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BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Triennial Assessment Of The Tennessee Valley Authority--Fiscal Years 1980-1982

This report summarizes GAO's work at the Tennessee Valley Authority (TVA) during the past 3 years. Because TVA is a Federal corporation, GAO is required to report on TVA's status every 3 years. The report presents the progress TVA has made to comply with GAO's recommendations dealing with demand forecasting, internal audit, and acquisition of ADP resources. It also discusses information and data on TVA requested by the Congress. Overall, TVA has taken a positive approach in implementing many of GAO's recommendations and is making progress in improving its operations.



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

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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. Overall, TVA has taken a positive approach in implementing many of our recommendations.

We made our review pursuant to sections 105 and 106 of the Government Corporation Control Act, as amended (31 U.S.C. 9105, 9106), 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.

Charles A. Bowsher

Comptroller General
of the United States

D I G E S T

The Tennessee Valley Authority (TVA) was created by the Congress in 1933 as an independent Federal corporation responsible for developing the Tennessee Valley region. It has grown to become the Nation's largest electrical power producer. Because TVA is a Federal corporation, GAO is required to report on TVA's status every 3 years.

This, GAO's second triennial report, covers GAO work performed at TVA in fiscal years 1980 through 1982 and the status of TVA's implementation of GAO's prior recommendations. Overall, TVA has taken a positive approach to implementing many of those recommendations.

TVA made several important decisions in the past 3 fiscal years and the period has been a critical one in the agency's history. TVA experienced several electric rate increases due primarily to financing its construction program and increases in fuel expenses. These rate increases and other important decisions that were made were the subject of much of GAO's work. (See p. 1.)

POWER PROGRAM OPERATIONS

At the beginning of the 3-year period, TVA had underway the largest nuclear construction program in the Nation consisting of 14 nuclear generating units. At the end of the period, two of these units were operational, four were under construction, four had been indefinitely deferred, and four had been canceled. These changes were the result of a decline in demand for electricity. TVA had predicted an 8-percent annual growth rate for electricity in the late 1960's and early 1970's, but consumption actually declined over the past 5 years.

On several occasions, GAO reviewed the way TVA projects its future demand for electricity and the status of its construction program. TVA continually assesses its need for power and has

improved its process for making demand projections. The agency is currently studying options for meeting future demand. It now expects no need for additional generating capacity beyond that now under active construction until after 1994. (See p. 6.)

COAL AND NUCLEAR FUEL

During the triennial period, TVA's coal and nuclear fuel costs represented about 72 percent of total power generation costs. Due to the high cost of coal and nuclear fuel purchases and their impact on electricity rates, GAO reviewed TVA's policies, procedures, and practices for purchasing coal and managing nuclear fuel. GAO found that during the 1970's, TVA had (1) contracted for coal under unfavorable market conditions, (2) contracted for most of its coal under long-term contracts which did not allow it to take full advantage of lower market prices, and (3) accumulated coal inventories that significantly exceeded established target levels. TVA has taken actions in these areas that to date have saved or avoided costs totaling over \$770 million.

When TVA started its nuclear construction program, it also contracted for nuclear fuel to operate the plants. Because the nuclear construction program was cut back, TVA found itself with a large excess inventory of nuclear fuel. To reduce the annual costs of maintaining this fuel, TVA decided in 1979 to sell its nuclear fuel and then buy it back, as needed, under a sale/leaseback arrangement. To finance the sale/leaseback arrangement, TVA obtained a \$2 billion line of credit from the Federal Financing Bank.

GAO examined this arrangement and recommended that before TVA increased the \$2 billion line of credit ceiling, the Congress should review such actions. TVA is now considering several options to keep the borrowing below the \$2 billion ceiling. (See p. 20.)

OVERSIGHT OF TVA OPERATIONS

The degree of autonomy vested in the TVA Board of Directors to manage the agency's operations was a highly debated issue when TVA was created 50 years ago. As the Board has made major decisions, such as rate increases, the Congress and the ratepayers have continued to question

the Board's degree of autonomy. GAO therefore presented several options which would provide for additional oversight of TVA.

For example, GAO looked at (1) scheduling regular oversight hearings, (2) expanding the Office of Management and Budget's (OMB's) role in developing and reviewing TVA's power program budget, (3) placing TVA's ratemaking process under the Federal Energy Regulatory Commission (FERC), (4) requiring the Board to publish records of decisions on major actions, (5) requiring the Board to develop a long-range strategic plan for the region, and (6) adding guidance to conservation and public involvement in the power planning process.

GAO noted that regular oversight hearings and expanding OMB's role would not require legislative action and would have minimal impact on the Board's authority and responsibility. The other options would require legislative action. However, some of the options, such as placing power rates under FERC authority, could erode the Board's current responsibility and accountability for rates and revenues. None of these options are under active consideration by either the Congress or TVA.

GAO recognizes that the Congress has broad authority over TVA power program operations. However, GAO found that one means of statutory oversight traditionally available to the Congress--approving increases in TVA's debt ceiling--may not be available for many years. Historically, the Congress provided TVA sufficient borrowing authority to cover a 4- to 7-year period. When TVA's borrowing authority was increased to \$30 billion in 1979, the increase was based primarily on a nuclear construction program that included the 14 nuclear generating units.

Now that the construction program has been reduced, TVA appears to have sufficient borrowing authority until about the year 2000. Therefore, the oversight opportunity the Congress historically had every 4 to 7 years is not available. If the Congress wants to maintain this option for periodic oversight of TVA's power program, the borrowing authority should be reduced to a level where periodic oversight can occur. (See p. 32.)

INTERNAL AUDIT AND EVALUATION ACTIVITIES

In 1981 GAO was asked to examine the adequacy of TVA's internal audit and evaluation activities and whether they are a viable option to a statutory Inspector General. GAO found that recent TVA actions have satisfactorily implemented prior GAO recommendations to increase the internal audit group's independence and visibility within the agency and to expand the scope and types of internal audits to be conducted. However, it will be some time before the effectiveness of these organizational and procedural changes can be measured and assessed in quantitative and qualitative terms. It will be important to monitor and assess the effectiveness of these actions.

While TVA's internal audit activity does not have the inherent power, authority, independence, and external reporting requirements vested in a statutory Inspector General, TVA believes that its approach to internal audit and evaluation is appropriate for its operations. (See p. 43.)

MANAGEMENT SUPPORT ACTIVITIES

During the 3-year period, GAO reported on various aspects of TVA's management support activities, including the agency's control and protection of its inventories and equipment, the acquisition and management of its automatic data processing equipment, and certain aspects of its personnel and administrative management practices. TVA has taken actions along the lines of GAO's recommendations except for one problem of equipment protection and an area of construction management where final action has not been taken.

TVA has developed and issued procedures and guidelines to improve its control and protection of tagged equipment and materials located at construction sites, power sites, and other locations along the lines recommended by GAO. However, there appear to be implementation problems. During a recent inventory, TVA could not locate about 41 percent of the tagged equipment and materials. GAO recommends that the TVA Board of Directors ensure that procedures and controls for protecting tagged equipment are consistently followed to bring the situation under management control.

GAO also reported that TVA needed to develop a single, agencywide procedure to determine whether projects should be constructed in-house or by private contractor. Each of TVA's three offices responsible for design and construction work had developed separate procedures and guidelines to be used. A working group combined the three offices' separate policies and procedures into a single, agencywide policy document. However, this policy document has not been formally adopted. GAO recommends that the Board of Directors complete its review of agencywide procedures and guidelines for determining who will build projects so that agency standards will be available. (See p. 53.)

POWER RESEARCH, DEVELOPMENT,
AND DEMONSTRATION

Administration cutbacks in funding research, development, and demonstration projects have affected TVA programs to demonstrate the commercial feasibility of several emerging energy-related technologies, including an atmospheric fluidized-bed combustion process. This process would permit burning high-sulphur coal in an environmentally acceptable manner without the need for expensive pollution control devices required for conventional coal-fired steam plants.

