BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

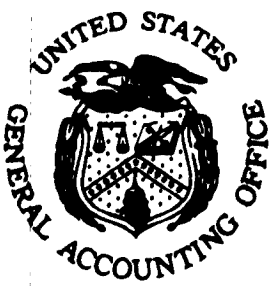
Triennial Assessment Of The Tennessee Valley Authority--Fiscal Years 1977-1979

This report reviews the work done by GAO at the Tennessee Valley Authority during the past 3 years and highlights some major events that occurred which materially affected TVA but were not the subject of GAO reports.

In this report GAO acknowledges the progress TVA has made to comply with its recommendations and identifies areas where it believes TVA's efforts have been inadequate.

Subjects covered by this report include

--TVA's electric energy options,
--load management activities,
--hydroelectric power improvement,
--Tellico Dam controversy,
--planning nuclear powerplants,
--TVA's ADP resources,
--labor-management relations,
--contracting and personnel management,
--TVA-EPA clean air agreement,
--debt ceiling increase, and
--TVA internal reorganization.



EMD-80-91

AUGUST 13, 1980

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-125042

To the President of the Senate and the
Speaker of the House of Representatives

This report reviews our work at the Tennessee Valley Authority (TVA) during the past 3 years. In this report we acknowledge the progress TVA has made to comply with our recommendations and identify areas in which we believe TVA's efforts to be inadequate. We fully support TVA's efforts in making the improvements, particularly in the energy field where we expect there will be benefits to both the region and the Nation in helping to solve our energy-related problems.

To insure that desired goals are accomplished, we again recommend that the TVA charter be revised to charge TVA with responsibility for (1) leading electricity management plans and programs development, (2) encouraging energy conservation and the most efficient production and use of energy, (3) encouraging the use of renewable resources, and (4) assuring adequate public involvement in energy planning and policymaking. We also recommend that adequate Federal funding be given to TVA to finance projects with national benefit where the cost exceeds TVA's usual cost. Thus TVA ratepayers would, as taxpayers, share equitably with other citizens the cost of national energy development. We also recommend that TVA employees' collective bargaining be improved by extending to them the protections of statutory labor relations legislation affecting other private and public sector employees.

We made our review pursuant to sections 105 and 106 of the Government Corporation Control Act, as amended (31 U.S.C. 850, 851) and the Tennessee Valley Authority Act (16 U.S.C. 831h).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretaries of Energy and the Treasury; and the Board of Directors, Tennessee Valley Authority.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

TRIENNIAL ASSESSMENT OF THE TENNESSEE VALLEY AUTHORITY--FISCAL YEARS 1977-1979

D I G E S T

GAO's work at the Tennessee Valley Authority (TVA) during fiscal years 1977, 1978, and 1979 covered subject areas ranging from power production to labor-management relations. This report summarizes that work and reports on the current status of TVA's activities regarding the issues discussed in our reports. Appendix I contains TVA's financial statements for fiscal years 1978 and 1979, as audited by an independent certified public accounting firm.

GAO'S REPORTS ON TVA, 1977-79

In a major review of TVA's power program completed in November 1978, GAO assessed TVA's activities in carrying out its role as a leader in the electric utility industry. In the report on that review, GAO made recommendations concerning TVA's systems for planning and for forecasting electricity needs in its service area; a number of supply and demand options available to TVA to permit it to better manage the demand on its power system and thus to reduce the need for additional generating facilities; and a number of methods for generating electricity in more ecologically acceptable ways.

In a related report, GAO evaluated what action TVA could take to better manage demand on its power system through load controls. GAO also did two reviews of TVA's water resource development activities. One focused on actions that might increase power production at TVA's dams; the other looked at the adequacy of its benefit-cost study for the controversial Tellico Dam. During 1977-79 GAO also reported on TVA's basis for estimating its nuclear powerplant cost and construction schedules and for assessing its need for automatic data processing equipment. (See chapter 2.) In addi-

tion, GAO evaluated the adequacy of statutory protection given TVA employees in the collective bargaining process and provided information on certain contracting and personnel management activities. (See chapter 3.)

OTHER SIGNIFICANT EVENTS, 1977-79

TVA was the subject of what has been characterized as the largest environmental enforcement litigation ever--calculated by GAO to cost about $6 billion over the lives of the 10 coal-fired plants involved. TVA was involved in defending itself on both sides of the "clean air" issue, with one group alleging that TVA is doing too little and the other alleging that it is doing too much.

Also during this period, TVA's debt ceiling was doubled to $30 billion. TVA officials stated this amount was necessary to enable the agency to meet power program commitments during the next 5 years. (See chapter 4.)

CONCLUSIONS

GAO believes that many activities either underway or planned by TVA are responsive to its recommendations in the reports just mentioned. The agency is

--trying to improve its planning and electrical forecasting processes,

--undertaking several conservation and demand management programs,

--working to develop energy from renewable resources and using new technologies,

--pursuing development of ecologically acceptable methods of using coal,

--basing nuclear facility estimates on better information, and

--exercising better management and control of its automatic data processing resources.

However, TVA has taken little or no action on some GAO recommendations:

--It has not acted very rapidly in developing joint solar projects with the Department of Energy. In fact, some groups at TVA did not hold their first meetings concerning development of joint projects with the Department until January 1980. GAO believes the potential for the development of joint projects in many areas which could be beneficial to the region and the Nation is not being fully exploited.

--To date, TVA has focused its cogeneration efforts on developing cogeneration using proven technologies and has limited its pursuit of cogeneration using less proven fuels and technologies to its fuel cell and coal gasification programs. However, it could achieve greater cogeneration potential and serve the people of both the region and the Nation by also developing innovative cogeneration demonstrations that use other less proven fuels and modes of cogeneration.

--Agency officials have not implemented a Valley-wide program to control water heaters. In GAO's opinion, an extensive water heater control program could prove cost effective. If implemented, such a program could improve TVA's load profile, yield valuable load management information, and give TVA a chance to show its leadership in this area.

--TVA has not established a system to periodically reevaluate its hydroelectric projects. By considering the benefits and costs of improved technology, changing conditions, and energy prices such a program would insure prompt implementation of energy-efficient and economical improvements.

--TVA has not enhanced participation by its employees in the collective bargaining process. TVA employees are still exempt from labor relations legislation affecting private and other public employees. GAO's conclusion, with which TVA disagrees, is that TVA em-

ployees have little control over their representatives in the collective bargaining process and limited access to the independent third party machinery available to most private and public employees to handle and resolve complaints such as unfair labor practices and violations of standards of conduct.

RECOMMENDATIONS TO THE BOARD OF DIRECTORS, TVA

To correct the above situations and to maintain appropriate momentum in TVA's work to satisfy regional and national energy needs, GAO recommends that TVA:

--Increase its coordination and cooperation with the Department of Energy and accelerate the development of joint projects. When funding for a demonstration having national benefits exceeds TVA's incremental cost, agency officials should request Federal funding.

--Undertake cogeneration applications and demonstrations that use less proven fuels and technologies in addition to its program for fuel cell and coal gasification development while actively pursuing development of cogeneration that uses already existing technologies. Funding should be as in the preceding recommendation.

--Implement a water heater control program to (1) install remote control devices on existing water heaters; (2) provide incentives for installation and control of super-insulated 120-gallon water heaters in new and remodeled homes; and (3) encourage replacement of existing units with larger, more efficient units, when possible.

--Develop a system to periodically reevaluate its hydroelectric projects to insure prompt action on energy-efficient and economical improvements. (See chapter 2.)

--In its capacity as employer and party to agreements negotiated with the Trades and

Labor Council, take action to enhance employee influence over the bargaining process. (See chapter 3.)

RECOMMENDATIONS TO THE CONGRESS

GAO recommends that the Congress:

--Revise TVA's charter to better reflect current national energy priorities by directing TVA to (1) take the lead in developing electricity management plans and programs, (2) promote energy conservation and the most efficient production and use of energy, (3) encourage the use of renewable resources, and (4) assure adequate public involvement in energy planning and policymaking. (See p. 18.)

--Act favorably on TVA's requests for funding of energy supply demonstration projects meeting the criteria GAO recommended. (See p. 18.)

--Include TVA employees under statutory labor relations procedures applicable to private or other Federal employees. (See p. 33.)

AGENCY COMMENTS

TVA generally agreed with the substance of this report except in the following areas:

--Revision of TVA's charter.

--Joint TVA/Department of Energy projects.

--Water heater control program.

--Labor relations.

These areas of disagreement are discussed at appropriate places in the report and are highlighted in appendix II. (See pp. 53 to 55.)

Contents

ABBREVIATIONS

ADP	automatic data processing
AFBC	atomospheric fluidized bed combustion
DOE	Department of Energy
DOI	Department of the Interior
EPA	Environmental Protection Agency
FGD	flue gas desulfurization
GAO	General Accounting Office
PURPA	Public Utility Regulatory Policies Act
TVA	Tennessee Valley Authority
UT	University of Tennessee

CHAPTER 1

INTRODUCTION

Sections 105 and 106 of the Government Corporation Control Act, as amended (31 U.S.C. 850, 851), require the General Accounting Office to audit the financial transactions of wholly owned Government corporations, including the Tennessee Valley Authority (TVA), in accordance with the principles and procedures applicable to commercial corporate transactions, and to submit reports of such audits to the Congress. In addition, the Act creating TVA provides (16 U.S.C. 831h) that the Comptroller General of the United States shall audit the Authority's financial transactions not less frequently than once each fiscal year.

Based on these statutory requirements, we issued reports to the Congress on TVA's financial statements for each fiscal year beginning in 1933 through 1976. Until fiscal year 1960, our reports were based upon our own detailed audits of the financial statements. In 1959, the TVA Act was amended to permit TVA to obtain the services of certified public accountants in the audit of its financial statements. In each year since 1959, TVA has obtained the services of a national firm of certified public accountants in the belief that such a firm's opinion concerning its financial statements would facilitate the marketing of its power revenue bonds. Beginning in 1960, our reports on TVA's financial statements have been based upon our observations and tests of the audits performed by the independent certified public accountants.

Over the many years that we have been auditing TVA, we have consistently found good accounting and good financial control practices. Likewise, we have found the scope and quality of the audits conducted by the independent certified public accountants to be satisfactory. For these reasons, and to make what we consider to be the best use of the limited resources available to us, we have since 1976 concentrated our work at TVA in the areas addressed in this report rather than in an essentially duplicative audit of the financial statements.

OBJECTIVES, SCOPE, AND METHODOLOGY OF THE REVIEW

The objectives of this review were to determine the current status of those TVA activities on which we had reported in fiscal years 1977 through 1979; to determine the actions,

if any, taken by TVA in response to the recommendations made in our earlier reports and to assess the adequacy of reported actions; and to report to the Congress on these matters and on TVA's financial condition as of the end of fiscal year 1979.

In accomplishing these objectives, we talked with knowledgeable TVA officials and performed a limited review of a number of TVA reports, budget documents, program plans, and various other documents: but we did not, for the purpose of this report, perform a sufficiently detailed review to permit us to independently validate the information obtained.

In addition to our follow-up work related to previously issued reports, we have included in this report (Chapter 4) a discussion of other matters in which GAO was ivolved to a lesser degree and with respect to which we made no formal recommendations either to TVA or to the Congress.

We did not independently audit TVA's financial statements. TVA's financial statements for fiscal years 1978 and 1979 and the certification of the independent certified public accountant are included as Appendix I of this report for the information of the Congress.

Chapters 2 and 3 of this report, which deal, respectively, with our prior reports on TVA's power program and on its nonpower activities, are arranged to show for each of the prior reports

--a brief description of the subject matter of the reports;

--the recommendations contained in the prior reports;

--the actions taken by TVA in response to the recommendation contained in the prior reports;

--our opinion as to the adequacy of the actions taken by TVA; and

--where we think that subsequent actions, either by TVA or by the Congress, have not adequately responded to our earlier recommendations and that the bases for those recommendations remain valid today, either a restatement of the prior recommendation or a new recommendation for further action is made.

TVA officials reviewed a draft of this report but, in the interest of helping us to expedite its issuance, did not submit written comments on it. We amended the draft in several places where they thought that we had either inadequately or incorrectly reported their actions or their positions. TVA does not agree with our conclusions or our recommendations in several areas. These areas and TVA's position on them are detailed in appendix II.

CHAPTER 2

OUR REPORTS ON TVA'S POWER PROGRAM

In fiscal years 1977 through 1979, we issued five reports dealing with TVA's power program.

ELECTRIC ENERGY OPTIONS HOLD GREAT PROMISE FOR THE TENNESSEE VALLEY AUTHORITY

This report, containing the results of the first comprehensive review of TVA's power program since 1959, was issued to the Congress on November 29, 1978 (EMD-78-91). In this report, we stated that TVA needed to establish new goals and new priorities if it were to reflect national energy goals and to continue its historical role as a leader in the field of energy technology and as a "yardstick" or standard against which to measure the efficiency of the electric utility industry.

We stated that many options, rather than a single focus on the construction of additional central station nuclear generating plants, were available for meeting the TVA region's power needs, and we suggested a number of supply and demand alternatives which we thought TVA should explore more fully. Completion of plants then under construction or licensed could, we said, satisfy demands through the early 1990s; and with expanded conservation, improved power management, and the use of renewable resources the region could meet its power needs through the year 2000 without building any thermal generating capacity beyond that then in the licensing process.

We suggested that before committing itself to the construction of additional thermal generating capacity, TVA should take time to develop, implement, and evaluate these other options. And to facilitate consideration of these options, we said that there was a critical need for TVA to prepare a comprehensive long-range plan extending at least 25 years.

