferry Nuclear Plant units 1-3	1967	Jan. 1974 July 1974 Apr. 1975	1,152,000 1,152,000 1,152,000	598,656	93,677	\$54,019	3,648	750,000
Sequoyah Nuclear Plant units 1-2	1970	June 1976 Feb. 1977	1,220,580 1,220,580	352,563	96,072	82,673	118,692	650,000
Raccoon Mountain pumped- storage project units 1-4	1971	Nov. 1974 Feb. 1975 May 1975 Aug. 1975	382,500 382,500 382,500 382,500	75,562	58,234	41,013	17,191	192,000
Watts Bar Nuclear Plant units 1-2	1973	Mar. 1978 Dec. 1978	1,269,900 1,269,900	37,327	93,879	195,808	372,986	700,000
Bellefonte Nuclear Plant units 1-2 ^a	1975	Sept. 1979 June 1980	1,332,000 1,332,000	10,333	22,374	80,040	612,253	725,000
Hartsville Nuclear Plant units 1-4 ^a	1976	Dec. 1980 Dec. 1981 June 1981 June 1982	1,300,000 1,300,000 1,300,000 1,300,000	884	3,554	8,206	1,562,356	1,575,000
Nuclear plants 7 and 8 (undetermined location) ^b	1978	1982-1984	5,200,000	-	152	1,105	1,798,743	1,800,000

a. Site is tentative pending completion of review of environmental impacts.

b. All data preliminary; based on four nuclear units.

Power Exchanges

Seasonal exchanges of generating capacity between TVA and adjacent utilities will provide TVA with additional capacity during the winters when TVA's requirements are highest as shown in the following table.

	Firm Power Available from Other Utilities - kW		
	Mississippi Power & Light Company	Southern Services, Inc.	Illinois- Missouri Group
Winter of			
1974-1975 and later years	1,500,000	300,000	260,000
			<u>2,060,000</u>

TVA will deliver the same amounts of power to these utilities during the summer periods when their requirements are high.

Power Supply and Demand

With the installation of the generating units previously described, the interchange agreements with neighboring utilities, and reflecting the capacity retained by the Southeastern Power Administration from the Corps of Engineers hydroelectric projects on the Cumberland River, the relationships between expected system capacity and predicted power requirements in the winters of 1974-1975 through 1978-1979 are estimated to be as shown in the following table.

	Approximate System Dependable Capacity - kW	Presently Estimated Demands - kW			Margin	
		Total	Served by TVA		kW	Percent
			Capacity			
Winter of						
1974-1975	24,378,000	22,600,000	20,540,000		3,838,000	18.7
1975-1976	26,283,000	23,700,000	21,640,000		4,643,000	21.5
1976-1977	27,398,000	25,100,000	23,040,000		4,358,000	18.9
1977-1978	28,523,000	26,400,000	24,340,000		4,183,000	17.2
1978-1979	30,863,000	27,750,000	25,690,000		5,173,000	20.1

The margins in the foregoing table reflect the difference between loads which TVA must serve and the dependable capacity available to supply these loads. To provide an acceptable degree of reliability, these margins must be adequate to allow for maintenance and emergency outages of generating capacity, reductions in hydro capacity due to adverse streamflow conditions, and unexpected variations in system loads.

CUMBERLAND STEAM PLANT—UNITS 1-2

1973 actual	\$48,761,398
1974 estimate	17,876,000
1975 estimate	

Two coal-fired generating units totaling 2,600,000 kW capacity at the Cumberland site in middle Tennessee will be completed in 1974. This site is near Cumberland City in Stewart County about 50 miles northwest of Nashville, Tennessee. It is on the Barkley reservoir (Cumberland River) which will serve as the source of cooling water.

On-site construction of the project began in March 1968. The first unit was placed in commercial operation on March 1, 1973, and the second unit on November 1, 1973.

Status of Construction

	Estimated		Completion Date
	Percent Complete June 30, 1974	Complete June 30, 1975	
Total project	100	100	April 1974
Land acquisition	100	100	June 1969
Powerhouse	100	100	April 1974
Boiler plant	100	100	October 1973
Turbogenerators	100	100	November 1973
Transmission plant	100	100	October 1973

126-Cumberland

Summary of Construction Program

	In Thousands			
	Actual to 6-30-73	Estimate		Total Cost
		1974	1975 To Complete	
Relocation of highways, structures, and improvements	\$54,418	\$3,582	-	\$58,000
Boiler plant equipment	168,545	3,355	-	171,900
Turbogenerator units	45,799	901	-	46,700
Accessory electrical and miscellaneous power plant equipment	21,784	1,416	-	23,200
Transmission plant	8,753	1,047	-	9,800
Construction plant, equipment, and inventories	1,573	-1,440	-	-
Interest capitalized during construction	52,266	3,034	-	55,300
Construction supervision and services, general engineering and design, and general administration	39,239	5,981	-	45,100
Total expenditures	392,377	17,876	-	410,000
Changes in unpaid undelivered orders	2,150	-2,150	-	-
Total obligations	394,527	15,726	-	410,000

Cost Estimate. The estimated project cost of \$410,000,000 includes an increase of \$18,000,000 over that reported in the Budget Program for 1974. This increase reflects (1) additional interest during construction due to delays in unit operating schedules (\$11,300,000) and (2) additional preoperational expense and other costs associated with the delayed operating schedules (\$6,700,000). Adoption of new water quality standards by the State of Tennessee may require the addition of water cooling facilities. This is not included in the current cost estimate because the scope has not yet been established.

BROWNS FERRY NUCLEAR PLANT—UNITS 1-3

1973 actual	\$95,271,105
1974 estimate	93,677,000
1975 estimate	54,019,000

Three identical nuclear power generating units totaling 3,456,000 kW are being installed at Browns Ferry site in northern Alabama. This site, on the north bank of Wheeler reservoir in Limestone County, is about 10 miles northwest of Decatur and about 30 miles west of Huntsville. The General Electric Company is providing the fuel and major components (boiling water nuclear steam supply system, turbogenerator, and some of the auxiliary systems). TVA designs and supplies or constructs other plant facilities.

Construction was started in May 1967, following the granting of a construction permit by the Atomic Energy Commission for the first two units. License to build the third unit was issued on July 31, 1968, and construction on it was started August 1, 1968. Commercial operating dates for the three units were originally scheduled for October 1970, October 1971, and October 1972. Due to delays in equipment deliveries by the manufacturer, modifications in scope of project features, evolving requirements of AEC for environmental protection and engineered safeguards, and other factors, the commercial operating dates have been rescheduled to January 1974, July 1974, and April 1975.

The plant will include a 500-kV switchyard. Auxiliary station service will be supplied from the transmission system at 161 kV. Mechanical draft cooling towers are also included as part of the original construction program.

Plans for 1975

The estimated expenditure of \$54,019,000 will be applied as follows:

Completion of reactor, turbine and service buildings, and continuation of general yard improvements	\$2,000,000
Completion of reactor plant equipment installations	14,200,000
Completion of turbogenerator installations and continuation of cooling tower system construction	19,900,000
Completion of accessory electrical and miscellaneous power plant equipment installations and contract payments	2,700,000
Completion of transmission plant equipment installations and contract payments	500,000
Construction plant, equipment, and inventories (transfer of depreciation and use to work features)	-5,000,000
Interest capitalized during construction	12,987,000
Construction supervision and services	5,385,000
General engineering and design	1,000,000
General administration	347,000
Total	<u>\$54,019,000</u>

Status of Construction

	Estimated		Completion Date
	Percent Complete	June 30, 1975	
Total project			
Land acquisition	90	99	March 1976
Structures and improvements	100	100	June 1969
Reactor plant equipment	97	99	March 1976
Turbogenerator units	90	100	April 1975
Transmission plant	88	100	April 1975
	95	100	April 1975

Summary of Construction Program

	Actual to 6-30-73	In Thousands Estimate			Total Cost
		1974	1975	To Complete	
Structures and improvements	\$84,365	\$6,000	\$2,000	\$335	\$92,700
Reactor plant equipment	174,667	17,700	14,200	4,333	210,900
Turbogenerator units	118,470	27,800	19,900	930	167,100
Accessory electrical and miscellaneous power plant equipment	36,253	6,500	2,700	147	45,600
Transmission plant	15,340	1,000	500	60	16,900
Construction plant, equipment, and inventories	14,150	-4,600	-5,000	-4,550	-
Interest capitalized during construction	89,113	28,900	12,987	-	131,000
Construction supervision and services, general engineering and design, and general administration	66,298	10,377	6,732	2,393	85,800
Total expenditures	598,656	93,677	54,019	3,648	750,000
Changes in unpaid undelivered orders	31,825	-19,025	-10,200	-2,600	-
Total obligations	630,481	74,652	43,819	1,048	750,000

Cost Estimate. The estimated cost of \$750,000,000 includes an increase of \$50,000,000 over that reported in the Budget Program for 1974. This increase reflects (1) an additional 4,500,000 man-hours of field work plus additional equipment and materials due to continuing revisions, additions, and delays associated with AEC requirements for safeguards and quality assurance (\$34,700,000); (2) increased estimates for general costs due to the longer schedule, higher charges by AEC for nuclear license fees, preoperational expense, and additional design cost (\$11,400,000); (3) additional interest during construction due to increased project estimate, schedule delays, and higher rates (\$14,000,000); and (4) other adjustments (\$-10,100,000). The project completion date has been delayed by three months and the scheduled operating dates for the three generating units have been delayed five months, three months, and six months, respectively.

SEQUOYAH NUCLEAR PLANT—UNITS 1-2

1973 actual	\$121,732,778
1974 estimate	96,072,000
1975 estimate	82,673,000

Two nuclear generating units with a total rating of 2,441,160 kW are being installed at the Sequoyah site in east Tennessee. This site is about 18 miles northeast of Chattanooga, Tennessee. It is on Chickamauga reservoir (Tennessee River) which will serve as the source of cooling water.

Construction of permanent structures began upon receipt of the Atomic Energy Commission permit May 27, 1970. The two units are scheduled for commercial operation in June 1976 and February 1977, respectively. These dates reflect delays of fourteen months each from the previously reported schedules. The plant will be connected to the transmission system at 161 kV and 500 kV.

Plans for 1975

Estimated expenditures of \$82,673,000 will be applied as follows:

Continuation of buildings, miscellaneous structures, and yard improvements	\$3,200,000
Continuation of reactor plant equipment installations and contract payments	14,500,000
Continuation of turbogenerator and cooling water facilities installations	15,100,000
Continuation of accessory electric and miscellaneous equipment payments and installations	5,900,000
Construction plant, equipment, and inventories	2,100,000
Interest capitalized during construction	30,500,000
Construction supervision and services	5,985,000
General engineering and design	5,100,000
General administration	288,000
Total	<u>82,673,000</u>

Status of Construction

	Estimated		Completion Date
	Percent Complete	June 30, 1975	
Total project	70	85	December 1977
Land acquisition	100	100	June 1971
Structures and improvements	85	95	December 1977
Reactor plant equipment	75	85	February 1977
Turbogenerator units	65	80	February 1977
Transmission plant	99	100	July 1974

Summary of Construction Program

	Actual to 6-30-73	In Thousands		Total Cost
		1974	1975	
Structures and improvements	\$57,425	\$15,700	\$3,200	\$3,275
Reactor plant equipment	104,772	30,300	14,500	29,528
Turbogenerator units and cooling water facilities	80,809	3,700	15,100	22,491
Accessory electrical and miscellaneous power plant equipment	13,623	6,100	5,800	16,877
Transmission plant	14,575	2,000	100	625
Construction plant, equipment, and inventories	12,109	2,000	2,100	-16,209
Interest capitalized during construction	26,999	24,200	30,500	48,301
Construction supervision and services, general engineering and design, and general administration	42,251	12,072	11,373	13,804
Total expenditures	352,563	96,072	82,673	118,692
Changes in unpaid undelivered orders	24,346	1,823	-8,597	-17,572
Total obligations	376,909	97,895	74,076	101,120
				650,000

Cost Estimate. The estimated cost of \$650,000,000 includes an increase of \$180,000,000 over that reported in the Budget Program for 1974. This increase reflects (1) addition of cooling towers to the project scope (\$50,000,000); (2) additional interest during construction costs associated with the extended project schedule (\$55,000,000); (3) additional craft labor and procurements of materials and equipment due to continuing revisions, additions, and delays associated with AEC requirements for safeguards and quality assurance (\$43,200,000); (4) higher estimates for general costs due to the longer schedule, increased nuclear license fees, increased preoperational expense, and greater design and engineering costs (\$17,500,000); and (5) adjustments in other allowances to provide for probable additional revisions and for other uncertainties (\$14,300,000). The project completion has been delayed one year, and the scheduled operating dates have been delayed fourteen months for each unit. These delays resulted primarily from design changes to the emergency core cooling system and to the tritium drain system in the interest of safety and environmental protection.

RACCOON MOUNTAIN PUMPED-STORAGE PROJECT

1973 actual	\$33,670,761
1974 estimate	58,234,000
1975 estimate	41,013,000

Four identical reversible pump-turbine hydroelectric generating units totaling about 1,530,000 kilowatts capacity are being installed at the Raccoon Mountain site, about six miles west of downtown Chattanooga, Tennessee. The plant is on the east bank of the Nickajack reservoir which will serve as the tailpond for Raccoon Mountain discharges. Construction began in July 1970.

The first Raccoon Mountain unit is scheduled for commercial operation in November 1974. The other units are scheduled to follow at three-month intervals.