When Federal funds for the fluidized-bed process were eliminated, TVA sought other sources of financing. It signed an agreement with Duke Power Company, the Electric Power Research Institute, and the State of Kentucky for \$100 million to support a jointly designed and built demonstration plant and is actively seeking other sources of funds for the \$200 million project. (See p. 76.)

AGENCY COMMENTS

TVA was provided a draft of the report for comment. TVA provided technical comments on the draft which were incorporated as appropriate. Overall, TVA believes the report accurately represents TVA's views on the subjects GAO examined. (See p. 99.)



C o n t e n t s

		<u>Page</u>
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	Objectives, scope, and methodology	4
2	POWER PROGRAM ACTIVITIES	6
	Demand forecast changes and their impact	8
	Nuclear program status	12
	Sale of surplus electricity	15
	Energy conservation	16
	Conclusions	18
3	ACQUISITION OF COAL AND NUCLEAR FUEL	20
	Coal procurement practices	21
	Procurement strategies	22
	Quality assurance measures	24
	Inventory management practices	24
	Clean air compliance status	26
	Acquisition of nuclear fuel	27
	Conclusions	30
4	OVERSIGHT OF TVA OPERATIONS	32
	Degree of oversight and control currently exercised	32
	Options for improving oversight	33
	Agency views on oversight and accountability	35
	Schedule regular oversight hearings	36
	Expand OMB's role in review of power program budget	36
	Have FERC review power rates	37
	Publish records of major rate and resource development decisions	37
	Develop a strategic plan	37
	Provide additional statutory policy guidance	38
	Reduce the agency's bond ceiling	38
	Bond ceiling should be reduced to maintain periodic oversight	39
	Conclusions	41
	Matter for consideration by the Congress	42
5	INTERNAL AUDIT AND EVALUATION ACTIVITIES	43
	Improvements in internal audit activities	44

		<u>Page</u>
	TVA's audit and evaluation arrangements differ from those of the statutory Inspectors General	47
	Authority and functions of an IG office	47
	Authority and functions of TVA's Office of Audit and Evaluation and Audit Review Group	48
	Agency views on IG issue	51
	Conclusions	52
6	MANAGEMENT SUPPORT ACTIVITIES	53
	Management and control of materials and equipment	53
	Improvements in power stores operations	54
	Security control improvements still needed at construction and powerplant sites	56
	Acquisition and management of automatic data processing resources	62
	Personnel and administrative matters	65
	Cost impacts of reorganizations	65
	Use of in-house employees for design and construction projects	66
	Planned use of retention agreements rescinded	68
	Conclusions	74
	Recommendations	75
7	POWER RESEARCH, DEVELOPMENT, AND DEMONSTRATION	76
	Use of power program revenues for R&D activities	76
	Redirection of effort on demonstration projects	78
	Atmospheric fluidized-bed combustion	81
	Coal gasification	83
	Conclusions	84
APPENDIX		
I	GAO reports/testimony cited in each report chapter	85
II	TVA financial statements for the fiscal years ended September 30, 1980, 1981, and 1982	87
III	Letter dated March 25, 1983, from the Chairman of the Board of Directors, Tennessee Valley Authority	99

ABBREVIATIONS

ADP	Automatic Data Processing
AFBC	Atmospheric Fluidized-Bed Combustion
DOE	Department of Energy
ENCA	Ewing-Northern Coal Association
EPRI	Electric Power Research Institute
FERC	Federal Energy Regulatory Commission
FFB	Federal Financing Bank
GAO	General Accounting Office
GPU	General Public Utilities
IG	Inspector General
kWh	Kilowatt-hour
MW	Megawatt
OMB	Office of Management and Budget
RD&D	Research Development and Demonstration
RIF	Reduction in Force
SCOAP	Small Coal Operator Assistance Program
SFC	Synthetic Fuels Corporation
TVA	Tennessee Valley Authority

CHAPTER 1

INTRODUCTION

Congress created the Tennessee Valley Authority (TVA) in 1933 as an independent corporate agency of the Federal Government for the purpose of developing the Tennessee River system and other natural resources of the Tennessee Valley and adjoining areas. The agency is headed by a three-member Board of Directors appointed by the President and confirmed by the Senate. The day-to-day affairs of the agency are administered by a General Manager who reports to the Board of Directors.

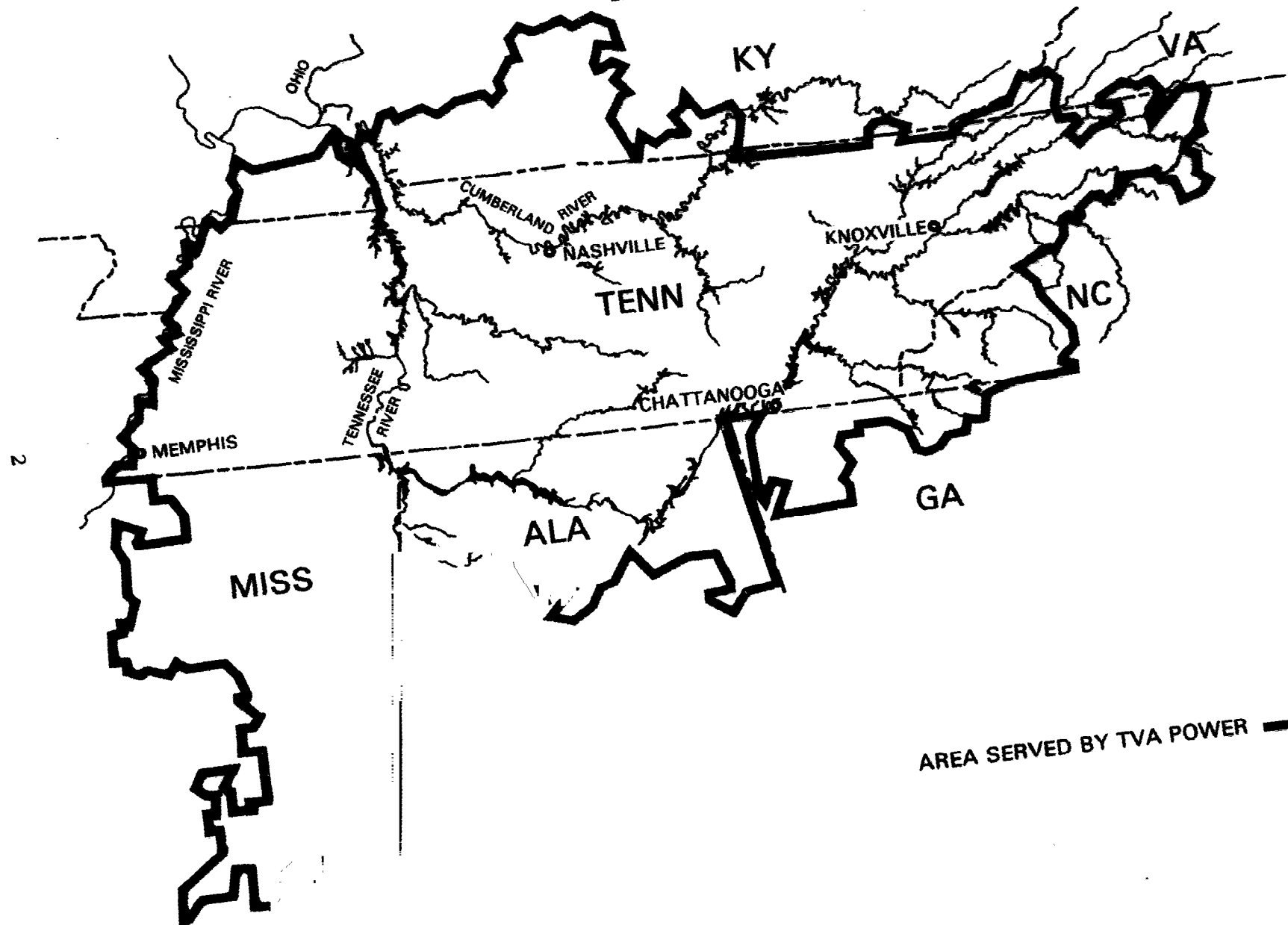
The agency is charged with the responsibility for developing the Tennessee River and for providing an adequate supply of electrical power to the Tennessee Valley region at the lowest feasible cost; for conducting chemical research and introducing experimental fertilizers useful in agriculture; and for the comprehensive resource development and economic growth of the region which includes parts of Tennessee, Kentucky, Virginia, North Carolina, Georgia, Alabama, and Mississippi as depicted by the map on the next page. TVA's power program is the largest in the Nation and ultimately serves nearly 7 million residents as well as a number of commercial and industrial customers and several Federal agencies.