Much of TVA's planning had been dependent on the Office of Power's annual load forecast. The load forecast was the basis for decisions concerning the effects of conservation, the size and timing of new generating plants, and fuel purchase estimates. We said that it was imperative that TVA abandon its practice of issuing a single forecast, which was largely an extrapolation of historical trends, because such a process could neither reflect changing national goals nor allow TVA to lead in applying or demonstrating new technologies. Therefore, we considered the desirability of TVA's preparing several long-range forecasts of future electric power needs based upon various supply and demand options. Also, realizing the uncertainty

inherent in such long-range forecasting and the general lack of information about the uses and users of electricity, we evaluated TVA's need for more extensive and more accurate information.

Long-range planning

To improve TVA's planning and decisionmaking processes and to provide criteria by which TVA's performance could be better evaluated, we recommended to the Board of Directors that

--TVA prepare a long-range comprehensive plan (minimum of 25 years) with specific short-term goals, that this plan be reviewed by the Department of Energy and by a broad spectrum of the regional population, and that it be submitted to the President and to the Congress;

--TVA prepare several 25-year electricity demand projections emphasizing energy conservation and the use of renewable resources; and

--TVA collect more detailed information on the users and uses of electricity.

TVA's actions

TVA has not completed a comprehensive, long-range plan as we recommended, but it has expended considerable effort and apparently made progress in developing a long-range power plan and an overall strategic plan. TVA's Office of Power drafted a long-range power program plan which will be updated annually based on analysis conducted by TVA staff and outside reviewers.

According to TVA staff most closely involved in the planning effort, the Board of Directors has shown much interest in and support for the planning effort. On February 20, 1980, the Board of Directors formally approved a new corporate planning system developed by TVA's Office of Planning and Budget. The planning system added policy analysis, economic assessment and program evaluation to the ongoing planning system. TVA staff expects to submit an initial draft of an overall strategic plan to the Board before the end of 1980. Plans call for obtaining input on the strategic plan draft from a wide spectrum of the populations served and from interested local, State, and Federal agencies. After its completion, long-range program planning will be conducted in the context of the strategic plan.

Formulation of the plan requires that the Office of Power prepare long-range forecasts. Its current forecast projects electricity demand in detail to the year 2000 and in less detail to 2020. The Office of Power now prepares several forecasts to take into account a range of electricity prices, Department of Energy loads, economic growth possibilities, potential new technologies, energy conservation efforts, and trends toward substitution of electricity for scarce fossil fuels. According to TVA officials, multiple forecasts enable the Board of Directors and the staff to consider the range of uncertainties in planning the future of the power system.

Although TVA's methodology permits separate analysis of the effects of each factor listed above, it does not allow simultaneous analysis of a combination of factors. Such capability would help the agency determine where best to apply its resources--for example, whether to spend more money on conservation measures or on new capacity. Although several models attempt such analysis, TVA does not consider any of them satisfactory and is currently working with the Electric Power Research Institute to develop a satisfactory methodology.

TVA has also begun to improve its data base on its customers. By taking a survey of residential customers, it has collected data in such areas as the extent to which various types of appliances exist in the region, operating characteristics of appliances in the region (e.g., frostfree or not), family size and income, conservation measures customers have taken, types of home structures, and types of heating fuel used. TVA staff expect to issue a preliminary report on this survey in May 1980 and a final report in about July 1980. In addition, TVA has expanded a load metering project, originally being carried out only in Chattanooga, to four other areas. It also has underway several smaller metering projects to determine hourly demand and cumulative electrical usage.

TVA's preliminary plans call for a survey of distributor-served commercial and industrial customers similar to the one for residential customers. The survey will try to gather additional information on the types and distribution of smaller commercial and industrial users of electricity. Currently, two questionnaires are planned--one for customers known to be manufacturers and the other for commercial and unclassified customers. Questions will concern such factors as the end uses of energy by fuel type; the characteristics of major equipment, particularly that used for space and water heating; and characteristics of the plant structure. TVA will try to correlate this data with the firms' monthly and annual energy usage. Before the end of 1980, TVA intends to hire a consultant to assist with this work. Agency officials expect to spend $50,000, $200,000 and $300,000 for the project in fiscal years

1980, 1981, and 1982, respectively. TVA and a contractor have already completed two surveys of TVA's larger direct-served customers to gather information concerning this group's expected demand.

Energy supply alternatives

In fulfilling its obligations as a power supplier for the Valley and as a national leader in the field, we recommended that TVA undertake a major application and demonstration of cogeneration technologies, which could include

--a coal-fired steam turbine system in the range of several tens of megawatts;

--a gas turbine system in the range of 50-200 megawatts and capable of using alternative fuels in a cogeneration mode;

--a gas turbine system capable of using different fuels and designed for use at smaller industrial locations;

--a coal-fired, fluidized bed gas turbine system of a size to demonstrate the feeding of excess power to the network and the producing of process steam for industry;

--a fluidized bed gas turbine system fired by biomass, in particular, wood waste;

--continuous assessment of the potential for industrial cogeneration and support of industries with such potential, particularly those in newly developed industrial parks.

We also recommended that TVA, in complying with the then proposed clean air agreements, follow the maximum demonstration and development of flue gas desulfurization technologies in its coal-fired plants and build a commercial scale atmospheric fluidized bed combustion facility and, upon successful demonstration of this technology, use fluidized bed combustion in all major power production facilities required through the year 2000. Recognizing that the cost of demonstrating some of these options and as-yet unproven technologies would be greater than the costs which TVA would normally incur for the production of power, we suggested that they seek appropriated funds to the extent that the cost of these demonstrations exceeds TVA's incremental cost.

Finally, we recommended that TVA's future coal purchasing policies should include actively pursuing contracts with coal mine operators who are using longwall mining techniques.

TVA's actions

At least six large industrial plants in the TVA region have engaged in cogeneration for a number of years to supply a portion of their own electrical needs. At the time the contracts between these plants and TVA were signed, it was not anticipated that they would be selling power to the TVA system. TVA currently has no contracts for participatory cogeneration between its system and an industrial concern.

Though TVA has no cogeneration projects now underway, officials believe they are moving in the right direction. In January 1979 TVA issued a study entitled "A Preliminary Assessment of Cogeneration Potential in the TVA Region." Later that year, in the fall of 1979, the Board of Directors adopted a cogeneration policy which it considers innovative because the policy (1) provides a market for the cogenerator's power and (2) does not penalize the cogenerator for his backup power use. The policy allows addition of up to 1,000 megawatts of cogenerated electricity to the system between the time the policy was approved and October 1, 1982. TVA will pay cogenerators 135 percent of TVA's wholesale demand and energy charges for power supplied during onpeak hours and 85 percent of these charges for power supplied during offpeak hours.

Following the Board's adoption of a policy on cogeneration, the TVA staff noted considerable interest in cogeneration on the part of Valley industries. They estimated that perhaps 100 or more industrial customers had inquired about cogeneration possibilities.

Although to date no industries have actually undertaken cogeneration arrangements with TVA, several projects are active to the point that TVA expects to complete contracts before the end of the year. Primarily because of the new cogeneration policy, TVA staff expects a contract providing for an industrial concern to operate its generators in the cogeneration mode, selling excess electricity to the TVA system, to be approved in June 1980. TVA officials also expect to undertake a cogeneration project before the end of the year with a manufacturer that is locating a new plant in the Valley. TVA staff also expects to renegotiate its contracts with the six firms now having in-plant generating capability in accordance with its new cogeneration policy. TVA is continuing its discussions concerning cogeneration with a large paper company that has facilities near one of its steam plants and with whom

it has been working for several years on the development of a a cogeneration project.

Although not technically a cogeneration project, it should be pointed out that TVA assisted in arranging financing for and is serving as an advisor on a municipal waste project in Sumner County, Tennessee. This project burns waste to produce electricity, which is sold to TVA, and steam, which is used by three small industrial plants nearby.

Additionally, TVA officials told us that TVA financed two cogeneration feasibility studies, one with an industry and another with the University of Tennessee (UT). Under the latter, TVA and UT were proposing that the Department of Energy (DOE) participate in the funding of UT's purchase of a different, more expensive fluidized bed boiler to replace a conventional boiler UT could no longer operate and that UT use the new boiler in a cogeneration demonstration. However, DOE will not help fund the project because it believes the effort duplicates other DOE work. The State of Tennessee and TVA have not been able to raise funding for the project to date but are still hopeful that they will be able to undertake some type of project.

Except for the proposed demonstration at UT, TVA has directed its cogeneration efforts toward projects that use proven technology. However, we also recommended that TVA undertake some cogeneration demonstrations using developing technologies and that, where project costs are expected to exceed TVA's incremental cost, TVA request appropriated funding for the difference.

TVA indicated support for the concept of demonstrating less proven fuels and cogenerating technologies while encouraging commercial use of existing technology. About a year ago TVA changed its research and development policy from one of pursuing a large number of research projects to one of focusing on a limited number of demonstrations to make best use of its resources. TVA believes that the combination of coal gasification and fuel cells offers the most cost effective, environmentally suitable means for dispersed cogeneration in the future. TVA has underway two very large demonstration activities on fuel cells and coal gasification to demonstrte this concept.

TVA officials pointed out that trying to obtain appropriated funds for cogeneration projects through the normal budget process presents a timing problem. Almost all potential cogeneration projects result from a new industrial firm moving into the area, an addition to an existing industrial firm, or replacement of existing equipment. When businesses take such steps, they are unwilling to wait several months or

longer for a decision on TVA's budget. In addition, TVA officials point out, cogeneration technology involves problems of reliability--reliability of electricity and of steam for industrial processes. The use of unproven technologies thus adds to the difficulty of finding a willing cogeneration participant.

With respect to our recommendations concerning flue gas desulfurization (FGD) demonstrations, TVA believes that its programs will result in the research and development projects that we intended and has begun installing a variety of equipment designed to significantly advance scrubber development.

Initially, TVA also agreed with us that part of the funding for FGD demonstration projects should come from appropriated funds. The Board of Directors later decided, however, that due to sludge problems with existing technologies, TVA would have to pursue new scrubber technologies, which would benefit its power program. Because the Board considered development of such technology as part of the business of supplying power, it decided to finance the demonstration projects entirely from power funds.

Concerning our recommendation for development of commercial scale atmospheric fluidized bed combustion (AFBC), TVA's current plans call for construction of a 20 megawatt pilot plant to be operational in fiscal year 1982 and, if TVA decides to proceed with the program, a 200-megawatt demonstration plant to become operational in 1986. Commercial operation of an AFBC plant could come in the early 1990's if the program develops at the expected pace. TVA is using both appropriated and power funds for this project and, when commerical-scale AFBC facility is demonstrated successfully, will decide what role AFBCs have in TVA's future power supply plans.

Concerning our recommendation on longwall mining, TVA officials pointed out that in many situations longwall mining of coal is not the best technique to use, nor is it always feasible. However, when feasible, it is also the most economical mining method, and coal mine operators therefore will probably use it as part of sound business practice. By buying the least expensive coal to meet its needs, TVA believes that it in effect supports longwall mining techniques and plans to continue doing so.

Energy demand alternatives

To reduce the growth rate of energy demand, to make the existing power system more efficient, and to defer the construction of additional generating systems, we recommended that TVA

--increase its efforts to implement the National Energy Plan;

--in conjunction with its program to train and certify mechanics in heat pump installation and maintenance, actively encourage installation of heat pumps in all new construction;

--study and implement seasonal and time-of-day rates;

--expand the use of interruptible contracts to include interruption on a regular basis rather than only in emergencies;

--evaluate and pursue opportunities for matching variable loads in the region;

--promote the use of building designs which take advantage of passive solar space conditioning;

--promote solar water heating by providing alternatives (such as lower rates) to make these systems economically competitive for consumers since they are less costly to the power system than adding new generating capacity;

--participate in research and development of solar space heating and cooling applications in coordination with the Department of Energy; and

--consider applying a rate surcharge or issuing bonds that would result in additional conservation, if the above options or other TVA initiatives do not adequately reduce demand.

TVA's actions

In responding to these recommendations, TVA stated that it is out front in the implementation of national energy goals and credited expansion of its existing programs, particularly the Home Insulation Program, with this progress. The Home Insulation Program offers free energy audits and no-interest loans in amounts up to $2,000 for periods up to 7 years for home insulation and other weatherization measures. All 160 of TVA's power distributors are participating in the program, and TVA has made over $50 million available for its operation. By February 22, 1980, more than 185,000 customers had taken advantage of the free energy audits and about 70,000 customers had obtained loans.

TVA believes that another of its programs, the "$uper $aver Home Program," encourages energy efficient home construction and installation of heat pumps; and its Certified Heat Pump Installation Program seeks to insure proper installation and service. To make the devices attractive to consumers, TVA offers 10-year, low-interest (8-1/2 percent) loans for installation of heat pumps in existing homes, provided the installation meets TVA standards.

According to officials, TVA has to date approved 11 designs for passive solar houses and expects to approve an additional 18 designs. Under this program, TVA approves a design and offers technical assistance to the customer or the builder in order to encourage solar installations. The agency plans to build 44 solar homes throughout the Valley and to pay the occupants "inconvenience" payments for answering questions and providing data concerning their life-style and energy use.

In addition to the above solar programs, the Board of Directors has requested that proposals for several small heat pump/solar projects at various locations throughout the Valley be submitted to it by the end of March 1980. Based on user acceptance of these projects and TVA's experiences with them, TVA staff expects the Board will adopt a new homes program for Valley-wide implementation at a later date.

To further promote energy efficiency, TVA is preparing to certify homes which incorporate its approved solar and $uper $aver standards and also has a modular solar home program in the works. Under the latter program, TVA expects to approve a number of designs, from which five approved manufacturers will build houses. As of February 29, 1980, TVA had tentatively selected the manufacturers and planned to have 130 prototype modular solar homes built by August 1980. In addition, TVA recently redesigned a 96-unit housing project for the elderly to incorporate passive solar space conditioning. It contributed $225,000 in power funds toward construction because of the project's value as a demonstration of passive solar design suitable for retirement villages, dormitories, motels, hospitals, and similar buildings. A passive solar retrofit program, which will modify existing Valley housing to take advantage of solar energy, is another solar venture TVA has planned.