Plans for 1975

The estimated expenditure of \$41,013,000 will be applied as follows:

Complete reservoir preparation and begin construction of public-use facilities	\$300,000
Continue construction of power plant chamber, miscellaneous buildings, and general yard improvements	3,500,000
Substantial completion of earth and rockfill dam	1,000,000
Complete construction of intake and continue construction of water conductors	4,900,000
Continue installation of pump/turbines, motor/generators, and accessory equipment; equipment contract payments	10,400,000
Continue transmission plant installations and equipment payments	9,500,000
Construction plant, equipment, and inventories (transfer of depreciation and use to work features)	-1,200,000
Interest capitalized during construction	7,500,000
Construction supervision and services	2,830,000
General engineering and design	2,000,000
General administration	283,000
Total	<u>41,013,000</u>

134-Raccoon Mountain

Status of Construction

	Estimated		Completion Date
	Percent Complete	June 30, 1975	
Total project	60	85	June 1976
Land acquisition	100	100	June 1971
Powerhouse	70	90	October 1975
Dam	90	97	August 1974
Generating/pumping units	60	85	August 1975
Transmission plant	45	90	August 1975

Summary of Construction Program

	In Thousands			
	Actual to 6-30-73	Estimate		Total Cost
		1974	1975	
Land and land acquisition	\$1,414	\$18	-	\$1,432
Reservoir clearing, rim treatment, and public-use facilities	271	600	\$300	\$629
Powerhouse, miscellaneous structures, and improvements	10,447	4,400	3,500	1,800
Main and auxiliary dams	13,821	7,800	2,453	20,800
Intake and water conductors	9,761	11,800	1,000	23,200
Generating/pumping equipment	13,950	14,500	4,900	23,200
Transmission plant	198	10,200	10,400	21,100
Construction plant, equipment, and inventories	4,878	3,700	4,350	43,200
Interest capitalized during construction	5,611	-	2,802	22,700
Construction supervision and services, general engineering and design, and general administration	15,211	6,216	2,489	22,000
Total expenditures	75,562	58,234	5,113	29,768
Changes in unpaid undelivered orders	29,664	-21,277	-6,573	17,191
Total obligations	105,226	36,957	15,377	192,000

Cost Estimate. The estimated total project cost of \$192,000,000 remains unchanged from that presented in the Budget Program for fiscal year 1974.

WATTS BAR NUCLEAR PLANT—UNITS 1-2

1973 actual	\$29,341,645
1974 estimate	93,879,000
1975 estimate	195,808,000

Two nuclear generating units with a total rating of 2,539,800 kW are being installed at the Watts Bar site near Spring City, Tennessee. Preliminary on-site work began in December 1972 and full-scale construction began following the granting of a construction permit by AEC on January 23, 1973. The two units are scheduled for commercial operation in March 1978 and December 1978.

As a result of problems with the Westinghouse designs for the ice condenser and emergency core cooling system, scheduled operation of each unit has been delayed by 10 months from the schedule reported in the Budget Program for 1974.

Plans for 1975

Estimated expenditures of \$195,808,000 will be applied as follows:

Continue construction of control, auxiliary, turbine, and service buildings	\$17,100,000
Continuation of contract payments for reactor equipment and installation of steel containment vessels	58,100,000
Continuation of work on the circulating water systems and cooling towers; begin turbogenerator erection; equipment contract payments	60,100,000
Continuation of contract payments and begin installation of accessory electric and miscellaneous equipment	14,100,000
Continuation of transmission plant construction and contract payments	7,600,000
Construction plant, equipment, and inventories	7,300,000
Interest capitalized during construction	15,500,000
Construction supervision and services	7,088,000
General engineering and design	7,400,000
General administration	1,520,000
Total	<u>195,808,000</u>

Status of Construction

	Estimated		Completion Date
	Percent Complete	June 30, 1975	
Total project	10	30	March 1980
Land acquisition	100	100	June 1973
Structures and improvements	15	35	March 1980
Reactor plant equipment	10	20	December 1978
Turbogenerator units	5	20	December 1978
Transmission plant	1	30	October 1977

Summary of Construction Program

	Actual to 6-30-73	In Thousands Estimate		Total Cost
		1974	1975 To Complete	
Structures and improvements	\$2,391	\$12,100	\$17,100	\$58,809
Reactor plant equipment	15,952	46,700	58,100	97,548
Turbogenerator units and cooling water facilities	624	14,400	60,100	53,376
Accessory electrical and miscellaneous power plant equipment	748	1,000	14,100	27,952
Transmission plant	2	200	7,600	6,298
Construction plant, equipment, and inventories	5,772	1,400	7,300	14,472
Interest capitalized during construction	1,250	5,200	15,500	98,050
Construction supervision and services, general engineering and design, and general administration	10,588	12,879	16,008	45,425
Total expenditures	37,327	93,879	195,808	372,986
Changes in unpaid undelivered orders	183,664	-9,943	-99,354	-74,367
Total obligations	220,991	83,936	96,454	298,619
				700,000

Cost Estimate. The estimated project cost of \$700,000,000 includes an increase of \$25,000,000 over that reported in the Budget Program for 1974. This increase reflects (1) additional interest during construction due to schedule delays and higher capitalization rates (\$20,000,000) and (2) increased estimates for licensing fees and preoperational expense and other adjustments (\$5,000,000). The project completion date has been delayed by nine months and the scheduled operating dates for the two generating units have been revised to March 1978 and December 1978, respectively, reflecting a delay of 10 months for each unit.

BELLEFONTE NUCLEAR PLANT—UNITS 1-2

1973 actual	\$7,614,477
1974 estimate	22,374,000
1975 estimate	80,040,000

Two nuclear fueled generating units with a total rating of approximately 2,664,000 kW are to be installed at a tentatively determined site with initial construction beginning in fiscal year 1975. The two units are scheduled for commercial operation in 1979 and 1980. The proposed site is Bellefonte on the Guntersville reservoir near Scottsboro, Alabama. The environmental analyses necessary for final site determination are in process. Contracts have been awarded for the nuclear steam supply systems and for the turbogenerator units.

Plans for 1975

The estimated expenditure of \$80,040,000 will be applied as follows:

Begin excavation and concreting for the reactor, auxiliary service control and turbine buildings	\$6,800,000
Continue progress payments on reactor equipment	37,200,000
Begin excavation for cooling towers and intake structure; turbogenerator contract payments	14,200,000
Begin mobilization of construction plant and equipment	7,000,000
Interest capitalized during construction	4,900,000
Construction supervision and services	1,717,000
General engineering and design	7,600,000
General administration	623,000
Total	<u>80,040,000</u>

140—Bellefonte

Status of Construction

	<u>Estimated</u>		<u>Completion Date</u>
	<u>Percent Complete</u>	<u>June 30, 1975</u>	
<u>June 30, 1974</u>			
Total project	-	5	June 1981
Structures and improvements	-	5	June 1981
Reactor plant equipment	-	5	June 1980
Turbogenerator units	-	2	June 1980
Transmission plant	-	-	March 1979

Summary of Construction Program

	In Thousands			Total Cost ¹
	Actual to 6-30-73	Estimate		
		1974	1975	
Structures and improvements	-	-	\$6,800	\$72,900
Reactor plant equipment	\$4,158	\$14,800	37,200	191,642
Turbogenerator units and cooling water facilities	34	100	14,200	247,800
Accessory electrical and miscellaneous power plant equipment	64	-	-	140,000
Transmission plant	-	-	-	35,136
Construction plant, equipment, and inventories	-	-	-	21,900
Interest capitalized during construction	368	1,340	7,000	-
Construction supervision and services, general engineering and design, and general administration	5,709	6,134	4,900	118,392
			9,940	175,000
Total expenditures	10,333	22,374	80,040	53,617
				725,000
Changes in unpaid undelivered orders	134,576	37,986	-5,000	612,253
				-167,562
Total obligations	144,909	60,360	75,040	-
				444,691
				725,000

Tentative.

Cost Estimate. The tentative project cost is \$725,000,000, no change from that reported in the Budget Program for 1974. The estimate remains tentative pending project scope determinations and further cost trend developments.

HARTSVILLE NUCLEAR PLANT—UNITS 1-4

1973 actual	\$697,039
1974 estimate	3,554,000
1975 estimate	8,206,000

Four nuclear fueled generating units with a total rating of approximately 5,200,000 kW are to be installed for commercial operation in December 1980, June 1981, December 1981, and June 1982, respectively. The tentative site is located on Old Hickory reservoir about 10 miles from Carthage, Tennessee. Environmental analyses necessary for final site determination are in process. A contract has been awarded for the nuclear steam supply systems. On-site construction is scheduled to begin during fiscal year 1976.

Plans for 1975

The estimated expenditure of \$8,206,000 will be applied as follows:

Payments on major equipment	\$700,000
Interest capitalized during construction	609,000
Preconstruction services	434,000
General engineering and design	6,400,000
General administration	63,000
Total	<u>8,206,000</u>

Status of Construction

	Estimated		Completion Date
	June 30, 1974	June 30, 1975	
Total project	-	-	June 1983
Structures and improvements	-	-	June 1983
Reactor and turbogenerator equipment	-	-	June 1982

Summary of Construction Program

	In Thousands			
	Actual to 6-30-73	Estimate		Total Cost ¹
		1974	1975	
Structures and improvements	-	-	-	\$172,600
Reactor	-	-	\$700	547,600
Turbogenerator	-	-	-	343,100
Accessory electrical and miscellaneous	-	-	-	76,800
Transmission plant	-	-	-	46,200
Interest capitalized during construction	\$33	\$186	609	234,172
Construction supervision and services, general engineering and design, and general administration	851	3,368	6,897	141,884
Total expenditures	884	3,554	8,206	1,562,356
Changes in unpaid undelivered orders	166,361	159,999	40,000	-366,360
Total obligations	167,245	163,553	48,206	1,195,996
				1,575,000

1. Tentative.

144—Hartsville

Cost Estimate. The tentative project cost of \$1,575,000,000 is unchanged from the estimate presented in the Budget Program for 1974.

NUCLEAR PLANTS 7 AND 8

1973 actual	-
1974 estimate	\$152,000
1975 estimate	1,105,000

Additional generating capacity of approximately 5.2 million kW is planned to meet forecasts of load requirements for 1982, 1983, and 1984. Planning and preliminary design will be under way in 1974 and orders for nuclear steam supply systems will be placed in that year. Unpaid undelivered orders at the end of 1974 are expected to total \$200 million. Purchase awards for turbogenerating units are scheduled for fiscal year 1976 with construction scheduled to start in fiscal year 1978.

The cost of this additional capacity is tentatively estimated at \$1,800 million. The estimate is based on two two-unit nuclear stations with consideration being given to installation of the four units on one site.

TRANSMISSION SYSTEM FACILITIES

1973 actual	\$68,727,422
1974 estimate	73,668,000
1975 estimate	72,400,000

TVA energy sales, excluding sales to Federal agencies, have grown at an average annual rate of about 9 percent during the past 10 years. In the next 10 years, these sales are expected to grow about 6 percent annually. Sales to Federal agencies, including interdivisional sales, are expected to increase from 17.7 billion kWh in 1973 to 27.4 billion kWh in 1975, an increase of 55 percent.

To supply the increasing electric energy requirements, TVA is expanding its extensive networks of extra high voltage (500-kV) transmission facilities and supplementing its lower voltage network. The extension and reinforcement of the transmission network will connect new generating plants into the system, improve reliability of power supply to growing area loads, and maintain system efficiency. New interconnections with neighboring utilities will provide improved system stability and economy by limiting the need for additional generation. Delivery of power to ultimate consumers, except for a few directly served industrial and Federal agency customers, is accomplished over distribution systems owned and operated by the municipalities and cooperatives which TVA serves.

The selection of voltage levels for a complex transmission system such as TVA's is a function of the quantities of power to be transmitted, the distance of transmission, and cost. The essential function of transmission substations is to change the voltage level by means of transformers to properly match the voltage to the particular transmission function required, or to a level suitable for delivery to a customer. The higher the voltage at which electric power is transmitted, the less energy waste. Higher voltage transmission demands greater initial investment for individual power lines and substations, but in relation to the lower voltage facilities which would otherwise be required, high voltage systems produce overall economies.

146—Transmission

Primary Transmission System Facilities

	X \$1,000	
	1973	1974
	Actual	Estimate
500-kV facilities	25,485	20,165
161-kV facilities	21,475	32,045
Total	46,960	52,210
		51,655

500-kV Facilities

About 1,485 miles of 500-kV transmission lines are in service or under construction. Approximately 435 miles are planned, for which acquisition of rights of way or construction will be started. The fiscal year 1975 program requires \$500,000 to install two 161-kV circuit breakers at the West Point, Mississippi, and Cordova, Tennessee, 500-kV substations; and \$2,800,000 to acquire substation sites and rights of way for future 500-kV substations in Madison County, near Jackson, Tennessee, Union County, near Tupelo, Mississippi, and Knox County, near Knoxville, Tennessee. Continued construction of other projects in fiscal year 1975 includes \$3,700,000 for the Weakley, Tennessee, 500-kV substation; \$5,445,000 for transmission connections for the Raccoon Mountain pumped-storage project; \$10,500,000 for the Widows Creek-West Jefferson 500-kV line; \$1,200,000 for transmission connections for the Watts Bar Nuclear Plant; \$1,000,000 for the Roane, Tennessee, 500-kV substation; \$200,000 for the Murphy Hill, Alabama, 500-kV substation; and \$510,000 to install 500-kV shunt capacitors at the Cordova, Tennessee, 500-kV substation.

The program also includes \$2,275,000 for new starts during fiscal year 1975. They are the Maury, Shelby, and Volunteer, Tennessee, 500-kV substations; the West Point-West Jefferson 500-kV line; capacity increases at the West Point, Mississippi, and Davidson, Tennessee, 500-kV substations; 500-kV facilities at the Shawnee Steam Plant; transmission connections for the proposed Bellefonte Nuclear Plant; and installation of 500-kV capacitors at the Weakley, Tennessee, 500-kV substation and in the Johnsonville-Cordova 500-kV line at the site of the future Jackson, Tennessee, 500-kV substation.

161-kV Facilities

To meet the growing demand for power in the TVA service area, \$5,245,000 is required in fiscal year 1975 for construction of additional 161-kV lines. As loads grow, the capacities of transmission lines supplying substations are approached. In other instances there are risks that, if for some reason one supply line was temporarily out of service, the capacity of an alternate line would be exceeded. As these circumstances develop, new 161-kV connections are provided to insure adequate supply and reliability. Of the 11 lines under construction during fiscal year 1975, eight will be completed and placed in service, and work will continue on the remaining three lines.

The program includes \$13,990,000 for additional 161-kV substations and connections in fiscal year 1975 to provide additional step-down facilities for supplying the subtransmission system and serving new delivery points. Six new substations will be started during fiscal year 1975, and 14 under construction in fiscal year 1974 will be completed.

Plans also provide \$3,985,000 to initiate capacity increases and improve service facilities at seven substations and to complete work at six substations during fiscal year 1975.