Provisions of the Government Corporation Control Act, which was recently recodified under Title 31 U.S.C. 9105, 9106, require us to audit the financial transactions of such wholly owned Government corporations as TVA. In addition, we are required by the TVA Act (16 U.S.C. 831h) to audit the agency's financial transactions not less frequently than once each fiscal year. Pursuant to these statutory requirements, we made independent examinations of TVA's financial statements and issued reports to the Congress on the results of our work for each fiscal year beginning in 1933 through 1959.

Since 1959, as authorized by an amendment to the TVA Act, the agency retained the services of a national firm of certified public accountants to examine and issue opinions on its financial statements. Our reports on TVA's financial statements for fiscal years 1960 through 1976 were therefore based on our observations and tests of the audits performed by the certified public accounting firm rather than our own independent audits of the agency's financial statements. Throughout this period, we consistently found good accounting and sound financial control practices by TVA. We also found the scope and quality of the audits conducted by the independent certified public accountants to be satisfactory.

For these reasons and to make the best use of our limited resources, we have since concentrated our audit work primarily

TENNESSEE VALLEY AUTHORITY
SERVICE AREA



AREA SERVED BY TVA POWER —

on programmatic aspects of selected TVA activities and operations. In fiscal years 1977 through 1979, we issued a number of reports on various TVA activities and programs, and the results of these audits, along with TVA's corrective actions, were summarized in our first triennial assessment report¹ issued to the Congress in August 1980.

This report contains the results of our second triennial assessment of TVA. It addresses the work that we did at TVA during fiscal years 1980 through 1982 and highlights some of the major events that occurred during this period which materially affected TVA's operations but were not specifically addressed in our prior review work. This report also discusses the progress that TVA has made to implement our recommendations during this period and identifies some additional improvements that we believe are needed in certain aspects of the agency's operations and activities as well as some actions that we believe the Congress needs to consider.

The past 3 fiscal years have been a particularly critical period for TVA because the agency was confronted with a rapid escalation in nuclear plant construction costs, record-high interest rates for funds necessary to finance its power construction program, and significant increases in fuel expenses. These factors have required TVA to increase average wholesale electric rates by about 43 percent during this period. Concurrent with these significant capital, operating, and rate increases, the agency has had to deal with a continuous decline in the projected demand for electricity which has resulted in an excess generating capacity. These matters have required the constant attention of TVA management officials to meet the congressional mandate of providing an adequate supply of electrical power to the Tennessee Valley region at the lowest feasible cost. The conditions discussed above, along with other factors, resulted in one of the most difficult decisions in TVA's history--a major reduction in the agency's nuclear powerplant construction program.

As a result of the above factors and decisions, the Congress has requested that we examine various aspects of such TVA operations as the deferment of nuclear powerplants, demand forecasting, nuclear fuel sales and leaseback arrangement, and the acquisition of automatic data processing equipment. We have also made a number of self-initiated reviews of such matters as TVA's multimillion-dollar coal procurement program; its power

¹"Triennial Assessment of the Tennessee Valley Authority-- Fiscal Years 1977-1979" (EMD-80-91, Aug. 13, 1980).

stores inventory procedures and practices; and its control over and protection of equipment, tools, and materials located at various construction and powerplant sites. In addition, we testified before several congressional committees and briefed a number of committee staff members on various aspects of TVA activities and operations.

A number of our reports contained specific recommendations to the TVA Board of Directors as well as matters for consideration by the Congress. We also issued reports that did not contain recommendations but provided specific information and data requested by a congressional committee or an individual Member of Congress. We have included in each chapter a brief synopsis of the findings, observations, and/or recommendations contained in each of these reports. For more detailed information about any specific subject matter, the individual reports and/or testimony cited in each chapter should be consulted. Appendix I contains a consolidated listing of the reports issued and testimony provided.

OBJECTIVES, SCOPE, AND METHODOLOGY

The primary objective of this review was to determine the current status of those TVA operations and activities on which we had reported in fiscal years 1980 through 1982 and to identify and assess the adequacy of the actions, if any, TVA took in response to our recommendations. Also, we updated pertinent information in some of our prior reports that did not contain recommendations. In addition, we considered major events that affected TVA operations over the past 3 fiscal years which were not specifically addressed in our prior review work. One of these areas, for example, concerns TVA's reduced effort on energy demonstration projects.

We did not make an independent audit of TVA's financial statements; however, we did examine some of the major changes in TVA's financial and accounting policies, procedures, and practices and made a limited assessment of the actual and/or potential impact of these changes on TVA operations. TVA's financial statements for fiscal years 1980, 1981, and 1982 and the certifications of the independent certified public accountant are included in appendix II.

In accomplishing our objectives, we discussed each of our prior recommendations with TVA officials to determine what actions had been taken and/or planned by the agency. We then reviewed the documentation provided by these officials in support of their comments and, as deemed appropriate, examined other reports, documents, and records to further assure ourselves that the actions taken and/or planned satisfied the basic

intent of our recommendations. In addition to our followup work on specific recommendations, we updated certain information in our prior reports that did not contain recommendations through discussions with knowledgeable TVA program officials and examinations of various records containing information on the current status and changes in the particular operation or activity since our prior review work. For each of the areas covered, we also considered the work accomplished and/or planned by TVA's internal audit activity.

To identify the major events that significantly affected TVA's operations since our last triennial assessment, we examined various sources of information, including congressional budget submissions and hearings, the agency's financial statements, and internal agency records and documents. We identified the most significant changes in TVA's financial and accounting policies, practices, and procedures by reviewing various agency financial documents and records as well as correspondence and reports submitted to the agency by its independent certified public accountant. We made a limited assessment of the actual and/or potential impact of these events and changes and discussed various aspects of these matters with TVA management officials, including the Board of Directors, the General Manager, and the agency's certified public accountant.

We accomplished our work in accordance with generally accepted government auditing standards.

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TVA was provided a draft report for comment. TVA provided us technical comments on the draft report which were incorporated as appropriate. Overall, TVA believes the report accurately represents its views on the subjects.