TVA is sponsoring the testing of 32 solar water heater systems at 5 different laboratories across the United States. TVA anticipates installing 1,000 solar water heaters in Memphis by August 1980 and will soon begin a program to install an additional 10,000 solar water heaters in Nashville and 1,000 more in a rural area near Nashville. Finally, TVA's

equipment performance standards for solar water heaters have been adopted by the American Society of Heating, Refrigerating, and Air Conditioning Engineers.

According to TVA officials, they try to coordinate their efforts with other organizations, including DOE and, when feasible, enter into cooperative arrangements with other groups. Although TVA stated in its response to the Congress concerning our recommendations that it was "currently conducting and planning research and development of solar space heating and cooling, both singly and in cooperation with DOE and other organizations", TVA and DOE are not involved in joint solar heating and cooling projects in the region, nor is TVA involved in a solar cooling project. In fact, TVA's residential solar group is just beginning to work with DOE to try to develop joint projects. TVA is actively working with DOE on a program of retrofitting buildings with solar energy facilities. They have sent 11 project proposals to DOE and expect early favorable action.

In the same response, the agency indicated that "TVA and DOE are currently working towards the development of an interagency agreement for the application of photovoltaic energy sources in TVA activities." This interagency agreement was signed September 30, 1979, and makes available $113,465 for TVA to use in the design, procurement, and installation of photovoltaic energy sources. An amendment to that agreement increasing the funding to $505,065 has been prepared by DOE and should be signed shortly. Four project proposals have been submitted to DOE under this agreement.

TVA also noted that they were involved in a joint project with DOE and the National Aeronautics and Space Administration to test and evaluate a new dish solar collector, another effort TVA had pledged to undertake. TVA further believes that it is fully coordinating its activities with DOE and others and regards the cooperation and exchange of information and assistance among the groups as free and willing.

With respect to our recommendations concerning load management, TVA reports that it has a program to install 300 energy-use display meters in three different configurations to test whether consumers' knowledge of the amount of power they are using has any effect on energy consumption. Another TVA program seeks to install load controls on 50,000 central air conditioning units by October 1983. The devices will have dual control capability in anticipation of future TVA plans to begin controlling water heater loads as well. The TVA staff expects to propose, in the summer of 1980, a program which would control existing water heaters in 10

distributors' areas that already have the required communication devices. The staff is studying the cost effectiveness of an additional water heater control program which would control 120-gallon water heaters valley-wide, where feasible. These and some smaller load management projects dealing with water heating and space conditioning will be addressed in greater detail in the discussion of our report on TVA's load management activities (p. 18).

As required by the Public Utility Regulatory Policies Act of 1978 (PURPA), TVA is considering six rate standards as well as one other standard it has independently decided to consider. The latter standard would impose a surcharge on the rates applicable to new housing that fails to meet approved TVA conservation construction standards. As required by PURPA, TVA has held public hearings on the standards, including seasonal and time-of-day rates. It has already published the results of a time-of-day rate study done in Knoxville.

TVA believes it is pursuing all opportunities to match variable loads in the region. Officials stated that in recent years TVA has interrupted power supplies to its customers who have interruptible contracts to the maximum extent that circumstances permit. Also, the agency has tried to expand the amount of its interruptible power by lowering the minimum demand required for a customer to be eligible for interruptible service and has amended its contracts to increase the percentage of time it can interrupt power supply to the affected customers.

In the commercial and industrial sector, TVA is stepping up its activities and will be performing energy audits similar to those described earlier for the residential sector. It plans to hire 84 engineers or engineer aides and 13 consulting firms to assist with some 150,000 expected requests for inspections from the almost 300,000 customers in this sector. Beyond recommending conservation measures that can result in lower demand, these engineering and consulting personnel will recommend load management measures, when appropriate, for the approximately 25,000 customers subject to demand charges.

TVA has already negotiated a 1,000 megawatt block of interruptible demand with DOE officials. This power, used in DOE's uranium enrichment facilities, is interruptible during two 3-month periods each year. TVA also maintains interchange agreements with surrounding utilities to assist it in meeting variable loads. The discussion of our report on TVA's load management activities (p. 18) will treat TVA's residential load management program.

With respect to our recommendation that TVA consider applying a rate surcharge or issuing bonds to encourage greater conservation, TVA's position remains the same as in its response to the Congress on this report. That is,

--its programs will be successful;

--consideration of a rate surcharge is hypothetical and unnecessary at this time; and

--a surcharge may be inconsistent with the requirement of the TVA act that power rates be as low as possible.

As we point out on page 14, however, one of the actions TVA is considering would apply a rate surcharge to new housing not built to TVA's conservation standards. We remain of the opinion that TVA is authorized (subject to Board approval) to impose a surcharge to encourage conservation.

Revision of TVA's charter

To ensure that TVA undertakes programs that offer the most benefit to the Nation, we recommended that the Congress revise TVA's charter to better reflect current national energy priorities. We suggested specifically, that TVA be charged with

--leading the development of electricity management plans and programs,

--encouraging energy conservation and the most efficient production and use of energy,

--encouraging the use of renewable resources, and

--assuring adequate public involvement in energy planning and policymaking.

TVA's position

In his comments on our draft report, which were printed with the final report and in his response to the Congress on the report, the Chairman of the Board of Directors indicated that TVA is already doing many of the things which we recommended and that the TVA Act already provides the necessary authority and purpose to achieve the goals recommended. The Board's position was that TVA was already acting on recommendations in the report and already had a policy "* * * to provide leadership in the development of electricity management plans and programs, to encourage energy conservation and the most efficient production and use of energy, to maximize energy conservation and the use of renewable resources, and to involve the public in energy planning and policymaking."

The Board therefore disagreed with our recommendation to amend the agency's charter.

We agree that TVA's present policy is that it should function as a leader in developing and demonstrating new and better ways of generating and using electricity and of involving the public in energy planning and policymaking; and, as shown in this report, they have undertaken a number of programs which are responsive to our recommendations in this regard. We fully support these policies of the present Board of Directors and expect that their efforts will benefit the Nation as it tries to solve its energy-related problems. We continue to believe, however, that congressional affirmation of TVA's role would help to ensure that the agency's direction and its national perspective would not change under different leadership.

The Congress has not acted upon our recommendation.

Adequacy of TVA's actions

Many of TVA's actions have been responsive to our recommendations. Ongoing efforts in these and other areas should enhance its ability to supply power to the region and to provide national energy leadership. Areas in which TVA has either started or increased its efforts include:

--Preparation of several possible demand forecasts that extend several years into the future, and other steps to improve its planning process. Agency officials also plan to undertake several studies, both separately and in conjunction with other efforts, to enable them to collect better data on users and uses of its electricity.

--Several programs already underway and others planned, to conserve energy usage and/or to lower demand growth through improved load management. Additionally, TVA is developing innovative energy technologies, including those that rely on renewable resources, which could result in both conservation and improved load management.

--Adoption of a cogeneration policy which provides a market for a cogenerator's power and does not penalize him for the backup power he uses.

--Work on scrubber technologies which will more efficiently remove the impurities that result from burning coal and help solve the sludge disposal problem, as part of its clean air compliance activities.

However, TVA has taken little or no action on some of our recommendations, which we believe remain valid. For example, though TVA has discussed coordination and cooperation with DOE, it needs to step up efforts in this area. It has yet to start many of the joint projects promised in its response to the Congress; some groups within TVA did not begin working with DOE to look into developing joint projects until early this year.

TVA has made progress in getting a Board-approved cogeneration policy and should continue pursuing economical cogeneration opportunities using proven technologies. However, it should not limit its activities to projects that use such technologies. A variety of cogeneration demonstrations, using several different technologies, could provide valuable data on efficiencies possible using different fuels and different modes of cogeneration. As TVA pointed out, experimental cogeneration technologies pose timing problems when the agency tries to match funding, which must be obtained long before it even begins a demonstration project, with industrial planning, which does not allow for the months involved in TVA's appropriations process. However, TVA can and should work toward a solution to this problem in addition to continuing its work on the coal gasification and fuel cell programs.

Reliability of the electricity or process steam supply to an industry is perhaps a more serious problem with cogeneration technology, especially when unproven technologies are involved. Again, the agency's application and demonstration program for cogeneration technologies should include research on a solution.

Recommendations to the Board of Directors, TVA

To correct the preceding problems and to maintain desirable momentum in working toward solutions to national energy problems, we recommend that:

--TVA increase coordination and cooperation with DOE and accelerate development of joint DOE/TVA projects. When funding for projects with potential for national benefit exceeds TVA's incremental cost, agency officials should request Federal funding.

--TVA undertake, in addition to its coal gasification and fuel cell programs, other cogeneration applications and demonstrations using less proven fuels and technologies while it continues to develop cogeneration using

reliable and economical existing technologies. Again, TVA should seek Federal funds for these activities.

Recommendation to the Congress

To help ensure that TVA's present perspective of its role as a national leader in developing and demonstrating new and better ways of generating and using electricity and of involving the public in energy planning and policymaking will survive future changes in its Board of Directors, we recommend that the Congress revise the TVA charter to better reflect current national energy priorities by directing TVA to (1) take the lead in developing electricity management plans and programs, (2) encourage energy conservation and the most efficient production and use of energy, (3) encourage use of renewable resources, and (4) assure adequate public involvement in energy planning and policymaking. In addition, we recommend the Congress act favorably on TVA's requests for funding of energy supply demonstration projects meeting the criteria we recommended.

ADDITIONAL LOAD MANAGEMENT ACTIVITIES

Load management can be cost effective. Although widely practiced in other parts of the world, the United States has not widely adopted load management practices. In view of the potential savings, which we pointed out in our report on energy options, we undertook a study to determine the extent of TVA's load management activities and to evaluate their potential for application to the utility industry.

Many of TVA's load management projects were only in preliminary stages of testing at the time of our review, so we concentrated on those techniques already sufficiently proven at the time of our work.

We reported the results of our study to the Board of Directors in April 1979. In that report we recommended that TVA

- --initiate a comprehensive customer education program to promote the advantages and gain customer acceptance of load control devices;

- --proceed with implementation of water heater controls by installing remote control devices on existing water heaters, providing incentives for the installation and control of superinsulated 120-gallon water heaters in new and remodeled homes and encouraging replacement of existing units with larger, more efficient units, when feasible; and

--accelerate the testing of space conditioning devices with a view toward early installation throughout the TVA service area.

TVA's actions

TVA officials do not consider a comprehensive load management education program desirable at this time because, except for certain experimental programs, the current TVA rate structure is not designed to encourage load management and such an education program might serve only to frustrate the consumer. However, as mentioned previously, TVA is currently conducting hearings on several alternative rate structures in order to comply with requirements of the Public Utility Regulatory Policies Act. Should TVA adopt rates designed for load management--time-of-day rates, for example--then it would undertake a comprehensive educational program. Until then, TVA intends to continue load management education only as it relates to individual load management projects which it has undertaken.

TVA currently has several load management projects underway. In one test TVA installed water heater and space conditioning (cooling and heating) control devices in homes in four distributors' areas and gathered data on load controls from 457 customers. Units controlled included

--358 conventional water heaters (with tanks no smaller than 40-gallon),

--99 120-gallon water heaters,

--131 air conditioners, and

--27 central heating systems.

TVA gathered usage and hourly demand data on these appliances and on one other appliance in each home. Using data gathered from this test, TVA moved into a much larger project.

The larger project, approved by the Board of Directors in October 1979 will cost about $7.7 million. As a part of that project controls will be installed on about 50,000 central air conditioners in 10 distributors' areas by 1983. These controls will automatically turn off the air conditioners for about 7-1/2 minutes of each half hour. TVA estimates that these controls will reduce peak demand from 1 to 1.4 kilowatts per unit.

The TVA staff decided to put a higher priority on controlling air conditioning because they saw a greater immediate need to reduce summer demand. The Office of Power observed that the Valley load seemed to be developing into either a dual

peaking system (summer as well as winter peaking) or a summer peaking system.

Although the TVA staff had reservations about the operability of water heater controls on a systemwide basis, they now believe the problems have been resolved. The staff intends to propose to the Board of Directors, a program to control existing water heaters in the area served by the 10 distributors participating in the air-conditioning control project as an initial step toward a Valley-wide program. The staff also intends to propose the initial phase of another program to encourage consumers to install controlled 120-gallon water heaters which would be operated offpeak, if it proves to be cost-effective. Successful implementation of this program is contingent on the adoption of an appropriate time-of-day rate structure.

Another TVA load management effort is its 75-unit test of the effectiveness of three different thermal storage technologies for space conditioning. TVA is participating in smaller thermal storage space conditioning and water heater experiments as well.

Adequacy of TVA's actions

TVA's plans for controlling air conditioners are innovative and definitely a step in the right direction. Although it has limited programs to control water heaters, the agency could improve its load profile and gain valuable load management information more quickly by immediately implementing a wide-scale water heater control program. Water heater control could be one of the most cost-beneficial methods of shaving load on the TVA system.

Recommendations to the Board of Directors, TVA

To take advantage of the potential benefit of water heater control, we recommend that TVA implement a water heater control program to (1) install remote control devices on existing water heaters; (2) provide incentives for installation and control of superinsulated 120-gallon water heaters in new and remodeled homes; and (3) encourage replacement of existing units with larger, more efficient units, operated off peak, where feasible.

HYDROELECTRIC POWER OUTPUT CAN BE IMPROVED

Generation of electricity by hydro power is very desirable. Hydroelectric generation is the most cost-effective of

all conventional generating methods, it uses no fuel, emits no air pollution and creates no waste disposal problems.