Planning studies point to the need for additional new primary substations throughout the service area, and \$305,000 will provide for surveys and acquisition of sites and related transmission line rights of way to be completed at one location and initiated at another location.

Subtransmission System Facilities

	X \$1,000	
	1973	1974
	Actual	Estimate
69-kV and 46-kV lines, substations, and improvements	8,251	5,940
		6,425

When load growth in a distributor's service area approaches the capacity of its 13 or 26-kV service lines, joint studies are undertaken to determine the appropriate location for a new 69-kV or 46-kV substation to provide adequate and economical power supply.

148-Transmission

To strengthen or add to the power supply to distributors and directly served industrial power users, work will be started in fiscal year 1975 on two new subtransmission lines and work started in prior years will be completed on four other lines. Also, construction of eight new subtransmission substations will begin in fiscal year 1975 with work being completed on three other similar substations started in prior years. Work on these lines and substations will require \$3,375,000 in fiscal year 1975.

Capacity for load growth in the distributors' service areas will be provided at some locations by the installation of higher rated equipment in existing subtransmission substations. Transformer changes and equipment improvements will be initiated at 10 locations, will continue at 8 locations, and be completed at 15 locations in fiscal year 1975. These changes will require expenditures of \$2,880,000.

To further increase delivery of power for the growing loads, two subtransmission lines will be uprated through installation of larger conductors during fiscal year 1975. The uprating of two subtransmission lines will be initiated in fiscal year 1975. These improvements to facilities will require \$170,000.

Communication Facilities

	X \$1,000
1973 actual	225
1974 estimate	1,435
1975 estimate	2,390

Reliability of the electric energy supply of a power system is dependent upon the effectiveness of the communication network which controls it. TVA power facilities are located in an area embracing portions of seven states and the extensive area served requires a similarly extensive communication network. A communication network consisting of voice dispatching, power-flow telemetering, protective relaying, and supervisory control circuits must extend into the far reaches of the system to provide dependable and uninterrupted transmission of voice and electronic signals between central and area dispatching and operating locations and the generating plants, substations, and operating and maintenance personnel. At the close of 1973, TVA had in operation 60 generating plants, 624 substations, 16,544 miles of transmission lines, and numerous interconnections with other utility systems. Constant expansion and improvement to the communication system is required as new substations, transmission lines, generating plants or units, and remote or supervisory control installations are added to the system. Installation will continue during fiscal year 1975 on a power system area dispatching and control plan which will lead eventually to automatic control of all major substations and many generating plants from five area dispatching offices. This

program will further increase power supply reliability by reducing human error to a minimum. The budget program includes \$2,390,000 in fiscal year 1975 for communication facilities.

Rehabilitation and Replacements of 69-kV and 46-kV Facilities
and Miscellaneous Additions and Improvements

	X \$1,000
1973 actual	8,243
1974 estimate	8,375
1975 estimate	6,080

Replacement of transmission system facilities must continually be made following equipment failures, accidents, storm damage, and minor necessary equipment changes. This work is estimated to require \$2,915,000 in fiscal year 1975.

Installation of capacitors provides reactive power to improve voltage and increase the load-carrying capacity of transmission and subtransmission lines. Such installations often permit deferring for a time replacement of lines or adding transfer capacity at substations. Terms of the current standard wholesale power contract include a provision for holding delivery voltage to closer tolerance than in past years. To meet this contract requirement, installation of capacitors and voltage regulating equipment will continue for a number of years, requiring \$1,090,000 in fiscal year 1975.

TVA maintains a central service shop at Muscle Shoals and smaller repair facilities at numerous field locations where generating plant equipment, transformers, oil circuit breakers, and other power equipment are repaired and overhauled. A central electric and chemical laboratory at Chattanooga is used for testing and maintaining metering and electronic equipment and for performing chemical analyses and research on various materials. Shop and laboratory work requires a great variety of tools, operating equipment, specialized meters, and testing devices. To provide new and replacement items for the shops and laboratory, \$375,000 is required in fiscal year 1975.

At many locations power maintenance, construction, and stores personnel are quartered in obsolete buildings acquired years ago, or in rented facilities. These facilities are unsatisfactory. Space for special mobile equipment is restricted, space for outdoor storage of bulky materials and supplies is limited, and indoor provisions for shops, stores items, tools, and equipment are inadequate. An improvement program was started some years ago and several new power service centers have been completed providing adequate office, shop, and storage space at various locations in the service area. Plans are progressing for construction of a new center at Scottsboro, Alabama, an addition to the Tupelo, Mississippi, center in fiscal

150-Transmission

year 1974 with design and start of construction on centers at Murfreesboro and Columbia, Tennessee; Russellville, Kentucky; and Philadelphia, Mississippi, in fiscal year 1975. Acquisition of a new site for the Nashville service center is progressing. Completion of an expansion of the Wilson Dam power service shop in fiscal year 1975 will provide additional shop facilities capable of repairing the large electrical equipment now on the system. Work in this category will require \$1,700,000 in fiscal year 1975.

SUMMARY OF TRANSMISSION SYSTEM FACILITIES¹

	Actual 6-30-73	X \$1,000 Estimate			Total Cost
		1974	1975	To Complete	
Primary transmission system facilities:					
69-kV facilities					
161-kV lines	111,797	20,165	28,130	170,425	330,517
161-kV substations	10,994	10,915	5,245	2,300	29,454
Substation sites and connections	6,839	19,680	13,990	4,870	44,379
Capacity increases and transmission right of way for future use	8	235	305	100	648
Capacity increases and changes at existing primary substations	820	2,215	3,985	3,040	10,042
Total	130,440	52,210	51,655	180,735	415,040
Subtransmission facilities:					
69-kV and 46-kV lines and substations					
Capacity increases at existing subtransmission substations	1,662	3,880	3,375	2,825	11,742
Major rebuilding of existing subtransmission facilities	664	1,475	2,880	2,365	7,384
Total	390	585	170	150	1,295
Communication facilities	2,716	5,940	6,425	5,340	20,421
Rehabilitation and replacements of 69-kV and 46-kV facilities and miscellaneous additions and improvements:	221	1,435	2,390	5,320	9,366
Minor line and substation replacements and improvements					
Capacitor installations and low-voltage switches for service points	2,838	3,625	2,915	4,995	14,373
and operating equipment	1,293	1,540	1,090	2,135	6,058
Power service points, buildings for construction and operating forces, and related equipment	524	410	375	-	1,309
Total	4,650	2,800	1,700	985	10,115
Total transmission system facilities—direct	147,632	69,375	60,800	199,510	318,355
Engineering, design, and general expenses	147,632	69,375	60,800	199,510	318,355
Distribution of administrative and general expenses		4,240	4,350		8,590
Total transmission system facilities, all from power proceeds and borrowings		1,468	1,500		2,968
		73,668	72,400		146,068

1. Actual expenditures to June 30, 1973, estimated expenditures to complete, and total cost estimates relate only to facilities on which work is planned to be done during the period from July 1, 1973, through June 30, 1975.

Summary of Physical Units of Property in Service

	End of Fiscal Year		1975 Estimate
	1973 Actual	1974 Estimate	
Transmission lines (circuit miles):			
500 kilovolts	1,479	1,485	1,486
345 kilovolts	2	2	2
230 kilovolts	30	30	30
161 kilovolts	8,503	8,872	8,976
115 kilovolts	186	186	170
69 kilovolts	3,519	3,540	3,566
46 kilovolts	2,693	2,677	2,678
13 kilovolts	132	132	127
Total transmission lines (circuit miles)	16,544	16,924	17,035
Substations ¹ :			
Number	624	649	667
Capacity in megavolt-amperes	55,154	61,135	63,037

1. Exclusive of step-up stations at generating plants.

LAND AND LAND RIGHTS

1973 actual	\$9,648,437
1974 estimate	19,678,000
1975 estimate	21,696,000

Land and Rights for Future Fuel Supplies

	X \$1,000
1973 actual	8,301
1974 estimate	14,704
1975 estimate	17,695

To help assure the availability of an economical fuel supply for existing and future thermal generating plants in the TVA power system, an estimate of \$15,000,000 for fiscal year 1974 and \$18,000,000 for fiscal year 1975 provides for exploration and acquisition of additional uranium mineral and mining rights, if suitable reserves are located and available for purchase. TVA, through control of sufficient uranium reserves, hopes to avoid sharp increases in market prices as well as the expected shortage in the early 1980's. Partially offsetting these estimates are estimated credits of \$296,000 for fiscal year 1974 and \$305,000 for fiscal year 1975 for depletion allowances for coal mined on reserves owned by TVA.

Land for Future Electric Generating Plant Sites

	X \$1,000
1973 actual	1,347
1974 estimate	4,974
1975 estimate	4,001

To assure availability of sites for orderly and efficient expansion of the power system, it is prudent to develop and maintain an inventory of suitable sites for the location of future electric generating plants. Acquisition of four inventory sites which began in fiscal year 1972 is continuing in fiscal year 1974. In addition, plans include the purchase of one additional site in fiscal year 1974 and three in fiscal year 1975.

ADDITIONS AND IMPROVEMENTS AT POWER FACILITIES

	1973 Actual	1974 Estimate	1975 Estimate
Modernization and installation of electrostatic precipitators and stacks	\$10,294,770	\$29,764,000	\$61,225,000
Installation of sulfur dioxide removal equipment—			
Widows Creek unit 8	2,025,714	14,444,000	18,735,000
Rehabilitation of Ocoee No. 1 Dam	384,646	3,436,000	1,842,000
Power production training center		535,000	7,305,000
Installation of air preheating coils at Paradise Steam Plant	20,816	1,586,000	3,340,000
Other additions and improvements at generating stations	5,943,820	9,302,000	9,234,000
Power system control center	4,903,726	832,000	172,000
Construction equipment pool	4,516,716	4,540,000	5,270,000
Other additions and improvements	1,626,929	738,000	2,813,000
Total	<u>29,717,137</u>	<u>65,177,000</u>	<u>109,936,000</u>

238

Modernization and Installation of Electrostatic Precipitators

For a number of years TVA has been engaged in a program of upgrading air pollution control facilities at existing coal-fired generating stations. In January 1973, in response to new air quality requirements set by the states of Alabama, Kentucky, and Tennessee, the program was greatly expanded. The new program will provide for greater fly ash removal efficiencies and in some cases will provide taller stacks for dispersion of sulfur oxides at higher elevations to protect ambient air quality. The total past and current program is expected to cost over \$300 million. Major jobs in the 1975 estimate include Johnsonville Steam Plant units 1-6, Widows Creek Steam Plant units 1-6, Colbert Steam Plant unit 5, Shawnee Steam Plant units 1-10, and Kingston Steam Plant units 1-9. The installations at the Shawnee and Kingston plants, requiring \$28.8 million in 1975, are in addition to programs completed earlier at these plants at a total cost of \$12.4 million.

Installation of Sulfur Dioxide Removal Equipment—Widows Creek Unit 8

Over a period of several years TVA has been involved in research on methods for removing sulfur dioxide from flue gases of coal-fired plants. Methods investigated include dry limestone injection, ammonia scrubbing, and limestone wet scrubbing, the last of which offers the most promising process for full-scale application to a large steam plant. Operations of a pilot scale wet scrubber at TVA's Colbert Steam Plant during fiscal years 1971, 1972, and 1973 have provided information for use in the design of a full-scale unit and such a unit will be installed on the 550 megawatt unit 8 at Widows Creek Steam Plant. It is not contemplated at this time that the installation will include facilities for recovery of sulfur in a usable form. Expenditures through fiscal year 1973 totaled \$3.6 million. The \$14.4 million estimate for fiscal year 1974 provides for continuing investigations, engineering and design, purchasing of equipment, and construction. Continuation of work including further design and engineering, purchasing of equipment, and construction will require \$18.7 million for fiscal year 1975. This facility is scheduled for completion in fiscal year 1976 at an estimated total cost of \$42,000,000.

Rehabilitation of Ocoee No. 1 Dam

Ocoee No. 1 Dam was built by Eastern Tennessee Power Company between 1910 and 1914. It was acquired by TVA from Tennessee Electric Power Company in 1939. Concrete surfaces in the intakes are deteriorating and safety factors are below the standards dictated by modern criteria in the event that the maximum probable flood should occur at the site. Strengthening and resurfacing the dam is estimated to cost a total of \$5.9 million. The 1975 estimate of \$1.8 million will complete the project.

Power Production Training Center

To improve the reliability, operability, and safety of TVA's power plants, it is planned to construct a training center to provide the power plant operators and technicians with the highest quality training available. This will also allow centralization and optimization of power program training activities.

The training center will be located at the Sequoyah Nuclear Plant site and will consist of three simulators, classrooms, and office facilities.

These facilities will assure TVA of the availability of training facilities for fulfilling AEC's training and retraining requirements for licensing of nuclear plant operators. The inclusion of a fossil-fueled plant simulator will enable TVA to conduct a comprehensive fossil plant operator training program at this facility. The \$7.3 million estimate for fiscal year 1975 provides for construction requirements and payments on a contract for the simulators. This facility is scheduled for completion in fiscal year 1977 at a tentative total cost estimate of \$16.9 million.

Installation of Air Preheating Coils at Paradise Steam Plant

Heating coils are being installed in the air preheater inlet ducts on all three units at Paradise Steam Plant. Cool air entering the preheaters has caused corrosion in the tubes and damage to electrostatic precipitators resulting in excessive maintenance costs and load reductions on the generating units. Installation of heating coils is expected to eliminate these difficulties. The project will be completed in 1975 at a total cost of \$5.0 million.

Other Additions and Improvements at Generating Stations

In 1975, the continuing program of installing supervisory control at Norris, Cherokee, and Douglas hydro plants will require \$0.3 million. Generator stator windings will be replaced in Guntersville unit 3 and Nickajack unit 1 requiring \$0.5 million. Miscellaneous work at hydro plants, including work to comply with water quality laws and standards, will require \$0.2 million.

The 1975 estimate includes \$0.4 million for purchase of equipment for handling coal and ash at Gallatin, John Sevier, and Paradise steam plants. An estimate of \$2.2 million for additional ash pond capacity will complete the new Widows Creek ash pond, continue construction of the John Sevier pond, and provide for a start on raising the dikes at Allen.