CHAPTER 2

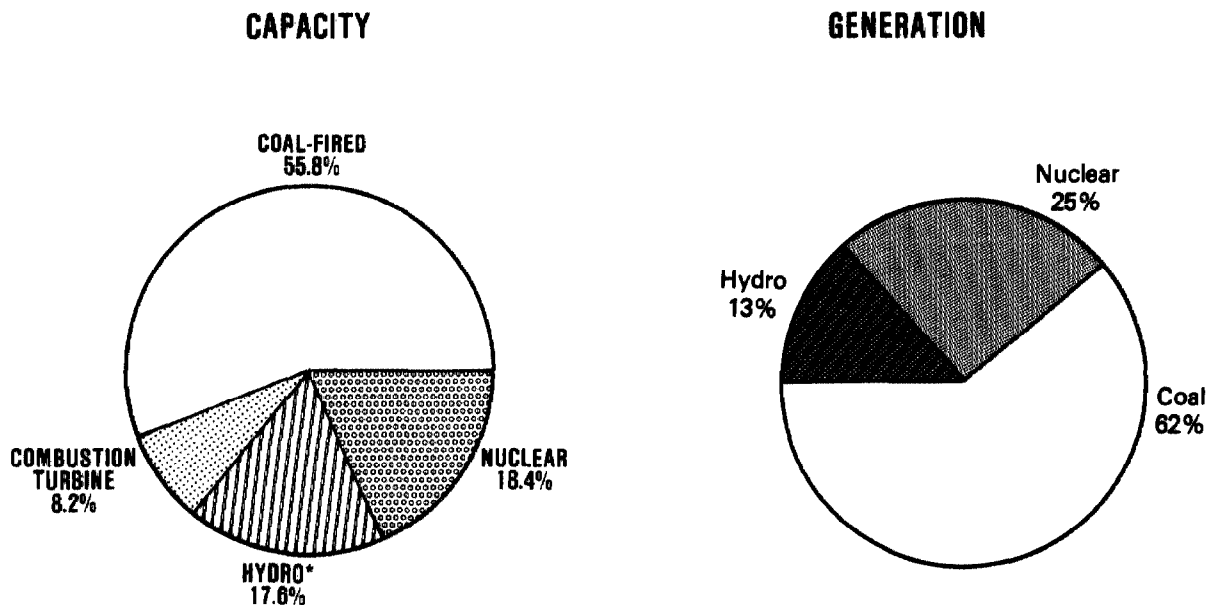
POWER PROGRAM ACTIVITIES

From its beginning in 1933, TVA has become the largest electric power system in the United States. TVA was created as a wholly owned Government corporation with the authority necessary to develop the resources of the Tennessee Valley, including the generation of electric power from flood control and navigation projects. World War II, however, brought a tremendous increase in defense-related electricity requirements, and TVA's capacity for hydroelectric generation was virtually exhausted. Peacetime needs for electricity grew beyond wartime levels, and TVA's need for more generating capacity became imperative. Because the potential for further hydroelectric development was relatively small, TVA turned to steam generation.

During the 1960's the demand for electricity continued to rise. In 1967, TVA began constructing the world's largest thermal nuclear plant--Browns Ferry located in northern Alabama--with a generating capacity of nearly 3,500 megawatts (MW) of electricity. By mid-1978, 14 additional nuclear units were either under construction or planned to help meet the region's projected power demands. As of September 30, 1982, most of TVA's generating capacity was made up of hydropower, coal, and nuclear facilities. Figure 1 shows the makeup of TVA's generation capacity and the percent of generation from these sources during fiscal year 1982.

Figure 1

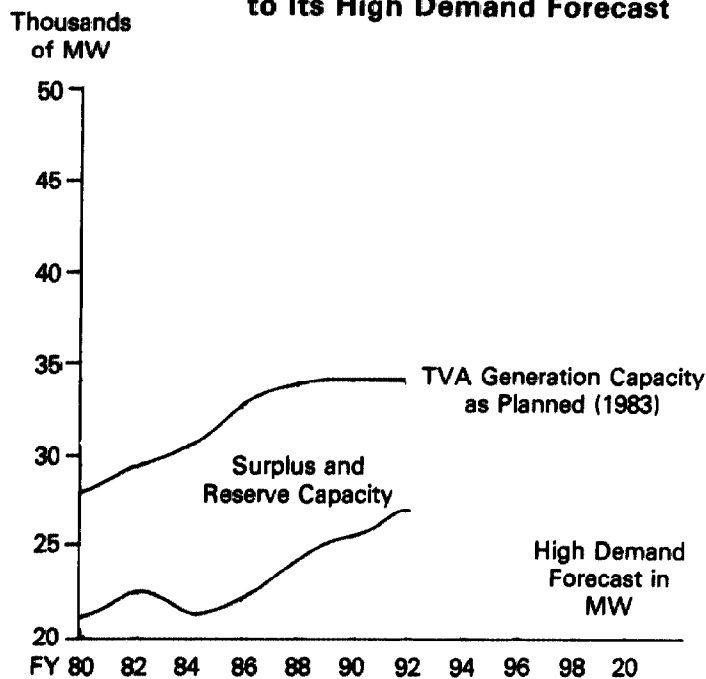
TVA Generation Capacity and Actual Generation for Fiscal Year 1982



* INCLUDES PUMPED STORAGE AND POWER FROM THE CORPS OF ENGINEERS AND ALUMINUM COMPANY OF AMERICA

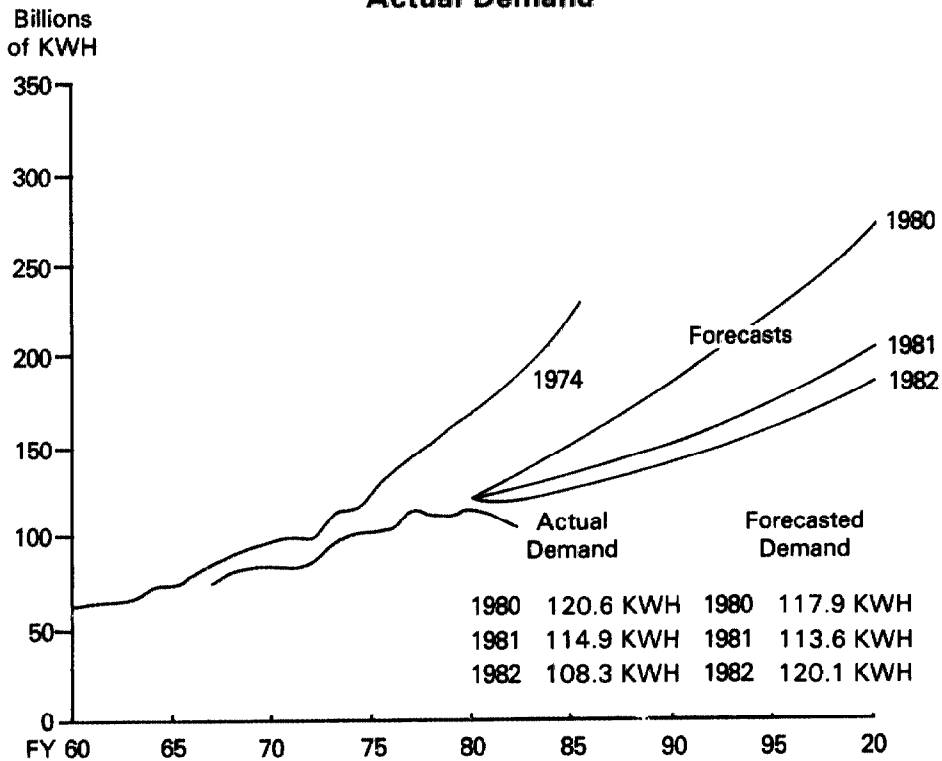
TVA's commitment to build nuclear plants was made in the late 1960's and early 1970's when power sales were growing at a steady rate. Following the oil embargo in the early 1970's, however, the economics of the electric power industry changed. Fuel and interest costs rose; the time required to build a nuclear plant increased; consumers reacted to higher electricity prices through conservation and new energy technologies; and slower load growth brought on the prospect of surplus generating capacity. TVA's current and projected surplus and reserve capacities through 1996 are shown in figure 2.

Figure 2
TVA Generating Capacity Compared
to Its High Demand Forecast



The mechanism used to make predictions of future electrical usage is a demand forecast. This process, while not an exact science, is one of the most important projections TVA prepares because it serves as the basis for deciding how much more electricity will have to be developed to meet future customer demands. For example, in the late 1960's and early 1970's, TVA was experiencing an annual growth rate of about 8 percent in the demand for electricity, and TVA's forecasts through the mid-1970's were showing continued high growth in demand. Because of these projections and the need to begin plans to meet them, TVA initiated a program to build 17 nuclear power units. The nuclear option was selected to meet the demand because studies then showed that nuclear power was the most economical approach. But projected demand never occurred. In fact, as figure 3 shows, TVA has experienced an actual decline in demand over the past few years.

Figure 3
TVA Forecasts Compared to
Actual Demand



As a result of the previous demand forecasts not materializing as anticipated, TVA has had to make several adjustments in its nuclear plant construction program. The Congress on several occasions requested that we review TVA's demand forecasts and the status of its construction program.