In 1975, three Federal agencies were operating a total of 152 hydroelectric power plants that had combined average output of about 124 billion kilowatt-hours per year. Because the operational efficiency of hydroelectric generating equipment changes as the equipment ages, as the purpose of the generation changes, and as conditions affecting generation change, we reviewed the procedures used to evaluate Federal hydroelectric installations and issued a report entitled, "Power Production At Federal Dams Could Be Increased by Modernizing Turbines and Generators," (EMD-77-22, Mar. 16, 1977). In the report we recommended that the Secretaries of the Interior and the Army and the Chairman of the Board of TVA follow certain procedures in evaluating hydroelectric generation facilities.

Specifically, we recommended that they

--identify opportunities to improve hydropower production through equipment modernization, and implement those improvements that are economically justified, perhaps even before the end of the equipment's (or its components') useful life,

--include in the economic analysis the value of oil or coal consumption displaced and, either directly or indirectly, the value of maintenance costs reduced by installing new equipment,

--include feasible turbine and generator modernization in their overall hydroelectric power expansion plans, and

--develop systems to make sure that future technological improvements are recognized and considered for implementation in existing systems.

TVA was not necessarily deficient in all areas covered by these recommendations, which were also addressed to the Department of the Army and the Department of the Interior.

TVA's actions

TVA's total power system consists of hydroelectric plants (conventional and pumped storage), coal-fired plants, nuclear plants, and combustion turbines. As of December 31, 1976 TVA had 29 hydro plants with an installed nameplate capacity of 3,240,460 kilowatts and an estimated annual generation of 14,069,000 megawatt-hours.

For each proposed increase in hydroelectric production, TVA determines the expected value of savings from alternate fuels over the life of the system. It also determines how installation of new equipment or the modernization or rehabilitation of existing equipment will affect operation and maintenance costs and system reliability.

In addition TVA has taken the following actions directed toward increasing hydroelectric generation:

--Under a continuing program to replace deteriorated generator stator windings, TVA has increased the capacities of 14 generators by a total of 48,850 kilowatts since 1977 and will add an additional 23,740 kilowatts by the end of 1982.

--By 1983, TVA expects to have rehabilitated the Ocoee Number 2 hydroelectric plant, which it has not operated since September 1976. The project will cost an estimated $20 million and is expected to produce about 135 million kilowatt-hours of electricity annually.

--TVA has established a task force to assess the potential of power production from small dams in the region. It is currently taking the first complete inventory of all dams in the TVA region and plans to do feasibility studies on the 10 with greatest potential for development as power generating sources. TVA is also evaluating the feasibility of improving several of its other hydro facilities.

--TVA has worked with the Corps of Engineers in studying the possibility of adding hydroelectric generators to four Corps projects; it is also cooperating with the Corps on the National Hydropower Study to assess the national potential for increasing hydroelectric capacity and generation.

TVA regards its efforts to improve its hydroelectric facilities as adequate.

Adequacy of TVA's actions

In our report, we pointed out that it may be both cost and energy effective to the Nation to improve hydroelectric generating facilities before the end of the equipment's useful life and that a detailed analysis of each dam is necessary to evaluate the potential for improvement. We noted that optimum design of turbines and generators depends on the purpose of the generation (i.e., peaking, intermediate, or base load generation) and the conditions under which the generation

will take place (i.e., reservoir levels, water flow, etc.); therefore, each site requires extensive evaluation by skilled engineers to determine if improvements can be made.

TVA still has not developed a system to make sure that future technological improvements are recognized and considered for implementation in existing systems. We continue to believe that a system for periodically reevaluating TVA's hydroelectric facilities to identify potential improvements would result in improvements beyond those already achieved by TVA. Such a system would insure evaluation of possible technological modifications in light of current uses and conditions and would also facilitate timely action on any improvements needed.

TVA officials interpreted our recommendation for such a system to mean one that would identify technological advances rather than one to periodically reevaluate existing equipment for possible improvement. In its response to the Congress, the agency stated that "TVA's engineers have in the past stayed abreast of technological advancements that might be utilized at our hydro generating facilities to improve the production of power, and they will continue to do so in the future."

With the clarification of the intention of our recommendation, TVA acknowledged the merit of a system to ensure periodic reevaluation of the hydro projects and said they would establish such a system. Since TVA acknowledges it will establish such a system, we plan to conduct follow-on work to verify such establishment.

Recommendations to the Board of Directors, TVA

We recommend that TVA develop a system to periodically reevaluate its hydroelectric projects to insure prompt action on energy-efficient and economically efficient improvements.

THE CONTROVERSY OVER THE TELLICO DAM PROJECT

Tellico Dam is part of a 38,000-acre water resource and regional development project located on the Little Tennessee River in Loudoun, Monroe, and Blount Counties, Tennessee. Although Tellico Dam itself does not have generators, officials estimated that the project would increase power output

at Fort Loudoun Dam by about 200 million kilowatt-hours annually by running additional water through the turbines at Fort Loudoun. Developed as a proposal in 1963, the funds were first appropriated for the project in 1966.

The Tellico Dam project has been controversial throughout much of its history. Early in 1977, after over $100 million had been obligated and the project was about 90 percent complete, Senator James Sasser; Representative John Duncan; and the Chairman, House Committee on Merchant Marine and Fisheries asked that we review certain aspects of the project. At the time of that review, due to a court injunction, TVA could neither close the dam nor take other actions which would threaten the habitat of the snail darter, a 3-inch-long fish declared endangered under provisions of the Endangered Species Act of 1973.

Based on the original congressional requests and subsequent agreement with the Committee, we identified

--what portion of project expenditures would provide benefits if the project were not completed,

--alternative methods of operating a reservoir that would not adversely affect the snail darter, and

--the benefits that would occur if the project were completed.

Later in 1977, we briefed the Chairman of the Committee and issued a report entitled, "The Tennessee Valley Authority's Tellico Dam Project--Costs, Alternatives, and Benefits," (EMD-77-58, Oct. 14, 1977).

The latest benefit-cost study available to us in 1977 was primarily prepared in 1968 and showed a benefit-cost ratio of 1.7 to 1. We concluded that benefits claimed for the project could be either understated or overstated because

--project cost had increased greatly,

--some assumptions and logic used in computing benefits were not sound,

--the methodology in some cases did not conform to Federal guidelines, and

--statistical projections were not always valid.

Therefore we recommended that

--the Chairman of the Board of Directors of TVA gather and provide to the Congress, through the Office of Management and Budget, detailed remaining cost and remaining benefit information on the Tellico project and its alternatives; and

--TVA, to provide a balanced perspective, obtain from the Director of the Office of Management and Budget, the Chairman of the Council on Environmental Quality, and the Secretary of the Interior both initial suggestions on developing alternatives and subsequent comments on TVA's methodologies, data bases, and resulting analyses; and that these comments be included in the information which TVA submitted to the Congress.

To the Congress, we recommended that until the remaining cost and remaining benefit information on the Tellico project was received from the Chairman of the Board, TVA, including the comments of the agencies referred to above, the Congress prohibit by law the expenditure of existing appropriations and defer further appropriations for work on the project that (1) would endanger the snail darter's survival, or (2) would not be necessary if the project were not completed or were modified. We further recommended that the Congress not act on the proposed exemption legislation until it had time to assess the updated information.

In making these recommendations, we noted that:

--The decision of whether to exempt the Tellico project from the provisions of the Endangered Species Act of 1973 involved more than comparing the value of the snail darter with benefits that could be derived from the completed project. The snail darter was important, we said, because it was an integral part of the broader issue of whether the Tellico project was the best use of the Little Tennessee River Valley.

--While biologists recognized that the Tellico dam threatened the snail darter's survival in the Little Tennessee River, they believed that former population levels could be reestablished in the river if conservation measures were taken, and, over the long run, if all or part of the dam were removed. Since time permitted, we said that more current information should be obtained on the project and its alternatives.

We stated that these recommendations did not indicate that we were either for or against completing the Tellico project, but rather that we believed additional information was necessary to allow the Congress to act on the questions before it.

TVA's actions

In 1978, following our report, TVA began working jointly with the Department of the Interior (DOI) to prepare an updated benefit-cost study. This study assessed benefits and costs for four alternative uses of the project, one of which --completion as originally planned--proved to be the most economical alternative. However, the study also showed that reasonable alternatives to completion did exist. TVA made a draft of this benefit-cost study available for public comment on August 10, 1978, and the Chairman, House Committee on Merchant Marine and Fisheries, asked that we look at the new study. In briefing the Chairman, we pointed out some major weaknesses in the study and noted that we had brought these and other, less serious problems to the attention of TVA officials, who said they would attempt to eliminate these problems from the final study.

In 1978, the Congress amended the Endangered Species Act to, among other things, establish an Endangered Species Committee to weigh the importance of conserving a species against the need for a Federal action. The Congress empowered this Committee to grant exemption from the Endangered Species Act if five of its seven members, voting in person, determine that the benefits of a Federal action, which is of regional or national significance and is in the public interest, clearly outweigh the benefits of conserving a species or its critical habitat and that no reasonable and prudent alternatives to the Federal action exist. The Committee refused to exempt the Tellico Project from the act because the TVA/DOI reevaluation had shown that reasonable alternatives to completing the project existed.

Adequacy of TVA's actions

TVA's actions subsequent to the issuance of our report have been substantially as we recommended.

Although the reevaluation showed that reasonable alternatives to the project existed, both evaluations showed dam completion to be the most cost effective. The Congress in 1979 specifically exempted the Tellico Project from the provisions of all laws and directed completion of the project. The gates of Tellico Dam were closed on November 29, 1979, and the desired winter pool level was reached on December 28, 1979.

PLANNING NUCLEAR POWERPLANTS

In 1979 we reported that from 10 to 12 years were necessary to plan, license, and build a nuclear plant. Given such lead times, planning for a plant needed in 1992 would have to begin in about 1980. Forecasting electrical demand that far in advance is difficult, as is the planning and scheduling of plant construction to meet the demand, and TVA's experience has been similar to that of private industry--plants come on line later and at considerably higher cost than expected. At the time of our report, TVA would have had a 30-percent reserve capacity in 1990 based on its 1978 demand forecast. The 1979 forecast indicates less need in 1990. Even though TVA has delayed the operational date of four nuclear units, its reserve capacity is still expected to be 25 to 28 percent in 1990.

In our report entitled "Tennessee Valley Authority Can Improve Estimates and Should Reassess Reserve Requirements for Nuclear Powerplants" (PSAD-79-49, Mar. 22, 1979), we pointed out that TVA was not basing its estimates on the best data available and recommended that

--TVA base its estimates for powerplants on likely cost and schedule conditions, and that the cost and schedule estimates for Hartsville, Phipps Bend, and Yellow Creek be adjusted to reflect the best assessment of what actual results will be;

--TVA base future cost-effectiveness evaluations of nuclear and coal-fired powerplants on cost and schedule estimates which, to the best of its knowledge and ability, reflect the results and trends of its own experience and analyses, as well as those of private utility companies; and

--in view of the large amount of the reserve capacity and the trend of the demand forecasts, the Board of Directors reassess the reserve requirements.

TVA's actions

Since our report TVA officials said that cost and schedule estimates for its nuclear powerplants have been revised to reflect most likely conditions and TVA's best assessment of what actual results will be. The following chart shows that cost and schedule estimates for all three plants--Hartsville, Phipps Bend, and Yellow Creek--have increased significantly since we issued our report.

TVA's Cost and Schedule Estimates
for Three Nuclear Powerplants

Plant	Cost			Schedule		
	Reported 3/22/79	Current	Increase	Reported 3/22/79	Current	Increase
	--------Billions---------			(month/year)		(months)
Hartsville	$3.5	$5.8	$2.3	12/85	8/91	68
Phipps Bend	1.8	2.95	1.15	8/86	8/90	48
Yellow Creek	2.4	2.975	0.575	5/87	8/89	27

TVA attributes these increases to changes in design scope; additional safety modifications resulting from the Three Mile Island incident; underestimation of the original scope of work; and, for Hartsville and Phipps Bend, changes in the complexity of the STRIDE design and late receipt of materials and equipment. Also, the revised construction schedules reflect revised forecasts of electrical demand. According to TVA officials, the new estimates comply with our recommendations.

TVA has not had to make new comparisons of coal-fired versus nuclear powerplant costs since doing such calculations for its Phipps Bend and Yellow Creek plants. Due to revised load forecasts, TVA has dropped two additional units it had been considering during our earlier review. However, should cost-effectiveness comparisons between nuclear and coal-fired plants be necessary in the future, TVA officials plan to base such evaluations on the principles we recommended for all technologies deemed feasible at the time.

Since we issued our report in March 1979, TVA has completed new load forecasts which show a marked decrease in the total demand for electricity through 1990. TVA constantly reassesses its load forecasts and reserve requirements; and, based on the latest load forecast, agency officials decided that the capacity scheduled to be brought on line in the mid-1980s would result in excessive reserves. They therefore adjusted construction schedules for four nuclear units to more evenly distribute capacity through the 1980s and, as noted above, dropped consideration of two additional units from the planning cycle.

Adequacy of TVA's actions

TVA has modified its cost and schedule estimates and reassessed its reserve requirements as we recommended in our report. TVA has also stated that if any future evaluations of the cost-effectiveness of coal and nuclear powerplants are needed, updated estimates will be prepared as we recommended.

CHAPTER 3

OUR REPORTS ON NON-POWER PROGRAMS

During fiscal years 1977 through 1979, we issued three reports dealing with TVA's non-power activities. In this chapter we summarize each of these reports; the actions TVA has taken to resolve the issues we presented; our conclusions as to the adequacy of the actions taken by TVA; and, where we believe TVA's actions have been unresponsive or inadequate, we are again making recommendations for corrective actions.