Air monitoring equipment, improvements to ash disposal systems, peaking modifications, fire protection facilities, dust control systems, and other miscellaneous improvements at steam plants will require \$1.6 million in 1975.

The estimates include \$3.1 million for replacement of units 1 and 2 turbine spindles at Gallatin Steam Plant and a spare spindle to serve Shawnee units 2 to 7 and Kingston units 1-4.

156-A&I

Additional soot blowing equipment for Paradise Steam Plant will require \$0.7 million. Miscellaneous small additions and improvements totaling \$0.2 million account for the balance of the estimate.

Power System Control Center

Completion of work which began in fiscal year 1970 on the Power System Control Center will require \$0.2 million in fiscal year 1975. This facility on Chickamauga Dam reservation is scheduled for operation in fiscal year 1975 at a total cost of \$11.2 million.

Construction Equipment Pool

In order to achieve efficient utilization of construction equipment, major equipment is held in a single pool. Projects are charged a rental rate for equipment which reflects an appropriate allowance for depreciation. The estimated net expenditure of \$5.3 million for fiscal year 1975 reflects the excess of purchases over depreciation charges for that year.

Other Additions and Improvements

The estimate of \$2.8 million for fiscal year 1975 includes \$1.4 million for the completion of a dragline facility at Paradise Steam Plant which is being deferred from 1974 and a \$1.1 million payment to the Bureau of Employees' Compensation related to claims for injuries sustained by TVA personnel while at work on projects in this budget category completed or under construction. The remainder of the estimate, \$0.3 million, is required for miscellaneous additions and replacements at various power plants.

NUCLEAR FUEL

1973 actual	\$29,229,596
1974 estimate	30,213,000
1975 estimate	43,740,000

The nuclear fuel supply contracts for Browns Ferry and Sequoyah nuclear plants provide for progress payments to be made to the suppliers as the fuel is fabricated. Progress and interest payments and charges for inspection of nuclear fuel through June 30, 1973, total \$93,089,994. Total estimated expenditures which include estimated payments to the Atomic Energy Commission for uranium enrichment services for the nuclear plant tentatively located at Hartsville and for nuclear plants 7 and 8 for fiscal years 1974 and 1975 are \$37,679,000 and \$70,649,000, respectively. After accounting for estimated nuclear fuel burnup, net expenditures for fiscal years 1974 and 1975 are estimated at \$30,213,000 and \$43,740,000, respectively.

INVESTIGATIONS FOR FUTURE POWER FACILITIES

Increasing demands for power require that TVA constantly explore alternative plans for future generating facilities. Investigations in progress will be continued and new investigations started on facilities necessary to meet future power loads. Expenditures for the demonstration plant liquid metal fast breeder reactor which appear here in 1973 are being budgeted for future years in reimbursable services.

	X \$1,000		
	1973 Actual	1974 Estimate	1975 Estimate
Hydro generating facilities	5	141	77
Steam generating facilities	1,109	693	748
Demonstration liquid metal fast breeder reactor	768	-	-
Total investigations for future power facilities	1,882	834	825

Schedule B-3. Power Operations
(For fiscal years ending June 30, 1973, 1974, and 1975)

	1973 actual	1974 estimate	1975 estimate
Operating revenues			
Sales of electric energy:			
Municipalities and cooperatives	\$476,354,399	\$597,410,000	\$682,300,000
Federal agencies	103,165,615	168,405,000	207,605,000
Industries	144,732,337	184,530,000	209,415,000
Electric utilities	790,841	1,110,000	1,110,915,000
Total outside sales	725,043,192	951,455,000	1,110,915,000
Interdivisional sales	3,988,250	4,330,000	2,375,000
Total sales of electric energy	\$729,031,422	\$955,785,000	\$1,113,290,000
Rents and other revenues	20,368,652	21,564,000	22,581,000
Total operating revenues	749,380,015	977,349,000	1,135,871
Operating expenses			
Production	408,765,380	541,194,000	566,537,000
Transmission	18,483,064	20,437,000	21,895,000
Customer accounts	498,004	327,000	553,000
Demonstration of power use	1,271,576	1,211,000	1,325,000
Administrative and general	27,378,562	31,143,000	34,609,000
Payments in lieu of taxes	27,310,061	31,119,000	32,485,000
Social Security taxes	3,816,311	4,763,000	5,215,000
Provision for depreciation	89,468,110	105,191,000	121,775,000
Total operating expenses	\$779,429,408	\$735,607,000	\$791,118,000
Operating income	171,950,607	241,742,000	344,753,000
Other income and deductions			
Interest charged to construction	73,356,862	77,100,000	85,250,000
Other	444,009	225,000	370,000
Total income	73,800,871	77,325,000	85,620,000
Interest charges			
Net income from power operations	139,330,514	180,200,000	208,280,000
Total	106,420,964	138,867,000	222,173,000
Operating margin			
Net income from power operations	106,420,964	138,867,000	222,173,000
Treasury dividend (return on appropriation investment)	53,784,451	63,422,241	70,000,000
Operating margin	\$2,636,513	\$75,444,759	\$151,173,000

Reconciliation of Schedule B-3 with Budgeted Income and Expenses

	1973 Actual	1974 Estimate	1975 Estimate
<u>Budget income</u>			
Operating revenues	\$749,380,015	\$977,349,000	\$1,135,871,000
Interchange power delivered	27,295,325	15,471,000	16,797,000
Incidental income	25,712		
Interdivisional sales and rents	-4,107,239	-4,450,000	-2,485,000
Total budgeted income	<u>772,593,813</u>	<u>988,370,000</u>	<u>1,150,183,000</u>
<u>Budgeted expenses</u>			
Operating expenses	577,429,408	735,607,000	791,118,000
Interest charges less other income and deductions ..	65,529,643	102,875,000	122,580,000
Interchange power delivered	27,295,325	15,471,000	16,797,000
Incidental income	25,712		
Interdivisional sales and rents	-4,107,239	-4,450,000	-2,485,000
Provision for depreciation	-89,468,110	-105,191,000	-121,775,000
Total budgeted expenses	<u>576,704,739</u>	<u>744,312,000</u>	<u>806,235,000</u>

POWER SUPPLY AND USE
(OPERATING EXPENSES AND INCOME)

POWER OPERATIONS
(Schedule B-3)

Net income from power operations for fiscal year 1975 is estimated to be \$222.2 million compared with \$106.4 million in fiscal year 1973 and an estimated \$138.9 million in fiscal year 1974. The increase in net income reflects two rate adjustments, one in January 1973 and the other in January 1974. Together these rate adjustments provide estimated additional revenues of about \$164.7 million and \$267.9 million in fiscal years 1974 and 1975, respectively. The rate adjustments were necessary in order for TVA to meet its financial responsibility.

These adjustments will provide sufficient revenues for TVA to meet the requirements of the TVA Act and the basic bond resolutions during fiscal years 1974 and 1975. The rate test requires that TVA's rates be sufficient in each year to cover current costs of operations plus all interest and principal payments on its debts and payments to the Treasury. The rate test provides for an alternate computation which substitutes equal annual debt requirements if they are higher than actual. In addition to these costs, rates are required to provide a margin for reinvestment in power system assets.

The purpose of a second financial requirement of the bond financing amendment is to protect the bondholders' investment. This test is required for five-year periods and not for each separate year as is the case for the rate test. The bondholders' test requires in effect that the net income at least equal the Treasury dividends in each successive five-year period beginning in fiscal year 1961. The sum of annual operating margins, as shown on schedule B-3, for the appropriate five-year period is the bondholders' investment test margin.

To afford additional protection to the bondholders, the basic bond resolution added another test. This test must be met before additional bonds can be issued on an equal rank with outstanding bonds. It provides, in effect, that net income at least equal the Treasury dividends on the appropriation investment if the appropriation investment were not reduced by the repayments. This test applies to running five-year periods. The margins above these requirements provide capital for investment in new power facilities. The growing indebtedness of the system and high interest rates on borrowings make it necessary to finance more from earnings than has been the practice in order to avoid excessive future costs.

The actual rate test margins for fiscal years 1971, 1972, and 1973 and estimated margins for fiscal years 1974 and 1975 are shown below.

	X \$1,000,000				
	Actual		Estimated		
	1971	1972	1973	1974	1975
Rate test margin (based on actual debt service)					
Revenues	598.0	641.9	749.4	977.3	1,135.9
Requirements:					
Operation, maintenance, and administration	349.5	372.0	460.4	599.0	629.9
Payments in lieu of taxes	20.0	25.7	27.3	31.1	39.2
Actual debt service	77.6	100.2	139.0	179.9	207.7
Payments to Treasury:					
Dividend (return on appropriation investment)	65.1	55.8	53.8	63.4	70.0
Reduction of appropriation investment	20.0	20.0	20.0	20.0	20.0
Total requirements	532.2	573.7	700.5	893.4	966.8
Margin	65.8	68.2	48.9	83.9	169.1
Rate test margin (based on level debt service)					
Revenues	598.0	641.9	749.4	977.3	1,135.9
Requirements:					
Operation, maintenance, and administration	349.5	372.0	460.4	599.0	629.9
Payments in lieu of taxes	20.0	25.7	27.3	31.1	39.2
Level debt service	87.6	99.3	137.8	187.3	222.3
Payments to Treasury:					
Dividend (return on appropriation investment)	65.1	55.8	53.8	63.4	70.0
Reduction of appropriation investment	20.0	20.0	20.0	20.0	20.0
Total requirements	542.2	572.8	699.3	900.8	981.4
Margin	55.8	69.1	76.5	76.5	154.5

Power Revenues

Power revenues are expected to increase from the actual of \$749.4 million in fiscal year 1973 to \$977.3 million in fiscal year 1974 and \$1,135.9 million in fiscal year 1975. Details are shown in the following table.

	1973 Actual			1974 Estimate			1975 Estimate		
	Million kWh	X \$1,000	Mills/kWh	Million kWh	X \$1,000	Mills/kWh	Million kWh	X \$1,000	Mills/kWh
Sales of electric energy									
Municipalities	47,716	350,331	7.34	51,338	441,327	8.60	54,810	511,362	9.33
Cooperatives	16,106	126,023	7.82	17,277	156,083	9.03	18,610	180,938	9.72
Federal agencies:									
AEC	15,747	91,507	5.81	22,627	153,055	6.85	25,804	193,595	7.50
AEDC	683	6,328	9.27	658	6,273	11.06	658	7,785	11.83
Other	883	5,351	7.81	700	6,072	8.68	653	6,225	9.53
Total	17,113	103,166	6.03	23,985	168,405	7.02	27,115	207,605	7.66
Commercial and industrial:									
Aluminums	8,570	55,396	6.46	10,555	77,517	7.34	10,750	87,053	8.10
Chemicals	8,515	57,167	6.71	8,520	67,046	7.78	8,590	71,110	8.28
Ferroalloys	2,468	16,416	6.65	2,655	20,349	7.66	2,710	22,892	8.45
Other	2,312	15,753	6.81	2,485	19,618	7.89	3,310	28,360	8.57
Total	21,865	144,732	6.62	24,315	184,530	7.59	25,360	209,415	8.26
Electric utilities	92	791	8.60	115	1,110	9.65	165	1,595	9.67
Total outside sales	102,892	725,043	7.05	117,030	951,455	8.13	126,060	1,110,915	8.81
Interdivisional	581	3,988	6.86	645	4,330	6.71	275	2,375	8.64
Total sales	103,473	729,031	7.05	117,675	955,785	8.12	126,335	1,113,290	8.81
Rent from electric property and other revenues ..		20,349			21,564			22,581	
Total revenues ..		749,380	7.24		977,349	8.31		1,135,871	8.99

Revenues from sales to municipal and cooperative distributors in 1975 are estimated to increase by \$215.9 million over 1973. The increase is due to the estimated load growth over the two-year period of 15 percent for residential, business, and industry loads and to the wholesale rate adjustments of January 1973 and January 1974.

Residential load growth is based on (1) continued growth in number of households and new housing construction, (2) continued growth of family incomes and concurrent increases in use of appliances, and (3) increased use of electrical heat resulting from the gas shortage. The average number of residential customers in 1975 is expected to be about 120,000 more than in fiscal year 1973. The average annual use is expected to increase by 1,200 kWh above the fiscal year 1973 level. Residential average use of electricity in the TVA area continues to be approximately twice that of the United States. The following table shows several years of comparison of residential average annual use and cost per kWh in the TVA area and in the United States.

12 Months Ended	United States ¹		TVA	
	kWh Use	Avg. Price Per kWh (¢)	kWh Use	Avg. Price Per kWh (¢)
June 1965	4,814	2.28	10,831	0.92
June 1966	5,072	2.22	11,294	0.90
June 1967	5,434	2.18	11,680	0.89
June 1968	5,788	2.14	12,668	0.93
June 1969	6,259	2.11	13,600	0.95
June 1970	6,810	2.09	14,560	1.03
June 1971	7,243	2.14	14,400	1.22
June 1972	7,496	2.25	14,040	1.28
June 1973	7,882	2.32	15,080	1.30

1. Total electric utility industry.

Growth in business and industry loads served by distributors is based on (1) growth of the service-type business to meet the demands created by industrial expansion and a growing population, (2) expansion of industry in the region in step with the national growth, and (3) an increasing demand for electricity resulting from the natural gas shortage.

Revenues from direct sales to Federal agencies in 1975 are estimated to be \$207.6 million, an increase of \$104.4 million from the actual for fiscal year 1973. The increase results from expanding power needs at AEC to meet the demand for

nuclear materials and from the effect of rate adjustments. AEC loads are expected to increase from 15,747 million kWh in fiscal year 1973 to 25,804 million kWh in fiscal year 1975, an increase of 64 percent.

Revenues from direct sales by TVA to industrial customers are expected to be \$209.4 million in fiscal year 1975. The increase of \$64.7 million over the 1973 level reflects the rate adjustments and expected load growth, especially in the aluminum industry. About 60 percent of the load growth is the result of the expansion of production facilities by ALCOA and the return to normal production levels by the other aluminum producers in the area. The remainder of the increase in revenue results from expected load increases by the other industries in the area.

Revenues from sales to electric utilities will continue at very low levels compared to past years. The 1975 estimate is \$1.6 million, about \$0.8 million more than the 1973 level. This is a result of the tight power supply situation which continues to limit commitments for firm power sales to utilities in fiscal year 1975.