DEMAND FORECAST CHANGES
AND THEIR IMPACT

In November 1978, we reported¹ the results of our first in-depth assessment of TVA's demand forecasting activities. We reviewed the process that TVA used to prepare its 1977 demand forecast and found a number of weaknesses. At that time, for example, TVA was preparing a single forecast based largely on a combination of trends and historical data, and some of the data used was incomplete and inadequate. We also pointed out the uncertainty that existed regarding the values of such parameters

¹"Electric Energy Options Hold Great Promise for the Tennessee Valley Authority" (EMD-78-91, Nov. 29, 1978).

as the price elasticity of demand for electricity² as well as rates of change of key variables. We therefore recommended that TVA collect detailed data on the users and uses of electricity in its service area, prepare several demand forecasts rather than relying on a single forecast, and do more research in such areas as the price elasticity of demand as well as other critical parameters that needed to be considered in the forecasting process.

As part of our last triennial assessment, we followed up on the actions that TVA had taken pursuant to the above recommendations and found that the agency had made a number of improvements. We reported³ that TVA's Office of Power was preparing long-range detailed forecasts to the year 2000 and in less detail to the year 2020. We also observed that the Office of Power was preparing several forecasts rather than a single forecast and that these forecasts considered a range of electricity prices, economic growth possibilities, potential new technologies, energy conservation efforts, Department of Energy (DOE) loads, and trends toward substitution of electricity for scarce fossil fuels.

While the multiple forecasts were a considerable improvement over the earlier single forecast, we pointed out that TVA's methodology at that time did not allow simultaneous analysis of a combination of the above factors. We suggested that such a capability would help TVA to determine where best to apply its resources--whether to spend more money on conservation measures or on new capacity. We also observed that TVA had begun to improve its data base on the use and users of electricity in its service area. The agency, for example, was conducting or planned to conduct surveys of its residential and commercial/industrial customers to obtain better information on who was using electricity and how it was being used. In view of the actions that TVA had already taken or was in the process of taking, we did not make any specific recommendations relative to demand forecasting in our last triennial report.

Shortly after our triennial report was issued, Senator Jim Sasser requested that we evaluate several aspects of TVA's

²As the price of electricity increases, consumers will generally tend to use less, which, in economics, demonstrates the concept of price elasticity of demand. Specifically, the price elasticity of demand for electricity measures the percentage change in electricity consumption relative to a percentage in electricity price. For example, an elasticity coefficient of 0.5 would indicate that a 1 percent change in price would lead to a 0.5 percent decrease in consumption.

³"Triennial Assessment of the Tennessee Valley Authority--Fiscal Years 1977-1979" (EMD-80-91, Aug. 13, 1980).

latest demand forecast. He specifically requested that we address the improvements that had been made, additional improvements warranted, and several related issues. In response to this request, we testified⁴ in December 1980, before the Senate Committee on Appropriations, that TVA had improved its methodology and approach used in demand forecasting over the past several years. We cited several examples of improvements, including

- TVA's revised methodology process, consideration of more end-use data, and preparation of three separate demand forecasts--low, medium, and high--rather than relying on a single trend forecast;
- the agency's incorporation of the results of its residential customer survey on uses and users of electricity and its plans to perform a commercial and industrial end-use survey;
- TVA's application of risk assessments⁵ to alternative levels of factors such as economic growth, the price of electricity, price of substitutes, conservation programs, and DOE's demand for electricity to enrich uranium; and
- the agency's preparation of a low, medium, and high forecast for each of the above factors, with the exception of the DOE demand for which two alternative levels were projected.

While the above actions represented significant improvements, we advised the committee that we did have some concerns about several of TVA's assumptions related to the five major factors used and the impact of these assumptions on the final forecast. We pointed out, for example, that the economic growth that TVA had used in its forecast appeared to be higher than warranted, which inflated its projection. We also raised questions about the agency's estimates of price elasticity of demand for electricity and pointed out that a high degree of uncertainty was associated with the agency's assumptions relative to this important factor, which could also inflate its forecast. In addition, we pointed out that TVA's estimate of the DOE demand for electricity was higher than warranted because of the uncertainty associated with commercial nuclear powerplant

⁴Statement of J. Dexter Peach, Director, Energy and Minerals Division, before the Committee on Appropriations, U.S. Senate, December 11, 1980.

⁵Assigning alternative levels to the variables based on their expected chances of happening.

completions and operations and the reduction in industry's need for enriched uranium. This higher estimate for DOE also tended to inflate TVA's demand forecast. We also advised the committee that TVA, after its 1979 and 1980 forecasts, deferred the completion of its Hartsville B units 1 and 2, Phipps Bend unit 2, and Yellow Creek unit 2 to more closely align its construction program with the lower demand.

In March 1981, we testified about several aspects of TVA's power operations, including demand forecasting, before the Senate Committee on Environment and Public Works.⁶ Since our December 1980 testimony, we advised the committee that TVA had eliminated the medium-range forecast and that the agency was using only the range between its low and high forecast for planning purposes. We pointed out that TVA had eliminated the medium-range forecast and that the agency was using only the range between its low and high forecast for planning purposes. We further pointed out that TVA was basing its nuclear construction program on the high forecast and that we still had reservations about some of TVA's assumptions on the factors that influence demand growth. We reiterated our concerns, for example, about TVA's optimistic assumptions on the regions' economic growth rate and the probability that TVA had understated electricity price increase and elasticity of demand in its latest demand forecast. Based on the analysis that we made at that time, we concluded that TVA should not cancel any units but that the agency certainly needed to reassess the potential risks and benefits of deferring the completion date of two more units in addition to the four that had already been deferred.

Subsequent to our testimony, TVA decided in August 1981 to defer completion of the Phipps Bend unit 1, and in March 1982, it decided to defer the completion of Hartsville A units 1 and 2 and the Yellow Creek unit 1 because of further declines in its forecasted demand. At this time, the agency had deferred a total of 8 of its 17 planned nuclear units.

At the request of Senator John Stennis, we reviewed TVA's December 1981 demand forecast and the benefit-cost analysis that TVA used as a basis for deferring Yellow Creek unit 1. We reported⁷ the results of our analysis in July 1982 and advised Senator Stennis that we believed TVA did a credible job in preparing its December 1981 demand forecast. We also pointed out that we found TVA's methodology, assumptions, and data used

⁶Statement of J. Dexter Peach, Director, Energy and Minerals Division, before the Committee on Environment and Public Works, U.S. Senate, March 16, 1981.

⁷"TVA Is Justified in Deferring the Yellow Creek Unit 1 Nuclear Powerplant" (GAO/EMD-82-114, July 30, 1982).

in preparing the forecast to be reasonable and, coupled with the agency's benefit-cost analysis, served as a valid basis for deferring Yellow Creek Unit 1 and the Hartsville A units 1 and 2. TVA's subsequent reviews showed that four of the eight deferred units would not be needed; and in August 1982, the TVA Board of Directors approved the cancellation of the two Hartsville B units and the two Phipps Bend units.

As part of our triennial followup work, we examined selected aspects of TVA's 1982 and 1983 demand forecasts; however, we did not perform any detailed analyses of the agency's assumptions or the data used in preparing the forecasts. Table 1 contains a comparison of TVA's projected growth rates in the demand for electricity over the past 6 years, including the 1982 and 1983 forecasts.

Table 1
Schedule of TVA Demand Forecasts
Expressed in Billions of KWH Growth Percentage

<u>Forecast year</u>	<u>Demand - Year 1990</u>			<u>Demand - Year 2000</u>		
	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>High</u>	<u>Medium</u>	<u>Low</u>
1978 (note a)		4.2			2.7	
1979	4.7	3.6	2.4	3.5	2.1	0.6
1980	4.1	3.0	2.1	3.7	2.1	-0.3
1981	2.4	1.5	0.4	2.9	2.2	1.2
1982	2.2	1.3	0.4	2.7	1.9	0.2
1983	2.6	1.5	0.1	2.3	1.4	0.3

a/Only one forecast range was prepared for 1978.