IMPROVEMENTS NEEDED IN USE OF AUTOMATIC DATA PROCESSING RESOURCES

We reviewed TVA's automatic data processing (ADP) operations because of the substantial investments TVA has made, and plans to make, in general use ADP equipment and ADP-related services. The value of its ADP equipment was about $10 million in 1978; and, during a 6-year period beginning in 1980, agency officials expect to spend up to $54 million more on new computer equipment. Additionally, (in 1978) TVA spent over $25 million to develop, maintain, and operate its computer applications. During 1980 these operating expenditures are expected to exceed $42 million. Inefficient use of ADP resources wastes money and, in TVA's case, could contribute to higher power rates. We evaluated the effectiveness of TVA's policies and procedures for planning, controlling and reviewing ADP activities and systems, and for identifying and acquiring ADP hardware and related services.

In our report entitled, "Improvements Needed in the Tennessee Valley Authority's Management and Use of Its Automatic Data Processing Resources," (EMD-79-102, Sept. 6, 1979), we stated that TVA did not have the degree of top-management involvement; central-management direction, coordination, and control; or planning processes necessary to increase effectiveness and achieve significant savings.. We therefore recommended that TVA:

--Establish a formal planning process that would provide top-management involvement in the development of an agency-wide ADP plan. This process should include establishing an executive ADP management committee to develop a statement of what information systems management would need over the next 3 to 5 years. As a first action, we said the committee should (1) assess how well existing and planned systems meet the identified needs, (2) develop an outline of the major systems projects identified for development, and (3) ensure that the plan provides for systems with potential for sharing

development and operational costs among more than one office and division.

--Develop agency-wide policies for encouraging and ensurring that organizations develop and implement, where appropriate, interdivisional systems.

--Establish agencywide goals and priorities, implement more effective controls over ADP activities by establishing clearly defined policies and procedures for approving and managing systems development projects, and develop and implement an agencywide estimating and budgeting process for ADP systems.

--Develop and enforce procedures for ensuring compliance with GSA's regulations for obtaining delegation of procurement authority for ADP-related services.

--Develop procedures which will allow the Division of Management Systems to evaluate user forecasts for central processing unit requirements by analyzing their needs.

--Review the existing studies in support of the fiscal year 1980 computer procurement to determine compliance with the intent of Federal Property Management Regulations.

--Review the adequacy of the internal audit coverage of ADP activities and commit, as appropriate, additional resources to this function.

TVA's actions

TVA generally agreed with our recommendations. The Chairman of the Board of Directors, in his response to the Congress, stated that "Unfortunately, many of GAO's criticisms were well founded" and that "TVA did need to do more to strengthen the management of and control over TVA's ADP activities."

TVA has taken action to implement most of our recommendations. It has centralized responsibility for establishing agency-wide ADP goals and priorities, for developing procedures for ADP applications and for computer resource planning; for developing procedures for approving and managing ADP development projects; and for implementing an agencywide estimating and budgeting process for ADP activities. TVA also has initiated action to develop a formal ADP planning system which will include processes for independently evaluating user forecasts of central processing unit requirements and for updating the studies on which it bases ADP procurement plans.

Adequacy of TVA's actions

We believe that the actions taken or initiated by TVA have been and will be responsive to our recommmendations. However, since TVA only recently began action to develop a formal ADP planning system, but is continuing to proceed with ADP purchases over the next few years, we will continue follow-on work in TVA's need for and procurement of this equipment.

LABOR-MANAGEMENT RELATIONS

In 1978 TVA had approximately 26,000 construction and operating and maintenance employees who belonged to some 200 local unions. In the collective bargaining process, these employees are represented by 15 bargainers (16 at the time of our report) who come from the international unions that have craft jurisdiction over work performed at TVA. These representatives form the Trades and Labor Council, which is a party to TVA's two collective bargaining agreements, one covering construction employees and the other covering annual and hourly operating and maintenance employees.

In July 1977, the late Representative Clifford Allen requested that we review TVA's labor-mangement relations program on behalf of one of his constituents who was concerned that TVA employees lacked control over their designated union representatives and access to third-party adjudicatory bodies. Our review focused on the effect on TVA's employees of its exemption from laws and regulations applicable to labor organizations in the private and Federal sectors and on the bargaining structure of TVA's labor relations program.

In our report entitled, "Additional Safeguards Needed for Tennessee Valley Authority Trades and Labor Employees to Protect Their Interests in Collective Bargaining," (FPCD-78-12, Mar. 15, 1978), we recommended that the Congress and the Chairman of the Board of Directors of TVA take actions to protect and enhance the influence that TVA employees have over the bargaining process.

We recommended that the Congress include TVA employees under either existing statutory labor relations procedures or any forthcoming legislative procedures applicable to other Federal employees. We also recommended that the Board of Directors of TVA, to the extent feasible in its capacity as an employer and as a party to the agreements negotiated with the Trades and Labor Council, take measures to enhance employee influence over the bargaining process.

In a 23-page response to the Congress, dated May 15, 1978, TVA strongly disagreed with our report. TVA officials termed

it "superficial" and alleged that our assumptions, reasoning, and conclusions were unsound.

In an August 10, 1978, letter to the Congress, we pointed out that despite its length, TVA's response was irrelevant and unresponsive to the issues addressed in the report. We reiterated our position that the structure of the Trades and Labor Council and the process used to select its members had resulted in a potentially serious diminution of employee participation in and control of the collective bargaining process. We therefore recommended again that the Chairman of the Board of Directors of TVA take steps to enhance employee participation in the bargaining process and restated our recommendation that the Congress include TVA employees under statutory labor relations procedures applicable to other private or public sector employees. Such congressional action would give TVA employees access to an independent third party to resolve disputes, a right already enjoyed by other private and public sector employees.

TVA's actions

Our followup work indicates no change in the labor relations situation at TVA; TVA's position on our recommendations likewise remains unchanged. TVA believes it has a good labor relations program. But while the degree to which TVA's labor relations program is lacking may be a matter of judgment, we continue to believe that the program has resulted in a potentially serious diminution of employees' participation in the collective bargaining process. In our reply to TVA's response to the Congress we pointed out that we had received the following petition signed by 571 TVA employees with a postscript that more would follow. The petition read as follows:

> "We Annual and Hourly Operating and Maintenance Employees of the Tennessee Valley Authority do hereby certify that we support the GAO report before Congress, by a majority in rank and file membership and we do not agree with TVA * * * that only a minority of blue-collar employees are dissatisfied with the procedures of redress."

Adequacy of TVA's actions

The fact remains that TVA employees are still exempt from most legislation affecting labor-management relations in the public as well as private sectors; and, because of the organization of their bargaining unit, they have little voice in selecting the person who represents them on TVA's Trades and Labor Council. It is our opinion, with which TVA disagrees, that this situation has resulted in a potentially serious diminution of TVA employee participation in and control over their collective bargaining process.

Recommendation to the Board of Directors, TVA

To correct the problems that we have identified, we recommend that TVA, to the extent possible in its capacity as an employer and as a party to agreements negotiated with the Trades and Labor Council, take action to enhance employee participation in the bargaining process.

Recommendation to the Congress

The Congress should include TVA employees under the statutory labor relations procedures applicable to private or other Federal employees.

CONTRACTING AND PERSONNEL MANAGEMENT

As a wholly-owned Government corporation, TVA is not subject to many of the laws and regulations that affect other Federal agencies; this exemption extends to many statutes pertaining to contracting and personnel management. On October 9, 1975, Representative John E. Moss requested that we inspect the appropriateness of TVA's contracting and the effectiveness of its financial disclosure system. He also asked that we provide information on the number of retired Federal employees who worked for TVA and on how many TVA employees were involved in public relations and media contact work. In a report entitled, "Tennessee Valley Authority: Information on Certain Contracting and Personnel Management Activities" (CED-77-4, Dec. 29, 1976), we supplied the information, summarized below, to Representative Moss; the report did not contain any recommendations.

As explained in the report, TVA is not subject to the Federal procurement regulations but does adhere to provisions of the Federal regulations to the maximum extent deemed practicable by its Board of Directors. Of the 36,673 contracts totaling $3.6 billion that TVA awarded in 1975, it awarded only 4 percent noncompetitively. Our review of a cross section of contracts awarded by formal advertising and by negotiation disclosed no material deviations from TVA's formal policies and procedures.

The report likewise noted that TVA had established a financial disclosure system applicable both to its employees, to its consultants, and to its personal service contractors with whom an employer-employee relationship existed. Review of the system disclosed only minor deficiencies. While review of all financial disclosure statements filed by TVA employees in 1975 revealed no conflicts of interest, we did find several situations that might give the appearance of a conflict of

interest. After examining these, the General Manager stated that he did not believe they could result in a conflict of interest.

Retired Federal employees working for TVA in 1975 numbered 310, or about 1 percent of its workforce. The pay and annuity of some of the retirees had been reduced, depending on the requirements of the systems under which they had retired.

Finally, we reported that TVA's public relations program was not promotion-oriented; its policy was to make all information, save that exempted by Federal law, available to everyone on an equal basis. In 1975, TVA's Information Office had 59 staff members of whom only 23 were engaged in providing information directly to the public or the media. The remaining employees did editorial, secretarial, technical, and support work related to providing information services, maintaining technical libraries for official use, and publishing a magazine for distribution to employees. The 23 employees mentioned above and 5 employees in TVA's Washington office represented less than one-tenth of 1 percent of TVA's workforce in 1975.

CHAPTER 4

OUR OTHER WORK NOT RESULTING IN RECOMMENDATIONS

During fiscal years 1977, 1978, and 1979, major events that materially affected TVA but were not the subject of GAO reports included

--agreements between TVA and the Environmental Protection Agency (EPA) concerning abatement of the adverse effects of TVA's coal-fired power plants on air quality and subsequent litigation attacking the validity of those agreements, and

--the increase in TVA's borrowing authority from $15 billion to $30 billion.

CLEAN AIR AGREEMENTS

During the 3-year period covered by this report TVA continued a program begun in the early 1970s to retrofit some of its existing coal-fired power plants with emission cleaning devices, scrubbers, bag houses and electrostatic precipitators. TVA has also made contractual arrangements for buying coal with a low-sulfur and low fly-ash content which will further reduce the amount of sulfur dioxide emitted into the air by those plants. There is no question that these modifications are very costly and will add to the cost of electricity to the consumers in the Tennessee Valley.

The confrontation of clean air versus increased costs resulted in litigation. TVA was placed in the position of defending itself on the one hand from the Environmental Protection Agency (EPA);the States of Tennessee, Kentucky and Alabama; and private organizations which generally felt that TVA had done too little in cleaning up the air to the detriment of the health of the people they represent. On the other hand the Tennessee Electric Cooperative Association believed TVA had over-reacted and was incurring costs unnecessarily to the financial detriment of those same people.

The Clean Air Act Amendments of 1970 and implementing regulations required every State to develop plans for controlling emissions from all sources to achieve established national standards.

In the early 1970s, TVA took the position that the Clean Air Act did not require sources to control emissions to the same degree at all times, regardless of the meteorological

conditions. It was TVA's position that intermittent controls tailored to supply the amount of emission reduction needed under particular meteorological conditions were both technologically feasible and the least expensive method of achieving ambient standards. This position led to a dispute with EPA that was resolved by the courts in April 1976 in favor of EPA's views. At that time, TVA acknowledged that its 12 coal-fired steam plants were required to meet constant emission limitations and immediately began developing a compliance program to achieve emission limitations. However, because the compliance deadline for meeting constant emission limitations had already passed, TVA was subject to citizens suits being brought at any time, regardless of the expeditiousness of its compliance program.

In June 1977 the State of Alabama brought a citizens suit against TVA concerning sulfur dioxide emissions from the Colbert and Widows Creek power plants. At the same time, a group of environmental organizations--including the Natural Resources Defense Council, the Kentucky chapter of the Sierra Club, and the League of Women Voters of Tennessee--brought citizens suits concerning 8 of TVA's 10 remaining coal-fired steam plants. The United States, at the request of EPA, and the Commonwealth of Kentucky intervened as plaintiffs. The litigation was characterized by the plaintiffs as the largest environmental enforcement action ever brought. Two months after the lawsuits were brought amendments were made which considerably strengthened the Clean Air Act's requirements. TVA believes the impetus behind those amendments was growing concern in the Congress over the harmfulness of air pollution, including the particulates and sulfur dioxide emitted by power plants.

By the time the lawsuits were brought, TVA had already developed and was implementing a system-wide plan to meet the emission limitations. TVA proposed its ongoing compliance program as a basis for settlement of the litigation and after several modifications to TVA's compliance program were made, a proposed settlement was agreed to by all the parties.

In January 1979, that proposed settlement was presented to the courts in each of the above cases as a consent decree which set out the corrective action to be taken at 10 of TVA's coal-fired plants to achieve the emission limitations. In addition TVA agreed among other things to

--submit quarterly progress reports,

--perform emissions tests and pay expenses and fees of plaintiff observers,

--install and operate monitoring equipment,

--pay implementation committee members $200 per day for preparation for and participation in committee meetings plus associated expenses, and

--pay legal fees of plaintiffs.

In March 1979, at the request of one of the courts considering the settlement, TVA and the plantiffs filed a Statement of Economic Impacts. This document pointed out the hazards of air pollution and the anticipated benefits of air pollution control. The statement further acknowledged that it is impossible to place a specific money value on reducing the incidence of damage to human health and the environment by cleaning up air pollution, but concluded tht the "costs imposed each year on the public by air pollution appreciably exceed the costs of the cleanup program called for in the settlement."

In April 1979, the Tennessee Electric Cooperative Association intervened in the court action as defendants claiming that the compliance program was extreme and that TVA was not protecting the financial welfare of electricity consumers in the Tennessee Valley.

In August 1979, TVA announced that it had found certain errors in the computer model for the Cumberland power plant and as a result compliance costs would be less than initially estimated. However, at the time the errors were discussed TVA had already expended about $19 million on unneeded work and it was too late to recover those funds.