Interdivisional sales are estimated to be \$2.4 million in 1975, about \$1.6 million less than the 1973 level.

Estimated rent from electric property and other revenues in fiscal year 1975 total \$22.6 million, an increase of \$2.2 million over the 1973 level. Most of the increase is due to growth in facilities rental charges to municipalities and cooperatives under the TVA wholesale rate schedules and to directly served customers under the TVA general power rate schedule. Both schedules are designed for delivery at not less than 161 kilovolts. When deliveries are made at lower voltages, the wholesale rate schedules provide for a charge based upon the highest hourly demand during the past 12 months. The general power rates provide for a charge to the directly served customers based on their contract demand. As loads grow, the facilities rental charges increase.

Power Expenses

Production Expense

Total energy requirements for fiscal year 1975 are estimated to be 138.4 billion kWh, an increase of 21.3 billion kWh over the actual for fiscal year 1973 and 9.0 billion kWh more than estimated for fiscal year 1974. With above normal rainfall and streamflow conditions in fiscal year 1973, hydro generation was 24.5 billion kWh, a record high, exceeding the previous year's high of 21.3 billion kWh. Hydro generation in 1973 was 6.5 billion kWh above normal, resulting in less than normal generation by fuel-fired plants. Assuming about normal hydroelectric generation and a small change in power from

other utilities for fiscal years 1974 and 1975, steam-electric generation, including that from gas turbines, is estimated to be 114.2 billion kWh in 1975, an increase of 29.6 billion kWh or about one-third more than was generated in fiscal year 1973 and 10.6 billion kWh or 10 percent more than is estimated for fiscal year 1974. The following tables provide a summary of the source and disposition of energy and the expenses for production.

Source and Disposition of Energy

Input	1973 Actual	Million kWh		1975 Estimate
		1974 Estimate		
Hydroelectric generation:				
TVA hydro and pumped storage	18,141	13,738		13,488
Cumberland	3,693	2,812		2,690
ALCOA	2,623	2,090		1,975
Total hydroelectric generation	24,457	18,640		18,153
Steam-electric generation:				
Coal-fired	84,384	98,169		96,366
Nuclear	-	4,981		17,386
Total steam-electric generation	84,384	103,150		113,752
Gas turbine generation	254	437		450
Total generation	109,095	122,227		132,355
Purchased power	670	930		540
Interchange and exchange receipts from other utilities:				
Seasonal	2,799	2,913		2,799
Other	831	805		176
Concurrent and inadvertent	3,659	2,500		2,500
Total interchange and exchange	7,289	6,218		5,475
Total input	117,054	129,375		138,370
Output				
Sales:				
Municipalities	47,716	51,338		54,810
Cooperatives	16,106	17,277		18,610
Total municipalities and cooperatives	63,822	68,615		73,420
Other electric utilities	21,862	115		165
Commercial and industries	17,865	24,315		25,360
Federal agencies	1,713	23,985		27,115
Interdivisional	581	642		775
Total sales	105,473	117,675		126,335
Interchange and exchange delivered to other utilities:				
Seasonal	2,052	462		611
Other	2,484	2,913		2,799
Concurrent and inadvertent	3,667	2,500		2,500
Total interchange and exchange	8,203	5,875		5,910
Deliveries to Aluminum Company of America-ALCOA agreement	1,820	1,820		1,850
Transmission losses and shop use	3,558	3,975		4,275
Total output	117,054	129,375		138,370

Production Expenses before Depreciation									
	1973 Actual		1974 Estimate		1975 Estimate				
	Million kWh	X \$1,000	Million kWh	X \$1,000	Million kWh	X \$1,000			
Hydroelectric:									
TVA hydro and pumped-storage	18,141	9,881	13,738	9,067	13,488	8,438			
Cumberland	3,693	10,572	2,860	10,560	2,890	11,447			
ALCOA	(2,623)		(1,550)		(1,972)				
Total	21,834	20,453	15,550	18,627	16,178	19,885			
Steam-electric:									
Coal-fired gas turbine:	79,862	267,649	3,35	97,043	364,590	3,76	96,366	377,548	3,92
Nuclear fuel	254	2,437	9,59	3,742	5,630	1,50	16,949	26,112	1,54
Gas turbine fuel	80,116	270,086	3,37	377,648	17,000	3,76	450	8,707	1,93
Subtotal	80,116	270,086	3,37	377,648	17,000	3,76	450	8,707	1,93
Other expenses	80,116	270,086	3,37	377,648	17,000	3,76	450	8,707	1,93
Total	80,116	270,086	3,37	377,648	17,000	3,76	450	8,707	1,93
Purchased power:	670	6,133	12,12	101,222	473,335	4,68	113,765	517,400	4,55
Interchange receipts:									
Seasonal	2,799	9,797 ^b	3,50	2,913	10,196 ^b	3,50	2,799	9,797 ^b	3,50
Other	831	6,116	7,36	805	6,383	7,93	176	2,640	15,00
Concurrent and inadvertent	(3,659)			(2,500) ^c			(2,500) ^c		
Total	3,630	15,913	4,38	3,718	16,579	4,46	2,373	12,437	4,18
Interchange deliveries:									
Seasonal	2,484	7,787 ^b	3,13	2,913	10,196	3,50	2,799	9,797	3,50
Other	2,052	19,508	9,41	462	5,275	11,41	611	7,000	11,46
Concurrent and inadvertent	(3,667)			(2,500) ^c			(2,500) ^c		
Total	4,336	27,295	6,02	3,375	15,471	4,58	3,410	16,797	4,93
Other production expenses:									
LMFBR contributions and other R&D expenses	5,263								
Production administration	5,882								
Employee training	3,000								
Nuclear fuel purchasing and engineering studies and other	1,396								
Preliminary operations:									
Cumberland	4,522	20,996	1,239	3,635	1,239	3,635	437	1,296	
Sequoyah	856		1,126	5,953	1,433	1,581			
Raccoon Mountain			180			175			
Watts Bar	16,729			8,868	8,868	1,639			
Value of initial power credited to construction	(20,943)			(9,388)					
Amount charged to construction	4,522	20,996	2,365	10,681	2,365	10,681	437	1,296	
Net other production	4,522	35,914	2,365	30,133	2,365	30,133	437	1,296	
Total other production	4,522	35,914	2,365	30,133	2,365	30,133	437	1,296	
Allocation of multipurpose reservoir operations	106,236	408,765	3,85	121,410	541,191	4,46	130,485	566,231	4,34
Total production expenses before depreciation									
Thousand tons of coal burned (including inventory adjustments)	35,413		42,841				42,527		
Fuel expense as percent of total steam-electric and gas turbine expense	79.6		79.8				79.7		

a. Not included in expenses as this power is exchanged under terms of ALCOA agreement.
 b. No payments are made for seasonal interchange and the amounts of deliveries and receipts are balanced out in time. The dollars shown represent TVA's estimate of the value for accounting purposes.
 c. Not included in expenses as no money is involved and the receipts and deliveries balance out.

Steam-electric generation and gas turbine costs, which represent about 90 percent of total production expense, are estimated to increase from \$352.4 million in fiscal year 1973 to \$473.3 million in fiscal year 1974 and to \$517.4 million in fiscal year 1975. These expenses would have been greater in fiscal years 1974 and 1975 without the scheduled operation of the first nuclear plant in the system. During fiscal year 1974, one unit of Browns Ferry Nuclear Plant is scheduled for commercial operation with three units scheduled to be in commercial operation in fiscal year 1975. Fuel expense for nuclear generation is estimated to be 1.54 mills per kWh generated compared with 3.92 mills per kWh generated for coal-fired plants. Coal prices, which have been rising rapidly for several years, are estimated to continue to rise. Fuel expense for coal is estimated to be 3.92 mills per kWh in fiscal year 1975 as compared with 3.35 mills per kWh in fiscal year 1973, more than a 17 percent increase. Also fuel expense for gas turbine generation is estimated to increase, reflecting expected increases in oil and gas prices. Other expenses for steam-electric and gas turbine generation are expected to decrease from 1.03 mills per kWh generated in fiscal year 1973 to .93 mills per kWh generated in fiscal year 1975.

Hydroelectric expenses vary from year to year, depending primarily upon streamflow conditions for the Cumberland plants and maintenance requirements for the TVA plants. Fiscal year 1975 total hydroelectric expense is estimated to be \$19.9 million, an increase of \$0.3 million over the estimate for fiscal year 1974. Payments for power from the Cumberland River projects will increase by \$0.9 million reflecting a full year of generation from the new Cordell Hull plant. Operations and maintenance costs for TVA hydro plants are estimated to decrease \$0.6 million in fiscal year 1975 reflecting completion of Natchitoches repairs.

The estimate for purchased power for fiscal year 1975 is reduced from the estimate for fiscal year 1974, reflecting a full year of commercial operation of the Cumberland Steam Plant and Browns Ferry unit 1 and a partial year for Browns Ferry units 2 and 3.

The decrease in net interchange expense results primarily from lower levels of economy and emergency interchange receipts and higher deliveries of the same kind. This also reflects anticipation of commercial operation of the new units mentioned above.

Excluding expenditures for preliminary operations, other production expenses are expected to increase from \$19.5 million in 1974 to \$22.4 million in 1975. This increase reflects rising expenditures for research and development and training activities to provide generating plant operators, craft employees, engineering, and administrative employees to compensate attrition and to provide for manning of new plants. Rising training costs relate to new nuclear units scheduled for operation over the next few years. Partially offsetting these increases are expenses related to preliminary operations. These expenses vary considerably from year to year, depending upon the number of new plant units being staffed before commercial operations and the timing of initial generation of the units during a fiscal year. All costs incurred for new units before commercial operation are charged to other production expense. For that portion of the preliminary operation period from initial

generation for coal-fired units and fuel load for nuclear units to commercial operation, all operation and maintenance expenses are transferred to construction costs and the value of power generated during initial generation is charged to other production and credited to construction costs. For fiscal year 1975 net preliminary operations reflect a \$7.3 million decrease from the estimate for 1974.

Transmission Expense

	1973 Actual		1974 Estimate		1975 Estimate	
	X \$1,000	Mills/kWh Sales	X \$1,000	Mills/kWh Sales	X \$1,000	Mills/kWh Sales
Supervision and administration	3,898	.038	4,086	.035	4,217	.033
Substation operations and maintenance ...	6,895	.066	7,256	.061	7,686	.061
Line operations and maintenance	1,943	.019	1,977	.017	2,041	.016
Dispatching and protection	2,002	.019	2,126	.018	2,281	.018
Right of way clearing	1,420	.014	1,524	.013	1,712	.014
Research and development activities	318	.003	925	.008	1,301	.010
Other transmission expense	2,445	.024	2,543	.022	2,657	.021
Total transmission	<u>18,921</u>	<u>.183</u>	<u>20,437</u>	<u>.174</u>	<u>21,895</u>	<u>.173</u>

The increases in transmission expense reflect past experience with cost trends in operations and maintenance of the system, coupled with additional manpower requirements, materials, and related expenses associated with the operations and maintenance of the growing transmission system.

When related to power sales, expenses actually show a decline on a unit basis. Continuing efforts are directed toward improvements in equipment and techniques for better utilization of manpower in keeping expenses at a minimum consistent with the maintenance of reliable electric service.

170

Customer Accounts Expense

	X \$1,000	
	1973	1974
	Actual	Estimate
Total	498	527
		553

TVA delivers power to about 825 different metering points to TVA power distributors, directly served industries, Federal agencies, and neighboring utilities with which TVA has interchange agreements. From the metering points, information is gathered, analyzed, and processed monthly for the purpose of sending invoices to TVA power customers. The increases from year to year reflect rising costs of services and materials used in this activity.

Demonstration of Power Use

	X \$1,000	
	1973	1974
	Actual	Estimate
Gross expenses	1,766	1,748
Reimbursement	494	517
Net expenses	1,272	1,231
		1,325

Estimates for demonstration of power use provide for studies, research, experiments, and demonstration programs which help the users of an important resource, electricity, accomplish better and more economical applications of electric power for agricultural and domestic use and for production processes by small industries. These activities are carried out in cooperation with agricultural extension services, 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. TVA provides such services to about 140 of the 160 distributors served. The amount of reimbursement is determined by contract. The increases in estimated net expenses in fiscal year 1975 over estimated expenses in fiscal year 1974 reflect general cost trends, primarily increasing costs for labor and materials.

Administrative and General Expenses

	1973 Actual	X \$1,000 1974 Estimate	1975 Estimate
Executive administration and central management	5,206	5,673	5,722
Bureau of Employee Compensation payments	1,249	1,431	1,617
Power research related activities	708	1,042	1,269
Other general supervision and administration	8,727	9,864	11,251
Subtotal	15,890	18,010	19,859
Fringe benefits:			
Welfare funds	959	1,085	1,205
FEGLI	340	375	408
Hospitalization	2,396	3,075	3,644
Retirement plan	7,793	8,600	9,493
Subtotal fringe benefits	11,488	13,135	14,750
Total administrative and general expenses	27,378	31,145	34,609

Administrative and general expenses consist of costs of an administrative, supervisory, or general nature incurred in conducting the TVA power program. Almost half of the increase from 1973 to 1975 reflects increases in employee fringe benefits. The remainder results from increases in other administrative and general expenses, reflecting rising salaries and wages, coupled with slightly higher requirements for manpower, office supplies and materials, and other related items.

The increased expenses for fringe benefits primarily reflect larger employee benefits resulting from wage and salary negotiations. TVA contributes to union pension and welfare funds on behalf of hourly employees, the amount of payment depending upon classification of work and the union involved. Increases in contributions to the Federal Employees Group Life Insurance plan reflect additional insurance coverage. The increase in TVA's payments for hospitalization coverage for annual salary policy and annual trades and labor employees reflects changes in amounts of payments for each employee as well as coverage for additional employees in power operations. Retirement plan expenses reflect continuing increases in salaries, as well as additional manpower requirements needed in operating the expanding power system. Based on actuarial studies, TVA's contributions to the retirement system in fiscal year 1974 are estimated to be about 10.75 percent of the basic straight-time earnings of employees in the retirement system.