The downward trend in these forecasts can be attributed to several factors; however, some of the more important ones include the improvements that TVA has made in its demand forecasting process, the greater use of and more effective conservation measures, and the general decline in demand for electricity.

NUCLEAR PROGRAM STATUS

At the present time, TVA's nuclear powerplant program consists of five units in an operational status, four units under construction, four units in a deferred status, and four canceled units, as shown in table 2.

Table 2

Program Status Data
As of September 30, 1982

<u>Plant</u>	<u>Schedule data</u>		<u>Cost data</u>					
	<u>Original projection</u>	<u>Current projection</u>	<u>Original estimate</u>	<u>Cost to date</u>	<u>Estimate to complete</u>		<u>Estimated total cost</u>	
					<u>Conservative</u>	<u>Probable</u>	<u>Conservative</u>	<u>Probable</u>
----- (millions) -----								
Brown's Ferry								
Unit 1	1970	a/1974						
Unit 2	1971	a/1975	\$ 392	\$ 909	-	-	\$ 909	\$ 909
Unit 3	1972	a/1977						
Sequoyah								
Unit 1	1973	a/1981	336	1,654	\$ 117	\$ 117	1,771	1,771
Unit 2	1974	a/1982						
Watts Bar								
Unit 1	1976	1984	500	1,904	1,526	1,286	3,430	3,190
Unit 2	1977	1985						
Bellefonte								
Unit 1	1977	1987	650	2,064	2,411	1,961	4,475	4,025
Unit 2	1978	1988						
Hartsville A								
Unit 1	1979	(b)	640	1,502	(c)	(c)	(c)	(c)
Unit 2	1980	(b)						
Hartsville B								
Unit 1	1979	(d)	785	726	-	-	-	-
Unit 2	1980	(d)						
Phipps Bend								
Unit 1	1982	(d)	1,600	997	-	-	-	-
Unit 2	1983	(d)						
Yellow Creek								
Unit 1	1983	(b)	1,900	1,113	(c)	(c)	(c)	(c)
Unit 2	1984	(b)						

a/Actual completion date.

b/Units in a deferred status.

c/Estimates will depend upon when and if construction is restarted on these units.

d/Units canceled.

When TVA decided to cancel the four units in August 1982, the agency had already invested \$1.7 billion in construction costs and estimated that termination costs would add an additional \$212 million for a total cost of \$1.9 billion associated with these units. TVA reduced the \$1.9 billion by \$400 million already expended in fiscal year 1982 and determined that the remaining \$1.5 billion would be written off within 10 years of the date of cancellation. TVA decided to write off these costs within a 10-year period in order to defer rate increases that would have been necessary had the total cost been charged to current-year operating expenses. This approach is in accordance with generally accepted accounting principles established for regulated utilities. Following these guidelines, TVA elected to write off \$257 million of the \$1.5 billion in fiscal year 1982.

As of September 30, 1982, TVA had invested about \$2.6 billion in the four deferred nuclear units--\$1.1 billion in the two Yellow Creek units and \$1.5 billion in the two Hartsville A units. In late 1982, TVA estimated that \$155.7 million would be required to maintain the two Yellow Creek units in a deferred status for fiscal years 1983 through 1987; \$73.7 million of this amount is estimated contract payments. TVA's analysis also showed that deferment cost for the two Hartsville A units would amount to about \$130.7 million, including \$81.5 million in estimated contract payments for fiscal years 1983 and 1984. The analysis did not contain a projection of deferment cost for these two units beyond fiscal year 1984 because an assumption was made that construction would be restarted in April 1985. At the time we completed our review work, however, TVA had not established firm restart dates for either of the Hartsville units.

As part of its annual power planning process, TVA is reviewing various options for providing future capacity that the agency believes will be required by about 1994. The TVA Board of Directors told us that a restart of construction on one or more of the deferred nuclear units was only one of several alternatives that would be included in the analysis. They pointed out that other options included a new nuclear plant with updated technology or a new coal-fired plant; efficiency-related improvements in existing coal-fired plants; conservation; and load management programs. According to officials of TVA's Office of Power, their analysis will include an evaluation of the least-cost option to the ratepayer given the uncertainties in load growth, capacity costs, fuel costs, and potential environmental restrictions. At this time, TVA plans to complete its review by April 1983.

Office of Power officials provided us information showing that TVA's need for additional generating capacity by about 1994 was based on its 1983 high-range forecast. Based on the wide spreads between the 1983 forecasted high- and medium-range

growth rates, however, TVA's need for additional generating capacity would not materialize until well beyond 1994 if such projections were based on the medium-range forecast. As discussed in the previous section, TVA's 1983 high-range demand forecast showed an average annual growth rate of 2.6 percent to the year 1990 and a 2.3 percent growth rate between then and the year 2000. In contrast, the 1983 medium-range forecast showed comparable growth rates of 1.5 percent and 1.4 percent, respectively. The low-range forecast showed an even wider variance with comparable growth rates of 0.1 percent and 0.3 percent, respectively.

The point in time when TVA will need additional generating capacity becomes more uncertain when consideration is given to the actual growth rate in demand for electricity.

Table 3 shows TVA's actual growth rate since 1978.

Table 3

Actual Demand Growth Rate

<u>Fiscal year</u>	<u>Kilowatt hours sold</u> (millions)	<u>Annual growth percentage</u>
1978	113,418	-3.7
1979	113,438	0.0
1980	115,007	+1.4
1981	110,152	-4.2
1982	108,500	-1.5

The table shows that TVA has experienced a negative growth rate in actual demand during 3 of the past 5 fiscal years. This trend, when considered in conjunction with the wide variances in TVA's low, medium, and high demand forecasts, introduces even more uncertainty as to the time frame in which TVA will need additional generating capacity. For these reasons, it will be particularly important for TVA to consider such factors in making decisions on any of the options now being considered, including the restart of construction of one or more of its deferred nuclear units.

SALE OF SURPLUS ELECTRICITY

Because of TVA's excess generating capacity, Senator John Heinz and Congressman Robert Walker requested us to review the feasibility of a sale of TVA power to General Public Utilities (GPU) and to identify any problems that might be involved.

Based on the results of our review, we reported⁸ in September 1982 that any arrangement involving the sale of excess TVA power that could in turn be sold, appeared unlikely at that time. We pointed out that economics was the primary reason that such arrangements had not already been made and would probably not be made in the future unless TVA offered lower prices to GPU. Even if the TVA prices were competitive, we noted that several technical, legal, and institutional constraints would have to be resolved before such transactions could take place. We pointed out, for example, that the TVA Act currently precluded TVA from selling power to GPU. TVA would have to sell power to systems with which they had exchange arrangements in 1957, which would in turn have to sell the power to GPU.

ENERGY CONSERVATION

An option TVA has emphasized over the past few years for meeting demand and one they express strong interest in is conservation. The need for energy conservation became apparent in the 1970's when the costs for construction, fuel, and environmental compliance began to rapidly increase. Responding to this situation, TVA began to emphasize educating its customers on the merits of conservation. In 1977, TVA initiated its residential energy conservation financing program. Currently, programs are directed toward its residential, commercial, and industrial users. TVA views its conservation program as an important supply option to meet the demand for electricity in that conservation means reduced demand for new generating facilities and less need to operate expensive fuel oil-fired turbines or to purchase imported power during periods of peak usage. In its April 1982 program summary, for example, TVA estimated that its energy conservation and load management programs could save as much as \$7.8 billion in operating and construction costs by 1990.

TVA is currently carrying out a wide range of activities within its energy conservation, solar and renewable energy, and load management programs. The expenditures made during fiscal years 1981 and 1982, by program, and the level of projected expenditures for fiscal year 1983 are shown in table 4.

⁸"Analysis of the Feasibility of Tennessee Valley Authority Power Being Made Available Through Power Exchange Arrangements To General Public Utilities" (GAO/EMD-82-129, Sept. 30, 1982).