When they discovered the error in the computer model for Cumberland the TVA staff also discovered an anomaly in data that had been used in calculating the effects of sulfur dioxide emissions at the Paradise power plant.

Because of these problems and other questions, Senator James R. Sasser requested that we perform a sequential study of the clean air events. We did so and reported the details on the clean air agreement to Senator Sasser. We also reported that the total cost of the clean air agreement, including the costs of new facilities, maintenance cost, and incremental cost increase for fuel, would be about $6 billion over the lives of the power plants involved.

TVA responded as follows:

"The GAO calculation that TVA's total cost of compliance will be more than $6 billion is based on the present value of the capital and operating costs, including low-sulfur coal, of all the control efforts mentioned

in the consent decrees over the entire remaining life of the 10 coal-fired plants being discussed. This period stretches out to the year 2013 and unquestionably involves a lot of money. A calculation of this type involves many risky assumptions. The price of low-sulfur coal in the year 2000 and the amount of power generated by nuclear plants on the TVA system in the year 2005 are but two examples. In any event, these estimates are merely different ways of stating the capital and annual operating cost estimates that TVA had already developed. They do not represent an increase in the cost estimates; they are simply a way of adding up the control cost for each year each plant continues to operate."

* * * * *

"As large as the control costs are, it should also be kept in mind that the $6 billion estimate and all other estimates of the cost of compliance is in comparison with the cost of zero control of sulfur dioxide emissions. No one could seriously believe that this country would return to the days of unfettered power plant emissions without concern for effects on public health and welfare, or that TVA could simply ignore the law. Thus, the $6 billion estimate is not a comparison of two reasonable alternatives; it is a comparison of TVA's legally required, but bare bones control program with a totally unrealistic and unwanted situation of no pollution control."

At the time of our review the consent decree was still being litigated. TVA had taken the position that it must move ahead with actions to comply with the consent decree or face penalties and fines. As a result TVA has obligated 58 percent of the capital cost estimated for the clean air agreement.

DEBT CEILING INCREASE

Before 1959, much of TVA's funding came from congressional appropriations. The Congress had not established TVA primarily to produce electricity--power generation being considered instead a by-product of its navigation and flood control activities. But as demand for electricity grew, the potential for further hydroelectric projects did not and could not keep pace with the rapid growth in power demands. Therefore, in the late 1950s TVA sought funding to finance construction of additional steam plants to meet these demands.

TVA's sale of power in competition with private firms had long been controversial, and its 1958 proposal for additional steam plants raised considerable concern in the private sector.

After more than a year of intense debate, the Congress amended the TVA Act (16 U.S.C. 831n-4) to authorize public sale of electric power bonds to assist in the financing of the power program. This amendment

--authorized TVA to sell bonds for up to $750 million to finance the building of power facilities adequate to meet electricial demand;

--imposed new requirements for payments to the U. S. Treasury, both to continue repaying previous appropriations investments in the power system and to provide an established return or dividend on that investment; and

--placed a limit on the geographical area to be served by the TVA power system.

Subsequently, the Congress periodically fixed the agency's debt ceiling, which it originally set at $750 million. TVA does its debt planning in approximately 5-year increments, and as the following table shows, by 1976 had sought and received authority to increase the debt ceiling to $15 billion.

Year	Debt ceiling
1959	$ 750 million
1966	1.75 billion
1970	5 billion
1976	15 billion

In 1979, TVA requested that the Congress double its debt ceiling to $30 billion in order to enable the agency to meet power program commitments during the next 5 years. On February 15, 1979, the Senate Committee on the Budget held hearings in Knoxville, Tennessee, on the proposal, and we testified at the hearings primarily concerning our energy options report. Based on a review of TVA's power plant estimates, we stated that TVA would need an increase in its debt ceiling in order to complete power plant construction. While we could not specify the amount or timeframe for the additional funding, we did note that TVA's need for additional "* * * capacity is based on many assumptions and uncertainties, and there are various options available for decreasing or meeting demand that could have significant impacts on TVA's borrowing needs."

Later, in May 1979, TVA announced that it was delaying plans to proceed with four nuclear units, two at Hartsville and one each at Yellow Creek and Phipps Bend. In light of the delay, Senator James R. Sasser asked that we review

TVA's need for the full $15 billion increase originally proposed but not yet approved by the Congress. Although we did not perform a full-scale review, we stated that based on TVA's figures, the agency could operate for most of the 5-year period with only a $7 to $8 billion debt ceiling increase. Further postponement of plant construction or lower-than-anticipated demand, such as had occurred in the recent past, could enable TVA to complete its full 5-year operating period without increasing its debt ceiling beyond the $7 or $8 billion.

If TVA needed more funds, we went on to state, it could return to the Congress before 1985 to seek the additional borrowing authority necessary. A smaller increase to the TVA debt ceiling, we also pointed out, would give the Congress greater control and oversight over the agency. However, legislation was signed into law on November 1, 1979, raising TVA's debt ceiling to $30 billion.

APPENDIX I

TENNESSEE VALLEY AUTHORITY

(A CORPORATION WHOLLY OWNED BY THE UNITED STATES OF AMERICA)

BALANCE SHEETS SEPTEMBER 30, 1979 AND 1978

ASSETS

	Power program		All programs	
	1979	1978	1979	1978
	(Thousands)			
PROPERTY, PLANT, AND EQUIPMENT, substantially all at original cost				
Completed plant; schedule A**				
Multipurpose dams; note 1	$ 496,488	$ 495,407	$ 1,120,750	$ 1,092,715
Single-purpose dams	346,052	72,869	346,052	72,869
Steam production plants	2,634,519	2,534,622	2,634,519	2,534,622
Nuclear production plants	888,350	885,991	888,350	885,991
Other electric plant	2,071,199	1,876,347	2,071,199	1,876,347
Other plant	-	-	198,303	181,715
	6,436,608	5,865,236	7,259,173	6,644,259
Less accumulated depreciation and depletion; note 2	1,897,514	1,746,118	2,071,427	1,909,207
Completed plant, net	4,539,094	4,119,118	5,187,746	4,735,052
Construction and investigations in progress; schedule B and note 3	5,832,368	4,586,550	6,063,741	4,798,879
Nuclear fuel; schedule B	631,102	485,863	631,102	485,863
Less accumulated amortization and allowance for disposal of spent fuel; schedule B and note 2	183,033	92,817	183,033	92,817
Nuclear fuel, net	448,069	393,046	448,069	393,046
Total property, plant, and equipment	10,819,531	9,098,714	11,699,556	9,926,977
CURRENT ASSETS				
Cash	1,902	38,249	114,930	128,432
Accounts and loans receivable	421,573	328,034	434,272	336,522
Inventories, principally at average cost	610,991	359,502	628,637	374,087
Total current assets	1,034,466	725,785	1,177,839	839,041
DEFERRED CHARGES				
Unamortized debt issue and reacquisition expense; note 2	8,788	9,338	8,788	9,338
Mine and mill development costs; schedule B and note 2	196,115	76,488	196,115	76,488
Total deferred charges	204,903	85,826	204,903	85,826
Total assets	$12,058,900	$9,910,325	$13,082,298	$10,851,844

Notes 1 through 10 following the exhibits are an integral part of the financial statements.

*Deduct

**Schedules A through F are not included in this report, but are included in TVA's Annual Report to the Congress.

APPENDIX I

LIABILITIES AND CAPITALIZATION

	Power program		All programs	
	1979	1978	1979	1978
	(Thousands)			
PROPRIETARY CAPITAL				
Appropriation investment; note 4				
Congressional appropriations	$ 1,384,043	$1,383,721	$ 3,310,446	$ 3,155,915
Transfers of property from other Federal agencies	23,644	23,470	57,352	56,587
	1,407,687	1,407,191	3,367,798	3,212,502
Less repayments to General Fund of the U.S. Treasury; note 5	495,059	475,059	536,769	516,769
Appropriation investment	912,628	932,132	2,831,029	2,695,733
Retained earnings reinvested in the power program; exhibit II	1,295,631	1,227,762	1,295,631	1,227,762
Accumulated net expense of nonpower programs; exhibit III	-	-	949,294*	867,375*
Total proprietary capital	2,208,259	2,159,894	3,177,366	3,056,120
LONG-TERM DEBT				
Principal; note 6	6,625,000	5,425,000	6,625,000	5,425,000
Less unamortized discount; note 2	6,050	6,465	6,050	6,465
Total long-term debt	6,618,950	5,418,535	6,618,950	5,418,535
CURRENT LIABILITIES				
Short-term debt; note 6				
U.S. Treasury	150,000	150,000	150,000	150,000
Federal Financing Bank	1,925,000	1,520,000	1,925,000	1,520,000
Long-term debt due within one year	300,000	100,000	300,000	100,000
Short-term debt	2,375,000	1,770,000	2,375,000	1,770,000
Accounts payable	668,396	404,454	702,248	430,358
Employees' accrued leave	22,461	20,928	37,705	35,888
Payrolls accrued	26,322	22,095	31,517	26,524
Interest accrued	139,512	114,419	139,512	114,419
Total current liabilities	3,231,691	2,331,896	3,285,982	2,377,189
COMMITMENTS; note 3				
Total liabilities and capitalization	$12,058,900	$9,910,325	$13,082,298	$10,851,844

APPENDIX I

TENNESSEE VALLEY AUTHORITY
POWER PROGRAM
NET INCOME AND RETAINED EARNINGS
FOR THE YEARS ENDED SEPTEMBER 30, 1979 AND 1978

	1979		1978	
	kWh	Amount	kWh	Amount
		(Thousands)		
OPERATING REVENUES				
Sales of electric energy				
Municipalities and cooperatives	75,936,357	$1,810,848	77,875,252	$1,540,126
Federal agencies	16,169,981	368,741	16,722,347	305,805
Industries	24,912,785	598,180	22,877,485	455,957
Electric utilities	171,642	4,722	175,486	3,897
Interdivisional	497,510	12,813	295,320	6,523
Revenue credit due customers; note 9	-	163,000*	-	-
Total sales of electric energy	117,688,275	2,632,304	117,945,890	2,312,308
Rents		23,483		37,023
Discounts and penalties		108		100
Other miscellaneous revenues		994		703
Total operating revenues		2,656,889		2,350,134
OPERATING EXPENSES; schedule C				
Production				
Fuel		1,108,674		1,035,056
Other		485,332		504,868
Transmission		31,875		27,491
Customer accounts		767		706
Demonstration of power use		12,114		4,261
Administrative and general		93,556		81,559
Payments in lieu of taxes		100,024		79,872
Social security taxes		14,633		11,727
Provision for depreciation		160,573		150,447
Total operating expenses		2,007,548		1,895,987
Operating income		649,341		454,147
OTHER INCOME AND DEDUCTIONS				
Interest income		740		428
Other, net		7,959*		127*
Total other income and deductions		7,219*		301
Income before interest charges		642,122		454,448
INTEREST CHARGES				
Interest on long-term debt		478,986		419,434
Other interest expense		179,153		66,377
Allowance for borrowed funds used (construction and nuclear fuel); note 2		153,749*		248,967*
Amortization of long-term debt discount and expense; note 2		995		1,036
Net interest charges		505,385		237,880
NET INCOME		136,737		216,568
Return on appropriation investment; note 5		68,868		61,716
Increase in retained earnings reinvested		67,869		154,852
Retained earnings reinvested at beginning of period		1,227,762		1,072,910
Retained earnings reinvested at end of period		$1,295,631		$1,227,762

Notes 1 through 10 following the exhibits are an integral part of the financial statements.

*Deduct

APPENDIX I

TENNESSEE VALLEY AUTHORITY
NONPOWER PROGRAMS
NET EXPENSE AND ACCUMULATED NET EXPENSE
FOR THE YEARS ENDED SEPTEMBER 30, 1979 AND 1978

	1979	1978
	(Thousands)	
REGIONAL RESOURCES DEVELOPMENT		
Navigation operations	$ 7,709	$ 7,306
System flood control operations	6,016	5,670
Recreation development	4,747	4,531
Tributary area development	3,209	3,065
Regional water quality management	1,472	1,290
Fisheries and wildlife resources development	1,459	1,136
Preliminary surveys and engineering	[illegible]	[illegible]
Environmental education	495	374
Valley agricultural development	2,720	3,014
Forest resources development	2,247	[illegible]
Strip mine reclamation demonstrations	2,041	[illegible]
Interagency health services demonstrations	606	[illegible]
Regional economic studies	775	726
Townlift community improvement	750	793
Human resources development	764	679
Minerals resources projects	319	327
Special opportunities counties program	484	1,250
Minority economic development	677	111
Local flood damage prevention operations	8,369	7,014
Environmental quality projects	506	480
Net expense of regional resources development	46,206	43,267
FERTILIZER DEVELOPMENT; note 2		
Research and development	11,065	10,393
Fertilizer introduction		
Fertilizer industry demonstrations	2,737	2,845
Farm test demonstrations outside the Valley	1,126	1,155
Net expense of fertilizer introduction	3,863	4,000
Developmental production		
Cost of products distributed	28,716	26,663
General expenses		
Loss on retirements of manufacturing plant and equipment, net	417	139
Gain on sale of phosphate reserves, net	71*	107*
Administrative and general	226	582
Other	890	430
Total general expenses	1,462	1,044
Total production expense	30,178	27,707
Less transfers and sales of products		
Transfers to other TVA programs, at market prices	21,687	20,978
Direct sales	151	335
Total transfers and sales	21,838	21,313
Net expense of developmental production	8,340	6,394
Net expense of fertilizer development	23,268	21,287
NATIONAL ENERGY DEMONSTRATIONS	4,698	609
LAND BETWEEN THE LAKES OPERATIONS	5,547	5,509
VALLEY MAPPING AND REMOTE SENSING	1,012	771
OTHER EXPENSE, NET	1,188	972
NET EXPENSE; schedule D	81,919	72,415
Accumulated net expense at beginning of period	867,375	794,960
Accumulated net expense at end of period	$949,294	$867,375

Notes 1 through 10 following the exhibits are an integral part of the financial statements.