Payments in Lieu of Taxes

	1973 Actual	X \$1,000 1974 Estimate	1975 Estimate
Payment based on 5 percent of revenues ¹	27,302	31,109	39,175
Minimum payments related to mineral rights	8	10	10
Total payments in lieu of taxes	<u>27,310</u>	<u>31,119</u>	<u>39,185</u>

1. Revenues subject to 5 percent payment

Sales of electric energy:

	1972 Actual	1973 Actual	1974 Estimate
Municipalities and cooperatives	415,349	476,354	597,410
Electric utilities	6,250	791	1,110
Industrials	124,306	144,732	184,530
Customers' forfeited discounts and penalties	141	304	450
Total	<u>546,046</u>	<u>622,181</u>	<u>783,500</u>

Estimates of payments in lieu of taxes are based on revenues from the sale of electricity, exclusive of deliveries to Federal agencies, in accordance with provisions of Section 13 of the TVA Act. The payments represent 5 percent of such revenues for the preceding fiscal year. Payments for fiscal year 1974 are based on actual revenues from the sale of electricity in fiscal year 1973. Estimated payments for fiscal year 1975 are based on expected revenues for fiscal year 1974.

Social Security Taxes

	1973 Actual	X \$1,000 1974 Estimate	1975 Estimate
Total	<u>3,817</u>	<u>4,763</u>	<u>5,239</u>

Social Security tax payments will increase over the 2-year period as a result of changes in the tax law. Both the tax rate and the amount of wages subject to tax are increased over the 1973 level. Effective with wages paid on and after January 1, 1973, the Social Security tax rate is increased from 5.2 percent to 5.85 percent of taxable wages. The amount of wages subject to tax in calendar year 1973 is increased from \$9,000 to \$10,800 and to \$13,200 in calendar years 1974 and 1975. Maximum Social Security taxes per employee will increase from \$631.80 in calendar year 1973 to \$772.20 in calendar years 1974 and 1975.

Provision for Depreciation

	1973 Actual	X \$1,000 1974 Estimate	1975 Estimate
Hydro plants	7,852	7,676	8,809
Steam plants	50,476	59,210	61,260
Gas turbines	2,302	2,615	2,615
Nuclear plants		4,420	15,910
Transmission facilities and other electric plant	28,838	31,270	33,181
Total provision for depreciation	89,468	105,191	121,775

The allowance for depreciation expense is based on the amount of completed plant utilized in the power program. As of the end of fiscal year 1973, this completed plant amounted to \$3.8 billion and is expected to reach about \$5.1 billion by the end of fiscal year 1975. The increases in depreciation provision reflect additions in assets of approximately \$1.3 billion to the power program. Major additions include Cumberland Steam Plant unit 2; Browns Ferry Nuclear Plant units 1, 2, and 3; Raccoon Mountain units 1, 2, and 3; additions to the transmission facilities, primarily transmission lines and substations; and other additions and improvements at generating plants, including such facilities as ash ponds and electrostatic precipitators.

Interest Charges

Interest on borrowed funds is one of the most rapidly rising elements of cost in the TVA power program. The details of interest on outstanding and new borrowings are shown below. The increases reflect both growth in borrowings outstanding and increases in the effective rate of interest.

	1973 Actual		1974 Estimate		1975 Estimate	
	Interest (X \$1,000)	Rate (Percent)	Interest (X \$1,000)	Rate (Percent)	Interest (X \$1,000)	Rate (Percent)
<u>Interest on debt outstanding at</u>						
<u>beginning of fiscal year</u>						
Long-term debt	88,562	7.23	128,486	7.27	154,839	7.29
Short-term notes	5,518	4.43	7,130	7.63	9,198	7.50
Total	94,080	6.97	135,616	7.29	164,037	7.30
<u>Interest on additional borrowings during fiscal year</u>						
Long-term debt	23,127	7.38	19,742	7.50	19,018	7.00
Short-term notes:						
Payable to public	20,542	5.61	21,677	7.50	22,282	7.00
Payable to U.S. Treasury	1,518	4.97	3,100	7.50	2,800	7.00
Total	45,187	6.36	44,519	7.50	44,100	7.00
Interest on coal land reclamation	22		25		25	
Interest on Memphis pipeline	42		40		38	
Total interest charges	139,331	6.76	180,200	7.34	208,200	7.24
<u>Summary of interest charges</u>						
Long-term debt	111,689	7.26	148,228	7.30	173,857	7.26
Short-term notes:						
Payable to public	26,060	5.31	28,807	7.53	31,480	7.14
Payable to U.S. Treasury	1,518	4.97	3,100	7.50	2,800	7.00
Memphis pipeline	42		40		38	
Interest on coal land reclamation	22		25		25	
Total interest charges	139,331	6.76	180,200	7.34	208,200	7.24

BORROWINGS

Proceeds from borrowings during 1975 are estimated to be \$480.0 million, compared with \$400.0 million in 1973 and \$420.0 million in 1974. These proceeds are required to finance that portion of capital outlay in excess of available net power proceeds, after interest to operations, Treasury payments, changes in working capital, and discount on power bonds. Available net power proceeds are expected to be \$234.8 million in 1975, compared with \$82.7 million in 1973 and \$162.9 million in 1974. Capital outlay during fiscal year 1975 is estimated to be \$714.8 million, compared with \$482.7 million in 1973 and \$582.9 million in 1974.

Section 15d of the TVA Act authorizes TVA to issue bonds, notes, and other evidences of indebtedness to assist in financing its power program. The amount authorized to be outstanding at any one time is \$5 billion. At the end of fiscal year 1975 this indebtedness is estimated to be \$3.255 billion.

	1973 actual	X \$1,000 1974 estimate	1975 estimate
Borrowings outstanding			
Beginning of fiscal year:			
Long-term debt	1,225,000	1,775,000	2,125,000
Short-term notes:			
Payable to public	630,000	480,000	550,000
Payable to U.S. Treasury	100,000	100,000	100,000
Total	1,955,000	2,355,000	2,775,000
Changes in borrowings			
During fiscal year:			
Long-term debt issues	550,000	450,000	500,000
Long-term debt refunded	-	-100,000	-50,000
Short-term notes	-150,000	70,000	30,000
Net change	400,000	420,000	480,000
Borrowings outstanding			
End of fiscal year:			
Long-term debt	1,775,000	2,125,000	2,575,000
Short-term notes:			
Payable to public	480,000	550,000	580,000
Payable to U.S. Treasury	100,000	100,000	100,000
Total	2,355,000	2,775,000	3,255,000

POWER RESEARCH AND DEVELOPMENT ACTIVITIES

1973 actual	\$10,126,000
1974 estimate	24,126,000
1975 estimate	30,010,000

TVA conducts research and development in its own laboratories and facilities and provides financial support to pertinent research performed by others. Funds required for these activities are budgeted in other sections of Power Supply and Use.

Research and Development Activities
(Financed from Power Proceeds and Borrowings)

	1973 Actual	X \$1,000 1974 Estimate	1975 Estimate
Research facilities¹			
Sulfur dioxide removal equipment—Widows Creek unit 8	2,026	14,444	18,735
Miscellaneous equipment for air pollution studies	85	132	41
Total research facilities	2,111	14,576	18,776
Research expenses²			
Air pollution studies	2,032	1,964	1,554
Contributions to Electric Power Research Institute	1,220	3,881	5,817
Contributions to LMFBR demonstration project	3,255	2,370	2,370
Cooperative research on advanced energy concepts	172	448	653
Strip mine reclamation	1,134	645	665
Heated water discharges	202	242	175
Total research expenses	8,015	9,550	11,234
Total research and development activities	10,126	24,126	30,010

1. Included in Additions and Improvements at Power Facilities, page 153-154.

2. Included in Schedule B-3, page 158.

Research Facilities

The estimate for fiscal year 1975 includes \$18.7 million for continuing the installation of an experimental full-scale sulfur dioxide scrubber on the 550-megawatt unit at Widows Creek Steam Plant. This project is scheduled for completion in fiscal year 1976 at a total estimated cost of \$42 million.

The estimate of \$41,000 for equipment for air pollution studies will provide an array of analyzers, recorders, and monitors required for continuation of studies of processes in the atmosphere.

Research Expenses

The \$1,554,000 estimate for air pollution studies provides for studies necessary to furnish data for use in establishing sulfur dioxide emission control programs at TVA's coal-fired steam plants and to evaluate cooling tower plume behavior. Also included in this category is the continuation of the operations of the advanced concept pilot plant for sulfur dioxide removal at Colbert Steam Plant.

The \$5,817,000 estimated contribution to the Electric Power Research Institute is based upon the formula for utility subscription rates. The institute is an outgrowth of the Electric Research Council which became operational in fiscal year 1973. It serves as the research organization for the electric utility industry.

The \$2,370,000 estimate for contributions to the LMFBFR demonstration project includes one-tenth of TVA's total contribution plus \$200,000 in services which will be rendered without cost to the project.

Cooperative research on advanced energy concepts includes financial support to research projects on magnetohydrodynamics, electrochemical energy conversion devices, nonconventional energy sources, coal processing, and the breeder reactor. The \$653,000 estimate for fiscal year 1975 includes \$540,000 for research on processing coal to make clean fuel. The remainder of the estimate will be used to support a number of projects in the areas mentioned above.

Strip mine reclamation. TVA has entered into a contract with Long Pit Mining Company to carry out a mining and reclamation project in mountainous terrain. The project will test the technical and economic feasibility of handling spoil materials in a manner that will create no significant out-slope fill and virtually eliminate the high wall. The 1975 estimate of \$665,000 provides for the cost of this project in excess of the value of coal produced.

Heated water discharges. In 1975 the estimate of \$175,000 will provide continuation of research on beneficial uses of waste heat from steam plants. The estimate includes \$100,000 for the Gallatin catfish project. It has been determined that

the growth rate of catfish can be significantly improved by using heated water. Further research is needed to determine optimum stocking rates, feeding rates, disease and waste control methods, and the economics of the process. The remainder of the estimate, \$75,000, will provide for greenhouse studies, heat dissipation studies, and other general research in the area of heated water discharges.

POWER INVENTORIES AND DEFERRED ITEMS

Power inventories are estimated to increase by \$3,670,000 during fiscal year 1975.

Coal stockpiles at steam-electric generating plants were above normal operating levels at the end of fiscal year 1973 because of better than expected hydro conditions and higher than expected coal receipts. During fiscal year 1973 inventory stockpiles had increased to about 12.775 million tons, an increase of 2.370 million tons. Reflecting this greater tonnage and higher cost of coal, the value of coal in stockpile increased by \$27,502,000. Receipts and issues are expected in amounts that will reduce the stockpile to nearer the normal level in fiscal year 1974 and a normal level is planned for fiscal year 1975. The value of coal inventories is expected to decrease by \$13,597,000 in fiscal year 1974 and \$455,000 in fiscal year 1975.

Oil inventories are expected to increase by \$1,590,000 in fiscal year 1974 because of higher cost of oil and the addition of oil to bring oil inventories to full capacity. Oil inventories are expected to remain near current levels, increasing by \$450,000 in fiscal year 1975, reflecting cost trends.

General storeroom supplies of operating, maintenance, and construction materials are expected to increase in fiscal year 1975 by a net of \$515,000 to provide for increased construction and maintenance required by the expanding transmission system. Spare parts for new 500-KV substations and transmission lines and various types of steel for general use plants are estimated to increase by \$3,160,000, about two-thirds of which is required to continue the initial stock buildup at Browns Ferry, Cumberland, and Sequoyah plants. The remaining increase primarily provides spare parts for new fly ash precipitators, gas turbines, coal pulverizers, and ash disposal systems.

Deferred charges result from the incurring of certain expenditures which are appropriately amortized over a period of years. Expenditures consist primarily of expenses of issuing bonds and the discount at which bonds and notes are sold. Total expenditures are estimated at \$33,941,000 in fiscal year 1975, mostly for note discount expense, and amortization is estimated at \$32,028,000 resulting in an estimated increase in deferred charges of \$1,913,000 in fiscal year 1975.

Deferred credits consist of the premium at which the bonds are sold less the expenses of issuing bonds sold at a premium, and less amounts equal to the yearly amortization of bond premium and issue expense. The estimates of \$66,000 for fiscal year 1974 and \$30,000 for fiscal year 1975 provide for amortization of bond premium and issue expense relating to the 1969 Series A, and the 1970 Series C, both 5-year term bond issues. The 1969 Series A matures June 1, 1974, and the 1970 Series C matures June 15, 1974.

PAYMENTS TO THE TREASURY

Payments to the Treasury for fiscal year 1975 are estimated at \$90,020,000. This will bring total cumulative payments from TVA to the Treasury to \$1,273,187,611 of which \$1,231,541,137 is from power proceeds and \$41,646,474 from nonpower proceeds. Of the payments from power proceeds, \$65,072,500 represents retirement of bonds issued prior to 1942, \$410,059,019 represents reduction of the appropriation investment in power facilities, and \$756,409,618 represents a return on that investment in the nature of dividends.

PAYMENTS FROM POWER PROCEEDS

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

As amended on August 6, 1959, the Tennessee Valley Authority Act provides for payments, beginning in fiscal year 1961, of stipulated minimum annual amounts as reductions of the appropriation investment in TVA power facilities until a total of \$1,000,000,000, in addition to previous payments, shall have been repaid. The amended act also provides for payments to the Treasury of a return on the unrepaid 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 through fiscal year 1975 under the provisions of the amended TVA Act total \$981,409,618 and are presented in the following table:

182

Fiscal Year	Total Payments	Return on Appropriation Investment		Repayment of Appropriation Investment	Repayable Investment as of June 30
		Computed Interest Rate	Amount		
1960					\$1,000,000,000
1961	\$51,432,398	3.449	\$41,432,398	\$10,000,000	990,000,000
1962	46,541,639	3.063	36,541,639	10,000,000	980,000,000
1963	48,874,543	3.285	38,874,543	10,000,000	970,000,000
1964	50,206,432	3.425	40,206,432	10,000,000	960,000,000
1965	52,599,978	3.659	42,599,978	10,000,000	950,000,000
1966	58,873,084	3.800	43,873,084	15,000,000	935,000,000
1967	62,124,973	4.134	47,124,973	15,000,000	920,000,000
1968	61,861,924	4.165	46,861,924	15,000,000	905,000,000
1969	68,082,238	4.757	53,082,238	15,000,000	890,000,000
1970	72,648,798	5.232	57,648,798	15,000,000	875,000,000
1971	85,146,529	5.986	65,146,529	20,000,000	855,000,000
1972	75,810,390	5.210	55,810,390	20,000,000	835,000,000
1973	73,784,451	5.099	53,784,451	20,000,000	815,000,000
1974	83,422,241	6.129	63,422,241	20,000,000	795,000,000
1975 ^a	90,000,000	6.900	70,000,000	20,000,000	775,000,000
				<u>225,000,000</u>	
				<u>756,409,618</u>	

a. Estimated.