Table 4
Schedule of Actual and Estimated Costs
for TVA's Energy Conservation Program

<u>Program description</u>	<u>Actual</u>		<u>Projected</u>
	<u>Fiscal</u> <u>year 1981</u>	<u>Fiscal</u> <u>year 1982</u>	<u>Fiscal</u> <u>year 1983</u>
----- (in millions) -----			
<u>Conservation and energy management:</u>			
Home insulation program	\$13.1	\$14.9	\$12.8
Heat pump financing program	2.7	2.7	3.2
Low-income initiatives	-	-	-
Energy saver home program	-	1.0	1.5
Commercial and industrial conservation and energy management program	8.3	6.1	7.5
<u>Solar applications:</u>			
Residential solar water heating program	2.4	1.2	1.6
Wood heater program	.8	.9	.9
<u>Load management:</u>			
Air-conditioning cycling program	4.3	1.8	3.7
Water heating cycling program	.8	2.4	4.2
Thermal storage field test	.3	.1	-
Room unit thermal storage demonstration	-	.2	.1
Energy use display meter field test	.1	.1	.1
Programmable thermostat field test	-	-	-
Commercial and industrial heat and cool storage demonstration	.1	.6	.3
Other (note a)	<u>16.1</u>	<u>17.7</u>	<u>23.0</u>
(note b)			
Total	<u>\$49.0</u>	<u>\$49.7</u>	<u>\$58.9</u>
<u>Interest applicable to conservation program</u>			
loans	<u>\$13.6</u>	<u>\$23.3</u>	<u>\$27.2</u>
Total	<u>\$62.6</u>	<u>\$73.0</u>	<u>\$86.1</u>

a/Includes costs for the solar homes for the valley and solar modular homes projects, solar projects in TVA facilities, commercial and industrial solar water heating, commercial and industrial passive solar buildings program, commercial and industrial biomass program, and various administrative and general program costs.

b/Does not include \$130,000 for water heater cycling incentives.

In our 1980 triennial report,⁹ we commented on several aspects of TVA's work in these areas, including the status of the agency's efforts to install water heater control devices as a part of its load management program. To take full advantage of the potential benefits of water heater controls, we recommended that TVA implement a 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 to be operated off peak where feasible.

As part of our followup work, we observed that TVA had installed over 13,000 water heater control devices as of September 30, 1982, and had established a goal to install 30,000 additional devices during fiscal year 1983. TVA is still in the process of implementing the latter two recommendations, but the agency has not decided on the type or specific incentives to be used. Further, agency officials told us that their initial efforts in these areas would be implemented on a demonstration basis rather than throughout the agency's service region. The results achieved under the demonstration project will then be used to evaluate the merits of expanding the program.

Through these types of programs, TVA has established a goal of reducing the peak power demand by about 4,000 megawatts by 1990. At the present time, TVA has been able to reduce peak demand by about 600 megawatts through its residential programs and by about 200 megawatts through its commercial and industrial programs. The TVA Board of Directors is committed to conservation and has directed that this effort be incorporated into TVA's power planning system. The Board told us that these activities had been institutionalized within TVA and that they planned to continue to emphasize the effort because of the significant benefits to both TVA and the ratepayers.

CONCLUSIONS

Since our last triennial assessment, TVA has improved its demand forecasting process through adopting a number of our suggestions as well as independently incorporating other improvements. TVA has also emphasized the importance of its energy conservation, solar and renewable energy, and load management programs as important alternatives to constructing new generating capacity and is projecting a direct cost avoidance of \$7.8 billion in power operating and construction costs by 1990. TVA

⁹"Triennial Assessment of the Tennessee Valley Authority--Fiscal Years 1977-1979" (EMD-80-91, Aug. 13, 1980).

plans to continue to refine its demand forecasting process and to carry out conservation-related programs because of the significant benefits to both the agency and the ratepayer.

As part of its annual power planning process, TVA is currently evaluating various options, including the restart of construction on one or more of the deferred nuclear units, for meeting the potential need for additional generating capacity by 1994. This time frame was established, however, based on the agency's 1983 high-range forecast. When TVA's more conservative medium-range forecast, coupled with such other factors as the actual demand rate for electricity over the past several years, is considered, the agency's requirement for additional generating capacity may not materialize until well beyond TVA's tentative projection of 1994. This situation also introduces a considerable degree of uncertainty about the future status of the four deferred nuclear units.

CHAPTER 3

ACQUISITION OF COAL AND NUCLEAR FUEL

TVA is one of the largest coal-buying power producers in the Nation; and if its nuclear construction program had fully materialized, it would have been the Nation's largest producer of nuclear power. In a power program of this magnitude, acquiring and managing fuel becomes a key factor in producing power at the lowest feasible cost and, at the same time, minimizing adverse effects on the environment. The cost of fuel to operate the agency's coal-fired steam plants and nuclear power units, for example, constituted 72 percent of its total power program generating costs for fiscal years 1980 through 1982.

Over the past 3 fiscal years the cost of coal averaged about 79 percent of the total operating cost of TVA's coal-fired steam plants, and the cost of nuclear fuel averaged about 35 percent of the nuclear powerplant operating cost. Table 5 illustrates the cost of fuel in relation to total plant operating cost.

Table 5

Relative Cost of Coal and Nuclear Fuel

<u>Year</u>	<u>Coal-fired plants</u>			<u>Nuclear powerplants</u>		
	<u>Total operating cost</u>	<u>Cost of coal</u>	<u>Percent</u>	<u>Total operating cost</u>	<u>Cost of nuclear fuel</u>	<u>Percent</u>
----- (in millions) -----						
1980	\$1,558	\$1,237	79	\$154	\$57	37
1981	1,685	1,360	81	240	83	35
1982	<u>1,548</u>	<u>1,208</u>	78	<u>330</u>	<u>112</u>	34
	<u>\$4,791</u>	<u>\$3,805</u>	79	<u>\$724</u>	<u>\$252</u>	35

Because of the importance of these fuels, TVA has a separate Division within the Office of Power to plan for an adequate and economical supply of fuel for the agency's thermal electrical generating units and to implement these plans. Acquiring and managing coal is an extremely complicated process because of variations in the actual demand and load forecast, commercial operation of nuclear plants, and the shift of coal plants from base-load to swing-load operation. Further, the quality of coal burned at TVA's steam plants is now controlled, and this reduces the flexibility to transfer coal shipments on a systemwide basis. TVA's planning for and acquisition of nuclear fuel is also a complicated process which has recently been even further

complicated because of reduced energy demand resulting in an excess inventory. As a result, TVA is having to adjust its nuclear fuel program to the extent feasible.

Because of the importance of acquiring and managing fuel, we reviewed several aspects of TVA's procurement policies, procedures, and practices during the past 3 fiscal years, including an in-depth review of TVA's coal procurement practices, its nuclear fuel sale and leaseback arrangement, and the cost of bringing TVA's coal-fired steam plants into compliance with clean air standards.

COAL PROCUREMENT PRACTICES

In our 1981 report¹ on TVA's coal procurement practices, we pointed out that the agency's coal-purchasing program could be managed more effectively. Our findings were, in essence, that:

- TVA had, over the past 10 years, purchased most of its coal during the two least-favorable periods for buying coal and that the long-term contracts which TVA had entered into did not allow the agency to take advantage of decreases in market prices which usually follow periods of high demand.
- The agency could have saved between \$31 and \$36 million annually at its Shawnee Steam Plant by purchasing western rather than eastern coal.
- TVA had encountered a number of problems in developing its Breckinridge coal reserve and, for this reason, needed to proceed cautiously in developing additional reserves.
- The agency was using an outdated 1957 price adjustment formula to compensate for coal of a lower quality than contracted for and it had not revised the formula even though it recognized as early as 1975 that its formula was outdated.
- Coal inventories at nine TVA steam plants were about 5.9 million tons over target inventories.

Based on the results of our review work, we made several recommendations designed to bring about improvements in TVA's coal purchasing practices. In commenting on our report, TVA strongly disagreed with most of our observations. However, we observed that TVA has now either taken action or is in the process of implementing the general intent of each of our

¹"TVA's Coal Procurement Practices--More Effective Management Needed" (EMD-81-65, Aug. 14, 1981).

recommendations. For discussion purposes in this report, we grouped our prior recommendations into three categories-- procurement strategies, quality assurance measures, and inventory management practices. The recommendations, along with the actions taken and/or currently planned by TVA, are discussed below under each of these groupings.