*Deduct

APPENDIX I

TENNESSEE VALLEY AUTHORITY
CHANGES IN FINANCIAL POSITION
FOR THE YEARS ENDED SEPTEMBER 30, 1979 AND 1978

	Power program		All programs	
	1979	1978	1979	1978
	(Thousands)			
SOURCE OF FUNDS				
Program sources				
Net power income; exhibit II	$ 136,737	$ 216,568	$ 136,737	$ 216,568
Items not requiring funds; note a	67,707	58,821*	67,707	58,821*
Funds from power operations	204,444	157,747	204,444	157,747
Sale of power facilities	2,669	2,171	2,669	2,171
Funds from power program; note b	207,113	159,918	207,113	159,918
Net expense of nonpower programs; exhibit III			81,919*	72,415*
Add items not requiring funds; note a			9,106	8,232
Funds used in nonpower operations			72,813*	64,183*
Sale of nonpower facilities			362	342
Funds used in nonpower programs			72,451*	63,841*
Debt sources				
Long-term bonds				
Issues	1,500,000	800,000	1,500,000	800,000
Redemptions	100,000*	-	100,000*	-
Short-term notes				
Issues	7,795,000	4,280,000	7,795,000	4,280,000
Redemptions	7,390,000*	3,740,000*	7,390,000*	3,740,000*
Total debt sources	1,805,000	1,340,000	1,805,000	1,340,000
Other sources				
Congressional appropriations	500	320	154,531	138,510
Property transfers	174	261	765	528
Total other sources	674	581	155,296	139,038
Total source of funds	$2,012,787	$1,500,499	$2,094,958	$1,575,115
DISPOSITION OF FUNDS				
Expended for plant and equipment, excluding allowance for borrowed funds used	$1,797,320	$1,460,951	$1,860,624	$1,527,033
Less:				
Depreciation charged to construction and clearing accounts	4,456	3,620	6,874	5,766
Cost of removing retired facilities and salvage from retained materials	2,487	329	2,321	302
	1,790,377	1,457,002	1,851,429	1,520,965
Payments to U.S. Treasury; note 5				
Return on appropriation investment	68,868	61,716	68,868	61,716
Repayment of appropriation investment	20,000	20,000	20,000	20,014
	88,868	81,716	88,868	81,730
Unamortized debt discount and expense and other deferred charges				
Mine and mill development cost	119,627	39,395	119,627	39,395
Debt issue expense	30	16	30	16
	119,657	39,411	119,657	39,411
Changes in working capital (increase or decrease*)				
Cash	36,347*	26,921*	13,502*	15,481*
Accounts receivable	93,538	109,453	97,750	110,140
Inventories	251,489	13,495*	254,550	12,194*
	308,680	69,037	338,798	82,465
Less other current liabilities (excluding short-term debt)	294,795	146,667	303,794	149,456
	13,885	77,630*	35,004	66,991*
Total disposition of funds	$2,012,787	$1,500,499	$2,094,958	$1,575,115

*Deduct

APPENDIX I

TENNESSEE VALLEY AUTHORITY
CHANGES IN FINANCIAL POSITION
FOR THE YEARS ENDED SEPTEMBER 30, 1979 AND 1978

NOTES:

a. Items not requiring funds:

	Power		Nonpower	
	1979	1978	1979	1978
	(Thousands)			
Provision for depreciation	$160,573	$150,447	$8,760	$8,200
Provision for depletion	603	333	-	-
Provision for depreciation of mining equipment	3,618	-	-	-
Amortization of nuclear fuel	47,708	38,203	-	-
Net loss on retirements and disposals of property, plant, and equipment	7,959	127	346	32
Amortization of long-term debt discount and expense	995	1,036	-	-
Allowance for borrowed funds used (construction and nuclear fuel)	153,749*	248,967*	-	-
	$ 67,707	$ 58,821*	$9,106	$8,232

b. Net power proceeds (see note 6) may be derived as follows:

	Year ended September 30	
	1979	1978
	(Thousands)	
Funds from power program	$207,113	$159,918
Add back interest charges	658,139	485,811
Net power proceeds	$865,252	$645,729

Notes 1 through 10 following the exhibits are an integral part of the financial statements.

*Deduct

APPENDIX I

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS

1. Allocation of cost of multipurpose projects--Section 14 of the TVA Act requires TVA's Board of Directors to allocate the cost of completed multipurpose projects, subject to the approval of the President of the United States. The cost of facilities installed exclusively for a single purpose is assigned directly to that purpose; the cost of multiple-use facilities is allocated among the various purposes served.

The total investment of $1,120,750,000 in completed multipurpose dams at September 30, 1979, is classified as follows:

	Investment		
	Direct	Multiple-use	Total
		(Thousands)	
Power	$319,339	$177,149	$ 496,488
Navigation	153,088	137,281	290,369
Flood control	61,595	159,373	220,968
Recreation	1,324	66,073	67,397
Tributary area development	19	45,509	45,528
Total	$535,365	$585,385	$1,120,750

2. Summary of significant accounting policies--Power accounts are kept in accordance with the uniform system prescribed by the Federal Energy Regulatory Commission.

Plant additions and retirements--Additions to plant are recorded at cost, which includes material, labor, overhead, and allowance for funds used which is applicable to major generating facilities. The costs of generation during preliminary operations prior to commercial acceptance including amortization of nuclear fuel less credit for the fair value of energy generated are also included in the recorded costs of steam and nuclear generating plants. Except for chemical plant, plant retirements (including original cost and removal cost less salvage) are charged against appropriate accumulated depreciation accounts. Because of the experimental nature of fertilizer development, losses on early retirement of chemical plant are included in current year operations.

Depreciation and depletion--Straight-line depreciation is provided for substantially on a composite basis. Rates of depreciation including decommissioning costs of nuclear units, are derived from engineering studies of useful life and are reviewed each year. Depletion of coal land and land rights and phosphate land and mineral rights is provided on a unit of production basis.

Allowance for funds used--The practice of capitalizing an allowance for funds used during construction and during the fabrication of nuclear fuels in the power program was modified in the fourth quarter of fiscal year 1979 (retroactive to October 1, 1978) in accordance with the TVA Board of Directors criteria for establishing wholesale power rates. The effect of this change was to make the allowance applicable only to the construction of major generating facilities and limit the amount to the sum of depreciation and other current period noncash charges less the amount of the repayment of the appropriation investment as prescribed in section 15d of the TVA Act. The method used provides for the calculation each month of the interest on the most recent debt issues that are equivalent to the average balance of construction work in progress for major generating facilities subject to the limitation described. The limitation reduced net income and the amount of allowance for funds used during construction that would have been otherwise determined for fiscal year 1979 by $224,955,000 and reduced the equivalent average capitalization rate for fiscal year 1979 from 8.62 percent to 3.95 percent which compares with 7.57 percent for fiscal year 1978.

Repairs and maintenance--The cost of current repairs and minor replacements is charged to appropriate operating expense and clearing accounts, and the cost of renewals and betterments is capitalized.

Nuclear fuel amortization--The amortization of nuclear fuel is provided on a unit of production basis. Rates are established to amortize the costs over the useful life.

Mine and mill development costs--Deferred mine and mill development costs are assigned to coal inventory and nuclear fuel on a unit of production basis determined in relation to estimated ore reserves.

APPENDIX I

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS—CONTINUED

Operating revenues and energy costs--Revenues from the sale of electric energy are recorded only when billed. An adjustment addendum providing for monthly billing charges to reflect increases or decreases in fuel and purchased power costs was terminated effective in January 1979. These costs are now included for consideration in the quarterly rate reviews.

Borrowing expenses--Issue and reacquisition expenses and discounts on power borrowings from the public are amortized on a straight-line basis over the term of the related securities. Issue expenses on power borrowings from the Federal Financing Bank are amortized over a five-year period except that amounts under $6,000 are expensed as incurred.

Research and development--Research and development costs are expensed as incurred (approximately $40,735,000 in 1979 and $31,868,000 in 1978) except for those costs which relate to specific power program capital projects.

Sales of fertilizer--Sales of fertilizer materials are not made on a commercial basis, but are made to organizations collaborating in an experimental and educational program aimed at improving the manufacture, distribution, and use of fertilizers.

3. Construction projects, commitments, and rental expenses--The construction budgets for fiscal year 1980 are $2,000,587,000 for power projects and $71,067,000 for multipurpose and nonpower projects. Substantial commitments have been incurred for these projects.

The total rentals charged to power operating expenses and other operating clearing accounts for the years ending September 30, 1979 and 1978, amounted to approximately $20,128,350 and $20,484,000, respectively. At September 30, 1979, the aggregate minimum gross rental commitments of TVA under all noncancelable leases for the periods shown are as follows: 1980, $18,246,000; 1981, $15,393,000; 1982, $13,955,000; 1983, $12,967,000; 1984, $12,554,000; and thereafter, $44,256,000.

Minimum gross rental commitments include rentals paid under agreements with the City of Memphis, Tennessee, which provide that (1) TVA sells to the City all the power and energy requirements of its electric distribution system, and (2) the City leases to TVA the Thomas H. Allen steam-electric generating plant with an installed capacity of 990,000 kilowatts. Each agreement is for a term of 20 years, beginning January 1, 1965. The lease agreement provides for annual rental payments of $6,900,000 and grants TVA an option to buy the plant for $2,000,000 at the end of the lease term.

4. Appropriation investment--Changes in appropriation investment during the years ended September 30,1979 and 1978, were as follows:

	Power program		All programs	
	1979	1978	1979	1978
	(Thousands)			
Congressional appropriations, net	$ 322	$ 419*	$ 154,531	$ 138,510
Transfers of property from other Federal agencies	174	261	765	528
	496	158*	155,296	139,038
Less repayments to General Fund of the U.S. Treasury	20,000	20,000	20,000	20,014
Increase or decrease* for the period	19,504*	20,158*	135,296	119,024
Balance, beginning of period	932,132	952,290	2,695,733	2,576,709
Balance, end of period	$912,628	$932,132	$2,831,029	$2,695,733

*Deduct

An appropriation of $148,677,000 was made by Public Law No. 96-69, approved September 25, 1979, for the fiscal year beginning October 1, 1979.

5. Payments to the U.S. Treasury--Section 15d of the TVA Act requires the payment from net power proceeds of a return on the net appropriation investment in power facilities plus repayments of such investment, beginning with fiscal year 1961. The amount of return payable during each year is based on the appropriation investment as of the beginning of that year and the computed average interest rate payable by the U.S. Treasury on its total marketable public obligations as of the same date. The repayment schedule calls for payment of not less than $10 million for each of the first five years (1961-1965), $15 million for each of the next five years (1966-1970), and $20 million for each year thereafter until a total of $1 billion shall have been repaid. The payments required by Section 15d may be deferred under certain circumstances for not more than two years.

APPENDIX I

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS—CONTINUED

Required payments have been made as follows:

	Return	Repayment (Thousands)	Total
Total to September 30, 1978	$ 964,904	$290,000	$1,254,904
Year ended September 30, 1979	68,868	20,000	88,868
	$1,033,772	$310,000	$1,343,772

For fiscal year 1980 the required payments will be $78,413,000 as a return on the appropriation investment at the computed average interest rate of 8.592 percent and $20,000,000 as a repayment, a total of $98,413,000.

In addition to the payments from net power proceeds, $132 of nonpower proceeds was paid to the U.S. Treasury in fiscal year 1979 under the provisions of Section 26 of the TVA Act. This brought the total payments from nonpower proceeds to approximately $41,710,000.

Prior to 1961, under then existing legislation, TVA paid to the Treasury $185,059,000 of power proceeds. In addition to the repayments indicated in Exhibit I, $65,072,000 of bonds sold to the Treasury and Reconstruction Finance Corporation in fiscal years 1939-1941 have been fully repaid from power proceeds. Section 26 of the TVA Act provides for annual payments to the Treasury of any power or nonpower proceeds not needed for the operation of dams and reservoirs, the conduct of the power program, and the manufacture and distribution of fertilizers.