GENERAL SERVICE ACTIVITIES

General service activities include (1) a bridge replacement in the Great Falls reservoir area; (2) general facilities used in all TVA programs; (3) valley mapping and remote sensing which serve all TVA programs; (4) miscellaneous expenses; (5) reimbursable services; and (6) administrative and general expenses. These are described in the following sections.

RENO BRIDGE-GREAT FALLS RESERVOIR

1973 actual	-
1974 estimate	\$2,200,000
1975 estimate	300,000

The Reno Bridge will span the Great Falls reservoir on the Caney Fork River to provide an additional connection between White and Van Buren counties, Tennessee. It will be located approximately on the site of an inadequate and unsafe bridge removed in 1972 under a contract between TVA and the counties. Preliminary design work for the bridge began in August 1973; construction is scheduled to begin late in fiscal year 1974. The project will be completed by June 1976. The estimated total cost of the bridge is \$2,500,000, to be financed from appropriated funds.

GENERAL FACILITIES

General facilities include capital outlays for office facilities and equipment, transportation facilities and equipment, and other general-use facilities and equipment. Acquisitions of general facilities are financed largely from power funds, since the power program is the principal user of them.

1. See note on page 189.

1. See note on page 189.

The \$1,178,000 estimate for other office facilities and equipment provides \$900,000 for replacing worn-out or obsolete office furniture and equipment and the acquisition of additional equipment and facilities. TVA owns approximately 95,000 pieces of office furniture and equipment having an original investment value in excess of \$7 million. Continued use of old and worn-out equipment results in inefficiency, excessive costs for repair and maintenance, and excessive downtime. Equipment breakdowns and related production losses are costly. Rehabilitation is no longer possible for much of the equipment as some of it is obsolete. At least 45 percent of TVA's furniture and equipment is over 20 years old and far beyond its normal, useful life. All office furniture and equipment to be replaced in 1975 meets or exceeds the GSA standards for replacements. Timely replacement of these facilities is needed for the efficient and economical performance of many activities within TVA.

In addition to usual office furniture and equipment requirements, a \$278,000 estimate provides for replacements and additions of specialized equipment used in reproduction shops and for additional building and shop equipment and facilities such as air-conditioning equipment, stokers, boilers, fire-protective devices, power tools, pumps, motors, vacuum cleaners, and similar equipment.

The \$2,006,000 estimate for office facilities and equipment is partially offset by a \$1,200,000 depreciation credit leaving net budget requirements of \$806,000.

Transportation Facilities and Equipment

	In Thousands					
	1973 Actual and Financing		1974 Estimates and Financing		1975 Estimates and Financing	
	Appr.	Power Proceeds	Total	Appr.	Power Proceeds	Total
Trucks, trailers, and construction machines . . .	\$669	\$1,819	\$2,488	\$515	\$1,908	\$2,423
Passenger vehicles	-	671	671	-	677	677
Aircraft	-	56	56	-	60	60
Shop work and equipment	-62	80	18	180	201	381
Subtotal obligations	607	2,626	3,233	695	2,846	3,541
Less depreciation ¹	1,575	685	2,260	1,500	850	2,350
Total obligations	-968	1,941	973	-805	1,996	1,191
Changes in unpaid undelivered orders	-142	-736	-878	595	984	1,579
Total expenditures	-1,110	1,205	95	-210	2,980	2,770

A \$3,237,000 estimate provides for replacements only of trucks, trailers, and construction machines for use in rough off-highway operating, maintenance, and construction activities. In 1975 a total of 386 units which are worn beyond economical repair will be replaced. Use of worn units results in equipment failures which tie up crews, thus causing job delays and expensive repairs to units with a limited remaining service life. All units to be replaced for which a GSA retirement standard exists will meet or exceed those standards. Much of this additional equipment reflects the trend toward heavier units that provide more production per unit and savings in manpower and cost. New work techniques specifically designed for cost savings frequently require special equipment. Also much of the latest model equipment comes with safety features and devices designed to reduce accidents.

1. See note on page 189.

The estimate of \$642,000 provides for the replacement of 224 passenger sedans. These units will meet or exceed GSA retirement standards and will have reached the point where replacement is more economical than cost of repairs required for continued use. The replacements will be compact models equipped with 6-cylinder 225 CID engines. They will replace older model V-8's with engines of 302 and 307 CID. The older model sedans average 16 miles per gallon at best while the compact 6-cylinder sedans will average at least 19, representing a fuel saving of approximately 36,900 gallons annually.

	1973	1974	1975
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>
Passenger vehicles:			
Acquisitions (sedans)	258	236	224
Disposals (sedans)	<u>228</u>	<u>236</u>	<u>224</u>
Net additions	<u>30</u>	<u>0</u>	<u>0</u>
Total fleet	<u>942</u>	<u>942</u>	<u>942</u>

The \$75,000 estimate for aircraft provides for replacement of an 18-year-old Bell model 47J helicopter acquired by TVA from military service. The replacement helicopter will have a more powerful engine and weighted blades which provide a better safety factor in helicopter operations. The older model helicopters are limited in use as their lifting capacity is much less than that of the new models. The replacement helicopter's faster speed is a significant feature for transmission line patrol work. The greater lifting capacity of the new helicopter will also be advantageous in construction work for transporting men and materials between jobs.

A \$267,000 estimate for shop work and equipment covers installation of bodies, winches, and other special equipment to equip new fleet units; replacement of worn-out shop equipment; and the purchase of additional garage equipment.

The foregoing estimates for transportation facilities and equipment which total \$4,221,000 are partly offset by a \$2,400,000 depreciation credit on facilities in service, leaving net budget requirements of \$1,821,000.

Other General Facilities and Equipment

	Appropriation Financed
1973 actual	\$778,339
1974 estimate	1,823,000
1975 estimate	890,000

The Nolichucky dam and reservoir has been retired from service. An estimate of \$332,000 in fiscal year 1974 provides for acquiring outstanding rights on TVA shoreline lands and purchasing additional acres to convert the installation into a waterfowl development. An estimate of \$85,000 in fiscal year 1975 provides for environmental education facilities including foot trails, walks, bridges, interpretive stations, picnic shelters, road and parking lot, outdoor amphitheatre, observation tower, and sanitary facilities. The powerhouse and switchyard will be made safe for visitor use.

The other principal general purpose facilities and equipment requirements totaling \$805,000 are estimated as follows: \$201,000 for analytical equipment needed to assure improved water quality standards; \$100,000 for medical facilities and equipment; \$30,000 for field and laboratory equipment for fish and wildlife work; \$106,000 for air quality equipment; \$60,000 for industrial hygiene equipment; \$50,000 for facilities and equipment for reproduction and blueprint work; \$20,000 for equipment and facilities primarily for property protection work; \$73,000 for mapping and surveying equipment; and \$165,000 for numerous small items for use in geologic and soils work, engineering drafting, and hydrology work.

These items totaling \$890,000 are partly offset by a depreciation credit¹ of \$200,000 leaving a net estimate of \$690,000 to be financed.

1. In the interest of economy and efficiency, TVA general facilities and equipment are "pooled" and made available to programs and projects on a rental basis. The rental rates include appropriate provision for depreciation; therefore, budget requirements for each program and project include charges for depreciation. Since depreciation is a type of expense not requiring current outlay of funds, the total depreciation charges must be deducted to avoid overstatement of fund requirements. The credits estimated for fiscal year 1975 of \$1,200,000 for office facilities and equipment, \$2,400,000 for transportation facilities and equipment, and \$200,000 for other general facilities and equipment offset total charges included in program and project estimates as depreciation on TVA pooled general facilities.

VALLEY MAPPING AND REMOTE SENSING

1973 actual	\$456,256
1974 estimate	415,000
1975 estimate	395,000

To aid in planning and executing resource development programs, TVA, in cooperation with other agencies and organizations, provides topographic maps and other forms of information relating to the quantity, quality, and location of resources.

Valley Mapping

1973 actual	\$370,178
1974 estimate	309,000
1975 estimate	293,000

In 1962 TVA completed the 775 topographic quadrangles covering the Valley using the national map series standards. These are the only available large-scale maps that provide complete coverage of the Valley region. The present objective is to update the 7-1/2-minute topographic quadrangles as they are made obsolete by the Valley's rapid industrial and urban development. Topographic maps are in continuing demand and are widely used by Federal and state agencies, engineering firms, industrial organizations, and private individuals. The newly formed public and quasi-public development groups are creating demands for up-to-date maps to use in their resource development planning.

An economical method of map revision is the overprinting on existing maps of up-to-date information taken from recent aerial photographs. However, standard map revision methods must continue because updating by overprinting can be used only once and retain legibility. During the 1966-1973 period 258 quadrangles have been revised by overprinting and 115 by the standard method. At this time 450 maps of the series are out of date and have limited usefulness. During 1974, \$309,000 will be used for completing the revision of 33 quadrangles, 9 by the standard method, and 24 by overprinting.

The 1975 estimate of \$293,000 provides for topographic map revision work, including publication of 37 quadrangles, 28 by overprinting, and nine by the standard method.

Remote Sensing

1973 actual	\$86,078
1974 estimate	106,000
1975 estimate	102,000

The value and reliability of data obtained by such remote sensing techniques as conventional aerial photography have been firmly recognized and established. Because of the relatively recent availability of both extremely high altitude and satellite imagery, TVA, individually and jointly with other agencies, is investigating the utility of such imagery in TVA programs.

Hyperaltitude aerial photography has already become a tool in inventorying forests, agriculture, hydrology, geology, surface mining, mineral resources, and land use and its changes. TVA has been designated for an Earth Resources Observations System (EROS) Regional Browse File. In the establishment of this file in Chattanooga, TVA has compiled a microfilm file of the Earth Resources Technical Satellite (ERTS) imagery for the United States and other parts of the world, as well as originals of selected hyperaltitude aerial photography—all of which is available for viewing by the public and private sector.

TVA continues to perform basic research in and investigate the application of airborne thermal scanning for water temperature determination in an effort to meet Federal and state water quality standards. As a result, an atlas of thermal imagery of specific locations in the Tennessee Valley has been created which is continually being updated. The atlas has been used by engineers and environmental biologists for assessing design criterion and biotic effects of warm water effluents. Operational aspects of this activity directly related to thermal power generating plants are funded under the power program.

The 1975 estimate of \$102,000 provides for more efficient data-gathering methods and application, together with further cooperative development and demonstration.

OTHER EXPENSES

1973 actual	\$51,761
1974 estimate	148,000
1975 estimate	160,000

The Tennessee Valley Authority has important emergency preparedness assignments in the area of logistic support for the military services and for the civilian economy. Fallout shelter space has been prepared at selected points in the TVA service area under a reimbursable arrangement with the Department of Defense. These installations must have certain equipment and supplies on hand at all times, including office and communications equipment, medical supplies, food and water, bedding, lockers, and washing and drying machines. An estimate of \$10,000 provides for continuing maintenance of these items.

Pursuant to Public Law 79-561 (23 U.S.C., sec. 320), five bridges financed by the Bureau of Public Roads have been constructed across TVA's Kentucky, Chickamauga, Watts Bar, Fort Loudoun, and Pickwick Landing dams. The public law provides that bridges so constructed become a part of the dam structures with responsibility for maintenance of the bridges being assigned to the agency having custody of the dams. The law further provides for separate accounting of expenditures in connection with the maintenance of such bridges with no portion thereof being charged or allocated to other programs of the agency. A \$150,000 estimate provides for routine maintenance of the five bridges in 1975.

REIMBURSABLE SERVICES

This category includes (1) services which TVA performs at the request and expense of other agencies, and (2) the recovery of indirect expenses by income received from others. All expenses included in the category are offset by income and there is no net cost to TVA.

	1973 Actual	1974 Estimate	1975 Estimate
Mapping work for other Federal, state, and local agencies			
Continuing air pollution research and development on controlling SO ₂ from coal-fired power plant stacks including dry limestone process and wet scrubbers, and on other contaminants of such emissions, in cooperation with Environmental Protection Agency	\$822,345	\$551,000	\$667,000
Environmental research and development in cooperation with the Environmental Protection Agency to construct and operate the biothermal research facilities at Browns Ferry Nuclear Plant	2,982,927	2,542,000	2,200,000
Plan, design, and construct the liquid metal fast breeder reactor demonstration plant	142,429	1,934,000	397,000
Continuing field experiments to evaluate agronomic response to compost processed at the joint U.S. Public Health Service-TVA composting plant at Johnson City, Tennessee	-	809,000	1,028,000
Continuing cooperation with AID and other foreign assistance program agencies for which TVA's fertilizer program personnel provide training, research, and technical advisory services	66,318	39,000	-
Maintaining in standby service the Phosphate Development Works at Muscle Shoals, Alabama, for the Department of Defense	585,645	697,000	658,000
Miscellaneous reimbursements and recoveries of expenses: -Back charges to contractors for assistance furnished by TVA	96,925	98,000	98,000
-Technical advisory assistance for power distributors	3,248,906	1,661,000	800,000
-Financial and accounting services to TVA Retirement System	494,088	517,000	525,000
-Other miscellaneous reimbursements and recoveries of expenses	308,566	349,000	355,000
	1,344,329	1,309,000	1,045,000
Total reimbursable services	10,092,478	10,506,000	7,773,000

Schedule B-4. Administrative and General Expenses
(For fiscal years ending June 30, 1973, 1974, and 1975)

	1973 actual		1974 estimate		1975 estimate	
Executive direction	\$250,366		\$272,000		\$372,000	
Capital outlay	402,799		412,000		412,000	
General resources development	362,197		382,000		382,000	
Planning and budgeting	300,066		320,000		390,000	
Equal employment opportunity	1,091,114		1,220,000		1,250,000	
Technical library and information services	2,678,513		2,960,000		3,150,000	
Personnel services	3,371,885		3,720,000		3,720,000	
Fiscal and accounting services	1,471,885		1,565,000		1,440,000	
Legal services	1,363,226		1,571,000		1,543,000	
Medical and safety services	1,253,297		1,255,000		1,255,000	
Office and electronic computing services	215,605		214,000		220,000	
Other services	12,738,100		13,861,000		13,864,000	
Total administrative and general expenses	12,738,100		13,861,000		13,864,000	

Distribution of Administrative and General Expenses

	1973 actual		1974 estimate		1975 estimate	
	Appropriations	Proceeds	Appropriations	Proceeds	Appropriations	Proceeds
REGIONAL DEVELOPMENT PROGRAM						
Water resources development						
Capital outlay	\$320,179		\$345,000		\$336,000	
Expenses	485,218	\$128,887	\$23,000	\$140,900	\$33,000	\$142,000
General resources development						
Expenses	413,258		450,000		455,000	
Land Between The Lakes						
Capital outlay	81,860		76,000		60,000	
Expenses	61,536		67,000		69,000	
FERTILIZER AND MUNITIONS DEVELOPMENT						
Capital outlay	62,918		68,000		70,000	
Expenses	298,231	547,389	325,000	595,000	327,000	600,000
POWER SUPPLY AND USE						
Capital outlay						
Expenses		5,061,979		5,506,000		5,480,000
		5,077,356		5,433,000		5,580,000
GENERAL SERVICE ACTIVITIES						
Capital outlay	11,520	12,693	15,000	11,000	33,000	5,000
Expenses	20,314	184,772	22,000	175,000	22,000	150,000
Total distribution by funds	1,725,024	11,013,076	1,901,000	11,960,000	1,907,900	12,057,000
Total distribution	12,738,100		13,861,000		13,864,000	

ADMINISTRATIVE AND GENERAL EXPENSES (Schedule B-4)

Administrative and general expenses are estimated at \$13,964,000 for fiscal year 1975. This is less than one percent of the total TVA expenditures for 1975. These expenses include the cost of executive direction, general management, and centralized services that are required by all projects and programs and are listed in schedule B-4.