6. Borrowing authority--Section 15d of the TVA Act authorizes TVA to issue bonds, notes, and other evidences of indebtedness up to a total of $15 billion (effective October 31, 1979, increased to $30 billion) outstanding at any one time to assist in financing its power program. Debt service on these obligations, which is payable solely from TVA's net power proceeds, has precedence over the payment to the U.S. Treasury described in note 5. Issues outstanding on September 30, 1979, consist of the following:

	(Thousands)
Long-term debt	
4.40% 1960 Series A, due November 15, 1985	$ 50,000
4-5/8% 1961 Series A, due July 1, 1986	50,000
4-1/2% 1962 Series A, due February 1, 1987	45,000
5.70% 1967 Series A, due May 15, 1992	70,000
6-3/8% 1967 Series B, due November 1, 1992	60,000
8-1/4% 1969 Series B, due October 15, 1994	100,000
7.30% 1971 Series B, due October 1, 1996	150,000
7% 1972 Series A, due January 1, 1997	150,000
7.35% 1972 Series B, due May 1, 1997	150,000
7.35% 1972 Series C, due July 1, 1997	150,000
7.40% 1972 Series D, due October 1, 1997	150,000
7.35% 1973 Series A, due January 1, 1998	100,000
7.35% 1973 Series B, due April 1, 1998	150,000
7-3/4% 1973 Series C, due July 1, 1998	150,000
7.70% 1973 Series D, due October 1, 1998	100,000
8.05% 1974 Series A, due January 1, 1999	100,000
8.05% 1975 Series A, due January 31, 1990 (FFB)	200,000
8.70% 1975 Series B, due March 31, 2000 (FFB)	100,000
8.35% 1975 Series C, due May 31, 1988 (FFB)	200,000
8.47% 1975 Series D, due July 31, 2000 (FFB)	200,000
8.485% 1975 Series E, due October 31, 2000 (FFB)	300,000
8.175% 1976 Series A, due February 28, 2001 (FFB)	300,000
7.97% 1976 Series B, due November 30, 2001 (FFB)	400,000
7.625% 1976 Series C, due January 31, 2002 (FFB)	200,000
7.975% 1977 Series A, due February 28, 2002 (FFB)	300,000
7.935% 1977 Series B, due May 31, 2002 (FFB)	400,000
8% 1977 Series C, due October 31, 2002 (FFB)	400,000
8.375% 1978 Series A, due January 31, 2003 (FFB)	400,000
9.296% 1979 Series A, due February 28, 1989 (FFB)	500,000
9.155% 1979 Series B, due May 31, 1987 (FFB)	500,000
9.195% 1979 Series C, due August 31, 2004 (FFB)	500,000
Total long-term debt	6,625,000
Short-term debt	
U.S. Treasury	150,000
Federal Financing Bank (FFB)	1,925,000
Long-term debt due within one year	300,000
Total short-term debt	2,375,000
	$9,000,000

APPENDIX I

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS—CONTINUED

During fiscal years 1979 and 1978, the maximum amount of short-term borrowings outstanding, exclusive of long-term debt due within one year, was $2,166,000,000 and $1,612,000,000, respectively and the average amount (and weighted average interest rates) of such borrowings was approximately $1,920,000,000 (9.3 percent) and $1,001,000,000 (6.6 percent), respectively.

An additional $400 million bond issue, 10.545 percent 1979 Series D, due October 31, 2004, was sold to the Federal Financing Bank in October 1979.

7. Retirement plan--TVA has a contributory retirement plan which covers substantially all of its salaried employees. The cost of currently accruing benefits is funded currently. The cost of the plan to TVA was $48,823,000 in 1979 and $38,060,000 in 1978, including amortization of unfunded prior service costs over the average future careers of active members. The actuarially computed pension fund assets as of September 30, 1978, the latest actuarial valuation date, exceeded the actuarially computed value of vested benefits of the plan.

8. Litigation--Six citizens' suits were filed in six different district courts under the Clean Air Act, alleging that the sulfur dioxide emissions from 10 of TVA's coal-fired steam plants and the particulate emissions from 7 coal-fired plants violate the emission standards set by the states. Plaintiffs include the States of Kentucky and Alabama and the United States of America at the request of the Environmental Protection Agency. Five of the cases were consolidated in the United States District Court for the Middle District of Tennessee; the other was filed in the United States District Court for the Northern District of Alabama. Plaintiffs asked that the courts order TVA to comply with the applicable emission standards as expeditiously as possible. In addition, the State of Alabama specifically asked the court to restrict operation of Widows Creek and Colbert Steam Plants until final compliance is achieved and assess a State penalty of $10,000 per day per violation. A proposed settlement agreement was approved in December 1978 and presented to the courts for approval. This proposed agreement specifies compliance schedules to control both sulfur dioxide and particulate emissions at TVA steam plants and provides for stipulated daily penalties if TVA does not meet these schedules. The agreement waives any TVA liability for penalties and fines for past violations. The reference in the agreement as originally drafted to a Cumberland Steam Plant scrubber project and activities in lieu of penalties has been deleted, based on new air quality information. The Alabama district court has approved the agreement. While the agreement as submitted to the courts is in full satisfaction of all State or Federal civil penalties, TVA is still subject by law to the mandatory noncompliance penalties under section 120 of the Clean Air Act Amendments of 1977 which will be levied separate and apart from this action on all sources not in compliance after July 1, 1979. Several of TVA's steam plants were not in compliance on that date. The amount of these mandatory noncompliance penalties is based on the economic value of noncompliance to the owner, less any amounts actually expended by the source toward achieving compliance. The amount of these payments cannot be determined until EPA issues guidelines and regulations. It is TVA's position that under the act no penalties are due, based in part on the act's exemption from penalties for sources under consent decrees.

A residential electric consumer of the Memphis Light, Gas, and Water Division (Memphis) filed a class action suit against it and its governing Board in the Chancery Court of Shelby County, Tennessee, on June 9, 1978. Plaintiff claimed that the operation of the fuel cost and purchased power automatic adjustment formula then contained in the TVA resale rate schedule applied to him and his class violates the Fourteenth Amendment's due process clause and the Tennessee statutes which require rate changes by Memphis to receive prior approval by the Memphis City Council. In addition to declaratory and injunctive relief, plaintiff seeks a judgment for over $110 million allegedly collected by Memphis under the automatic adjustment formula since 1974. The case was removed to Federal court, TVA was jointed as a party, and plaintiff amended his complaint to charge TVA with a violation of the Fifth Amendment's due process clause on the same facts. The court granted judgment on the pleadings for TVA and Memphis, and the case is now pending an appeal before the United States Court of Appeals for the Sixth Circuit. In TVA's opinion the judgment should be affirmed.

The injunction against the Tellico project, which was involved in Tennessee Valley Authority v. Hill in the United States Supreme Court was formally dissolved by the district court following congressional passage and the President's approval of an act exempting the project from "the provisions of 16 U.S.C. chapter 35 or any other law."

Following the October 27, 1978, oral opinion by the court in TVA's suit against Westinghouse Electric Corporation, which found that Westinghouse had not carried its burden of proof on its defense under UCC § 2-615 or the uranium fuel contracts' force majeure clauses, the case was settled by agreement. The agreement included the withdrawal of TVA's appeal to the Fourth Circuit, discussed last year, and resolution of all of both parties' outstanding claims under the fuel contracts and other related contracts. Under the terms of the settlement TVA received cash, uranium properties, improvements in fuel fabrication contracts, and equipment and services having a value to TVA of about $130 million. Westinghouse also will deliver to TVA 560,000 pounds of uranium at the $8.24 price specified in the Watts Bar nuclear fuel contract.

APPENDIX I

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS—CONTINUED

On November 18, 1977, TVA filed antitrust suits against 10 foreign uranium producers and 3 domestic firms. The complaints were filed in U.S. District Courts in Chattanooga, Denver, and New York City, and alleged unlawful agreements among the defendants to fix uranium prices and allocate world uranium markets, which resulted in damages to TVA in an amount which cannot yet be determined. The cases were consolidated in Chicago for pretrial purposes by the Judicial Panel on Multidistrict Litigation. The consolidated proceeding is being coordinated with the Westinghouse v. Rio Algom Ltd., et al. antitrust litigation currently pending in Chicago. Discovery is now underway. Defaults have been entered by the clerk against certain of the foreign defendants who did not appear, including Rio Algom Ltd. (Rio). Rio has sued TVA in Canada for $2.2 billion for alleged breach of the same contract which is involved in TVA's suit against Rio, and which TVA has asked the court to find void. In TVA's opinion, there is little likelihood of a recovery by Rio.

In a suit brought by the Attorney General of Alabama, the United States District Court for the Northern District of Alabama has ruled that Section 8(a) of the TVA Act requires TVA to maintain its "headquarters" in the immediate vicinity of Muscle Shoals, Alabama. TVA has appealed the decision, and the court has stayed, pending the appeal, an injunction which requires TVA to relocate its "headquarters" from Knoxville, Tennessee, to Muscle Shoals. TVA expects the United States Court of Appeals for the Fifth Circuit to reverse the district court's order.

9. Revenue credit due customers--On August 24, 1979, the TVA Board of Directors determined that there would be an excess of power revenues in the amount of $163 million for fiscal year 1979 and that such excess should be credited to customers in calculating monthly power bills during the first six months of fiscal year 1980.

10. Subsequent event--Effective October 31, 1979, TVA sold and leased back all of its nuclear fuel for approximately $490 million. Rental payments will be charged to operations in amounts equal to the cost of the fuel burned plus finance charges.

APPENDIX II

COOPERS & LYBRAND

CERTIFIED PUBLIC ACCOUNTANTS

A MEMBER FIRM OF
COOPERS & LYBRAND (INTERNATIONAL)

To the Board of Directors of
Tennessee Valley Authority:

We have examined the financial statements of TENNESSEE VALLEY AUTHORITY at September 30, 1979 and 1978 and for the years then ended which are indexed on page 1 herein. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, Exhibits I, II, III, and IV present fairly:

(1) the financial position of the Authority at September 30, 1979 and 1978, and the results of operations and changes in financial position of its several programs for the years then ended; and

(2) the financial position of the power program of the Authority at September 30, 1979 and 1978, and the results of operations and changes in financial position of that program for the years then ended,

all in conformity with generally accepted accounting principles consistently applied during the period except for the change, with which we concur, in the method of determining the allowance for funds used during construction as described in Note 2 to the financial statements.

The supplemental information appearing in Schedules A to F, inclusive, which has been subjected to audit procedures applied in the examination of the basic financial statements, is in our opinion, fairly stated in all material respects in relation to the basic financial statements taken as a whole.*

Coopers & Lybrand

New York, November 21, 1979.

*GAO Note: Schedules A through F are not included in this report, but are included in TVA's Annual Report to the Congress.

TVA COMMENTS

TVA management officials reviewed a draft of this report; but, in the interest of helping us to expedite its issuance, did not submit formal written comment on it. We amended the report in several places where they thought we had either inadequately or incorrectly reported their actions or their positions. TVA officials do not agree with our conclusions or our recommendations in the following matters.

REVISION OF TVA's CHARTER

We are repeating (page 18) the recommendation contained in our report entitled "Electric Energy Options Hold Great Promise for the Tennessee Valley Authority" that the Congress amend TVA's charter to better reflect current national energy priorities by directing TVA to (1) take the lead in developing electricity management plans and programs, (2) encourage energy conservation and the most efficient production and use of energy, (3) encourage use of renewable resources, and (4) assure adequate public involvement in energy planning and policymaking.

TVA's position concerning this recommendation remains the same as it was when our report was issued in November 1978. TVA officials state that the TVA act as it is written sets out broad policy objectives and grants TVA authority to carry out those objectives. They believe that these aspects of the existing law constitute a legislative directive for TVA to develop, in an integrated manner, the total resources of the region. They believe that the flexibility, inherent in the broad authorizations of the TVA act, to adapt to changing circumstances and conditions has permitted TVA to achieve a position of national leadership and that any statutory limitations on that flexibility would only impair the agency's ability to maintain that position.

While we do not doubt that TVA's current Board of Directors is firmly committed to maintaining TVA's role of leadership in developing and demonstrating new ways of generating and using electricity, we continue to believe that congressional affirmation of such a role for TVA would help to ensure that the agency's direction and its national perspective would not change under different leadership.

JOINT TVA/DOE PROJECTS

We are recommending (page 17) that TVA increase its efforts to coordinate its activities with DOE and to accelerate joint projects with the department. TVA officials stated that their effort to establish projects with DOE must be evaluated

on a case-by-case basis. They say that in certain areas where DOE has experienced reorganizations and staffing problems; progress in establishing satisfactory working relationships has been quite limited; but that in other areas, significant progress has been made.

We agree that TVA has had some success in its efforts to establish joint projects with DOE, and these are pointed out in our report. We believe, however, that more can and should be done in this area and we encourage TVA to increase its cooperative effort with the department.

A copy of this report is being sent to the Secretary of Energy.

WATER HEATER CONTROL PROGRAM

To take advantage of the potential load management benefit of water heater control, we are recommending (page 20) that TVA (1) install remote control devices on existing water heaters, (2) provide incentives for installation and control of superinsulated 120-gallon water heaters in new and remodeled homes, and (3) encourage replacement of existing units with larger, more efficient units, operated offpeak, where feasible.

TVA officials said that as an initial step towards a valley-wide program they expect to propose to the Board of Directors during the summer of 1980, a program to control existing water heaters in the areas served by the 10 distributors who are currently participating in TVA's air conditioning control project (See page 19). In addition, they expect to propose to the Board of Director the initial phase of another program to encourage consumers to install controlled 120-gallon water heaters and to operate them on an offpeak basis. They pointed out however, that the effectiveness of such a program could be contingent upon the adoption of an appropriate time-of-day rate structure, and that such structures in the TVA system are largely dependent upon actions of the power distributors. Time-of-day rate structures are one of the items being considered in public hearings currently being conducted by TVA and the distributors pursuant to the Public Utility Regulatory Policy Act (PURPA).

We agree that a time-of-day rate structure probably would enhance the prospects for successful implementation of these water heater control programs, and we encourage TVA to advocate a time-of-day rate structure during the PURPA hearings.

LABOR-MANAGEMENT RELATIONS

We are repeating (page 33) the recommendations made in our report on the need for additional safeguards to protect the collective bargaining interest of TVA's employees that the Board of Directors of TVA, to the extent possible in its capacity as an employer and as a party to agreement negotiated with the Trades and Labor Council, take action to enhance employee participation in the bargaining process; and that the Congress include TVA employees under the statutory labor relations procedures applicable to private sector or to other Federal employees.

TVA officials stated that they have no objections to taking up with Trades and Labor Council our recommendation concerning enhancement of employee participation in the bargaining process to the extent that such action is necessary and to the extent that TVA can do so without improperly interfering in Council affairs. TVA officials oppose our recommendation for extending existing labor relations legislation to TVA employees because, they say, it would substitute litigation and other forms of third-party compulsion for the successful, voluntary, problem solving labor relations program which now exists in TVA.

We see little, if anything, to support the contention that labor/management relations in TVA are better than those existing generally in the private sector or in the rest of the Federal Government. Therefore, we perceive no rational basis for excluding TVA employees from the rights and benefits available to other workers in both the private and Federal sector.

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