Administrative and general expenses are distributed to all TVA projects and programs so that the entire cost of each activity may be properly reported. Distribution is primarily on a direction of effort basis. The distribution is summarized at the bottom of schedule B-4, and the amounts distributed are included as an indirect expense in estimates for each project and program throughout the budget.

The activities and services included as administrative and general expenses are described below.

Executive direction of TVA is provided by a three-man Board of Directors created by the Tennessee Valley Authority Act. The Board is a full-time governing body appointed by the President and approved by the Senate. The Board establishes general policies and programs, provides general guidance, and reviews and appraises progress and results. The 1975 estimate for executive direction is \$272,000, the same as for 1974.

General management activities provide for the administrative supervision of TVA. They provide for carrying out the objectives, policies, and directives of the Board of Directors and for coordinating all TVA projects and programs. They include also the provision of liaison between TVA and the Executive Office of the President, the Congress, and the Federal departments and agencies in the Washington area. The 1975 estimate for general management is \$412,000, the same as for 1974.

Planning and budgeting activities assist management in developing program plans; evaluating program accomplishments, and administratively controlling funds. These activities include the development and implementation of TVA's system of corporate planning. They include also the preparation and continual review of the TVA budget. The 1975 estimate for planning and budgeting is \$382,000, the same as for 1974.

Equal employment opportunity activities implement TVA's equal employment opportunity program by providing leadership and guidance in the development and execution of EEO action plans; informing employees and management about equal employment opportunity; counseling employees and qualified applicants who claim discrimination because of race, color, religion, sex, or national origin; handling formal complaints of discrimination; aiding minority group employees to advance to

higher level positions; administering civil rights compliance in TVA contracts; and enforcing nondiscrimination in TVA-assisted programs. To further its EEO program, TVA takes part in local community activities that are designed to upgrade the employability of minorities and women. The 1975 estimate for equal employment opportunity activities is \$390,000, slightly under the 1974 estimate.

Technical library and information services provide technical library services at Chattanooga and Knoxville, Tennessee; supervise technical library services at TVA's National Fertilizer Development Center at Muscle Shoals, Alabama; arrange schedules for official visitors and trainees; and supply information about TVA and its activities.

The three technical libraries provide the information needed by managers, engineers, scientists, and other professional people in the daily operations of TVA. This information is located and supplied by trained librarians, thus saving the time of the higher paid specialists. The libraries provide library research on technical and scientific problems. They keep TVA employees informed of research and studies conducted elsewhere so that full advantage may be taken of the results of projects conducted outside of TVA.

Each of the three technical libraries specializes in the materials needed by the employees in the area in which it serves. The library at Knoxville specializes in management and engineering materials; the library at Chattanooga specializes in medical, safety, and power engineering materials; and the library at Muscle Shoals specializes in fertilizer and agricultural materials. The TVA technical libraries are augmented by exchange arrangements with the Library of Congress and with the libraries of universities and colleges in the states where TVA operates.

Schedules and programs are arranged for official visitors who wish to consult with TVA staff members and inspect TVA projects. Training schedules are prepared for official trainees who wish to spend a longer period of time studying TVA and its operations. For fiscal year 1973, the total number of foreign official visitors was 1,095, and these came from 104 countries. The number of official United States visitors was 5,517. In addition, 28 trainees from 19 foreign countries spent two weeks or more training with TVA. The number of official visitors and trainees for 1974 and 1975 is expected to remain at the 1973 level.

Information services keep TVA employees informed about TVA activities and respond to requests for information about TVA and its activities. Requests for information number about 20,000 annually and are received from members of the Congress, other public officials and agencies, the press, and the general public.

The 1975 estimate for technical library and information services is \$1,250,000. The increase over the 1974 estimate is for higher costs of books and publications, for additional publications in the nuclear and environmental fields, and for growth in the information services workload.

Personnel services involve (1) employee recruitment and selection; (2) employee development, education, and training; (3) union-management relations; and (4) organization and administrative relations.

TVA has over 24,000 employees of many specialties and skills scattered over an area of 80,000 square miles. About one-third are craftsmen hired on temporary appointments of one year or less for work on construction projects throughout the Valley. Thus, the hiring, termination, and rehiring of such employees entail repetitious recruitment, selection, and detailed employment processing.

Centralized employment services recruit, examine, and maintain registers of qualified applicants. TVA makes appointments on the basis of merit and efficiency and without political bias. It promotes employment of minority group members, and its selection procedures are aimed to eliminate any form of prejudice or discrimination. It maintains an Employee Skills Utilization System to identify, appraise, and counsel on employee utilization and placement. To aid in the manpower planning, selection, and utilization processes, plans are being developed to integrate and automate the functions of the occupational register and personal history records systems to provide a mesh with personnel management information services.

TVA has a system of employee development, education, and training, including a managerial development program for employees with high managerial potential, which serves to integrate the attainment of its and individual employee objectives and maximize the utilization of its human resource. It provides an apprenticeship program for trades and labor employees.

As an aid to provision of a total compensation program and system of employer-employee relationships to help attract, retain, and motivate valuable employees, TVA carries out collective bargaining with the unions that represent its employees. Trades and labor (blue collar) employees are represented by the Tennessee Valley Trades and Labor Council composed of 16 international craft unions, 15 of which are affiliated with the AFL-CIO. Salary policy (white collar) employees are represented by the Salary Policy Employee Panel composed of five unions, three of which are AFL-CIO affiliated. The agreements with these bodies establish procedures to determine rates of pay, hours of work, working conditions, and adjustment of grievances.

TVA negotiates salary and wage agreements annually with these bodies. Negotiations are based on annual surveys of wages, salaries, and fringe benefits in the Tennessee Valley and the surrounding area. This is done to assure that its employees are paid the prevailing rates of pay.

The agreements with employee organizations also include provision for a system of year-round union-management cooperation. It is carried out through 89 cooperative groups made up of employee and management representatives who meet regularly. Among other benefits, this system produces employee suggestions for work improvements and cost-cutting without cash award incentives.

TVA assures full manpower utilization and maximum productivity by frequent reviews of organization and administrative relationships.

The 1975 estimate for personnel services is \$2,875,000, slightly less than the 1974 estimate.

Fiscal and accounting services provide accounting, auditing, disbursing, financial reporting, and other fiscal services to assist in administering the financial aspects of TVA projects and programs. They protect TVA's financial interest by auditing financial transactions, verifying accounting records and financial statements, and maintaining a system of internal controls.

An effective financial management system has always had a high priority within TVA. A single integrated system of financial control was completed 35 years ago. At the same time, accrual accounting and cost based budgetary practices were installed. The same program structure is used for budgeting, accounting, reporting, and control, and this structure assures that all costs are charged to appropriate program element and budget classifications. The General Accounting Office audits annually the accounts and reviews the system of internal control and financial reporting, and an annual audit is made also by a firm of independent certified public accountants.

The 1975 estimate for fiscal and accounting services is \$3,725,000. The increase over the 1974 estimate is for nuclear fuel and coal contract audits and for management audits.

Legal services provide legal advice and assistance to TVA on every phase of its activities. This includes defending TVA in all suits brought against it; the prosecution of suits for TVA (other than condemnation suits which are charged directly to construction projects) when necessary to protect TVA's interest; and the preparation of contracts, deeds, bills of sale, leases, and other legal documents, including those related to power bond financing. Legal services assist in proceedings before the Atomic Energy Commission to obtain licenses for the construction and operation of nuclear power plants and aid in conferences and negotiations with other governmental and nongovernmental agencies.

The 1975 estimate for legal services is \$1,640,000. The increase over the 1974 estimate provides for growth in general litigation work; for additional legal work related to the regulation of TVA programs concerned with nuclear and environmental matters; and for legal work in fields such as pollution control, bond financing, and uranium procurement.

Medical and safety services protect the health of employees and reduce service-connected injuries and illness. These services help to hold down costs by reducing the number of man-hours lost by illness or accidents and by reducing employee compensation costs arising from on-the-job injuries.

Medical services for TVA employees include preplacement and periodic health examinations, health counseling, immunization, and treatment of service-connected injuries and illness. TVA employees are counseled and referred to private physicians for treatment of nonservice-related injuries or illness.

TVA medical offices are located at Chattanooga, Knoxville, and Nashville, Tennessee, and at Muscle Shoals, Alabama, where there are large concentrations of employees. At major operating steam-electric plants, health stations are maintained by a resident nurse under the supervision of one of the medical offices. Medical facilities are established at major construction projects for the duration of the construction phase and the cost of operating these facilities is charged to the construction project. A mobile health clinic and mobile health stations are used to bring health services to employees in locations distant from TVA medical offices, health stations, or project health stations.

TVA promotes safety by conducting its operations so as to protect employees, the public, and property from accidents. It emphasizes hazard control in design, purchasing, construction, maintenance, and operating activities. TVA conducts both an on-the-job and an off-the-job safety program and a vehicular safety program among its employees and it cooperates with others in conducting a water safety program for users of TVA lakes.

TVA's disabling injury frequency rate for fiscal year 1973 was about 15 percent below the rate for the past ten-year period. During fiscal year 1973 TVA received six National Safety Council Awards of Merit: one was for the entire agency, four for power operations, and one for a construction project.

The 1975 estimate for medical and safety services is \$1,543,000, slightly below the 1974 estimate.

Office and electronic computing services include stenographic and clerical pools, maintenance and disposal of records, and assistance in office management practices and methods. Special office training is given minority group members and preassignment training is given to potential employees who have little or no experience to qualify them for TVA stenographic and clerical positions. Technical assistance in the use of TVA's electronic data processing equipment is provided also; this assistance includes system analyses and programming services. The 1975 estimate for office and electronic computing services is \$1,255,000, the same as for 1974.

Other services include the cost of annual audits by the General Accounting Office and by an independent firm of certified public accountants, office space and services provided to employee credit unions, and the TVA U.S. Savings Bond promotion program. The 1975 estimate for other services is \$220,000; the increase over the 1974 estimate is for increased cost of the GAO and the independent audits.

Number of Employees
(At end of fiscal years 1973, 1974, and 1975)

	1973 Actual	1974 Estimate	1975 Estimate
Permanent white collar and blue collar employees	13,995	14,000	14,350
Hourly construction employees and other temporary, part-time, and intermittent employees	9,451	12,000	11,650
Total employment included in ceilings	23,446	26,000	26,000
Disadvantaged youth employees	205	240	240
Total employment	23,651	26,240	26,240

INDEX

	Page
Air pollution control.....	23
Basic Bond Resolution.....	58
Bear Creek project.....	9, 61
Coal costs.....	55
Disaster relief assistance.....	7
Distributor rate reductions.....	76
Duck River project.....	8
Electric power.....	72
Electrical Power Research Institute.....	78
Elkmont City.....	15
Energy crisis.....	23
Environmental costs.....	57
Environmental impact statements.....	62
Fertilizer demonstration.....	70
Fertilizer program.....	19
Fisheries and waterfowl programs.....	68
Flood control.....	18, 66
Benefits.....	71
Fontana Dam.....	13
FPC overview.....	76
General service activities.....	60
Health service demonstration.....	22
Interest costs.....	74
Junked car collection program.....	22
Justifications.....	81-284
Land Between the Lakes.....	13
Legislation.....	76
Letters and news articles concerning TVA rate increases.....	34
Liquid metal fast breeder reactor.....	73
Livestock waste disposal.....	21
Local flood damage prevention.....	67
Nuclear fuel payments.....	77
Nuclear plant construction.....	25
Cost overruns.....	26
Nuclear power generation.....	25
Payments in lieu of taxes.....	79
Power construction.....	32
Power production training center.....	28
Power supply—capital outlay.....	27
Press releases.....	28
Rates.....	62
Research and development.....	78
Resolution of Tennessee State Legislature re TVA electric rates.....	33
Statement of the Chairman, Tennessee Valley Authority.....	1
Strip mine reclamation.....	20
Sulfur-coated urea.....	69
Summary of budget financed from power proceeds and borrowings.....	30
Tellico Dam.....	70
Thermal pollution.....	75
Timberlake City.....	14
Transmission line location.....	63
Transmission rates.....	73
TVA power development.....	64
Uranium mining rights.....	78
Water-milfoil control.....	68
Water quality management.....	11
Water resources development.....	9
Yellow Creek project.....	10, 61, 66