Procurement strategies

To improve the agency's overall coal procurement strategies, we recommended that TVA

- revise its coal purchasing practices and implement a better program of forward planning to minimize the award of contracts during periods when coal demand is high and to limit the duration of contracts that must be awarded during these periods;
- renegotiate at the earliest opportunity long-term contracts with reopeners entered into during unfavorable conditions and/or cancel those contracts where better prices could be renegotiated;
- revise its coal procurement procedures to make greater use of spot purchases² at all steam plants and to satisfy a specific percentage of forecasted coal requirements through spot purchases;
- work for the success of the Small Coal Operator Assistance Program (SCOAP)³ by establishing all set-asides possible;
- consider all responsive offers from coal suppliers, regardless of geographic location, giving the economics of the source primary consideration in accepting or rejecting an offer; and
- exercise caution in proceeding with development of its Ewing-Northern Coal Association (ENCA) reserves, particularly in regard to the economic feasibility of producing the desired quality and quantity of coal.

TVA has made several improvements in its coal supply planning process since our report was issued. Some of the more significant improvements include (1) refinement of its techniques for forecasting supply requirements for each plant, (2) reinstatement of the biweekly supply planning meetings which

²The award of short-term contracts having a maximum delivery term of 25 weeks.

³A program under which small, independent coal operators are eligible for set-aside purchases as well as technical assistance.

include representatives from various functional offices associated with power operations, and (3) formulation of a group to study and develop a general procurement plan that will include approaches that can be used to avoid contract awards during high-cost periods.

Most of TVA's coal purchase contracts contain clauses which allow for periodic renegotiation of contract terms. Under these clauses, TVA has renegotiated 14 of 17 long-term coal contracts and one transportation contract which have come up for renegotiation since our report was issued. These renegotiations have resulted in total savings of \$178.5 million through reduced coal and transportation prices. TVA has also terminated two contracts at a net cost avoidance of about \$84 million, and it plans to allow one other contract to expire at a savings of \$497.9 million. TVA officials advised that they planned to continue monitoring the status of all active coal contracts to determine if further savings and/or cost avoidances could be achieved.

In our followup work, TVA advised us that it agreed with the intent of our recommendation on spot coal purchases but that two factors had delayed its implementation of our suggestion. First, TVA pointed out that it had agreed under the clean air settlement to contract for 80 percent of its coal requirements for a 3-year period and that this commitment had not yet been satisfied. Second, TVA pointed out that overall system load growth has been considerably less than forecasted at the time the above commitment was made. The agency stated, however, that it intended to continue to buy spot coal when market conditions are advantageous but that it intended to rely on term coal as the principal source of supply.

As for our recommendation on SCOAP set-asides, TVA's Director, Division of Fuels, told us that TVA will continue to follow the SCOAP policy adopted by TVA's Board of Directors to foster and encourage small coal operators, including the continuation of set-asides as conditions permit. Also, TVA has formed a task force to evaluate the SCOAP Program and identify further actions that could be taken which would benefit both the agency and small coal operators. This evaluation had not been completed at the time we finished our review work in this area.

With respect to considering all responsive offers, the Director, Division of Fuels, advised us that the Division is currently considering all bids, regardless of the bidder's geographical location, on an economic basis. Division officials pointed out, however, that TVA can now obtain cheaper coal from eastern than from western suppliers because of the significant difference in transportation costs. According to these officials, coal from western sources would cost almost twice as much to ship as coal from current eastern sources. This condition did not exist at the time of our prior review. We observed in our earlier report that the TVA Board of Directors at that time was following a policy of buying coal only from eastern suppliers.

At the present time, TVA has no plans to develop its ENCA reserve. TVA's updated studies show that developing ENCA at this time would not be economically feasible. Furthermore, a potential problem with chlorine in this reserve has been identified and is being investigated. The agency is in the process of evaluating some of its present reserves, including ENCA, to determine whether some of them should be sold and/or leased. At the time we completed our review, TVA had not finished its evaluation.

Quality assurance measures

To improve the agency's coal quality assurance program, we recommended that TVA:

- Discontinue using its coal quality price adjustment formula and either review the formula we developed or develop another one that would reflect actual costs for use in future procurements.
- Install effective sampling facilities at its Kingston Steam Plant and take actions against those vendors that continually provide lower quality coal, assign someone to monitor coal sampling at the Breckinridge reserve, and avoid future contract provisions that allow contractors to do their own sampling.

We found that TVA had made an in-depth study of the effects of coal quality on operations and, as a result, developed a new quality price adjustment formula. TVA officials told us that they planned to use the new formula in all future coal contracts. The new formula is a significant improvement over the old one and should result in savings to the agency and rate-payers of millions of dollars. As for our second recommendation, we noted that TVA had (1) installed new coal sampling equipment at its Kingston Steam Plant and that the equipment is now in operation, (2) stationed one full-time individual at Breckinridge who, along with other duties, monitors coal sampling procedures and also provided for two engineers and a project manager to spend several days a week at the facility to identify areas in which efficiency could be improved, and (3) taken action to ensure that future contract provisions would not allow suppliers' sampling results to serve as a basis for payment as had previously occurred at Breckinridge. These actions should improve TVA's coal quality assurance measures.

Inventory management practices

To bring about more effective management of coal inventories, we recommended that TVA

- incorporate new density⁴ figures into its inventory level calculations based on recent density surveys,
- exercise its option to reduce deliveries by 10 percent to steam plants with inventories that exceeded target levels, and
- include provisions in all term contracts which provide an option to cutback on deliveries when needs were not as great as projected.

As for our recommendation concerning the incorporation of density figures in its inventory levels, we noted that TVA started using nuclear probe density values in June 1981. TVA has also contracted for more accurate nuclear probe surveys⁵ to be conducted at all of its steam plants over the next 2-year period, and agency officials advised us that new measurements would be done whenever the size of the stockpile and/or coal composition changed significantly or when an inventory adjustment of greater than 2 percent was required. Since initiating these surveys, TVA found that it had \$10 million more coal in its inventory than previously thought. As a result, TVA will be able to reduce planned purchases by about \$10 million.

In addition to these actions, we observed that TVA has taken advantage of the 10-percent cut back provision in existing contracts wherever possible. At the time of our prior work, TVA was exercising this option in only 12 of 30 contracts. TVA officials advised us that they planned to continuously monitor this area to assess opportunities for further reductions. As for our last recommendation, we noted that TVA is currently incorporating a 20-percent cut back provision in its current contracts which will provide the agency an even greater opportunity to more closely match inventory levels with actual requirements. TVA officials advised us that they planned to incorporate a 20-percent cutback provision on all future contracts which will provide the agency an even greater opportunity to optimize inventory levels with usage requirements.

Even though TVA has made several improvements in its inventory management practices, we noted that its coal inventory as of September 30, 1982, totaled 13.9 million tons as opposed to its inventory target level of 7 million tons, as shown in table 6.

⁴Coal density is the weight of coal per cubic foot which varies based on the ash content of the coal.

⁵Nuclear probes are, in essence, a process to determine the quantity of coal in inventory.

Table 6

Schedule of Actual Coal
Inventories and Target Levels
as of September 30, 1982

<u>Plant</u>	<u>Actual inventory</u>	<u>Target inventory (note a)</u>	<u>Variance</u>
------(in thousands of tons)-----			
Allen	564	413	151
Bull Run	730	422	308
Colbert	972	499	473
Cumberland	2,789	916	1,873
Gallatin	1,137	659	478
John Sevier	430	413	17
Johnsonville	332	551	-219
Kingston	1,136	698	438
Paradise	2,587	850	1,737
Shawnee	1,456	868	588
Watts Bar	88	120	-32
Widow's Creek	<u>1,688</u>	<u>601</u>	<u>1,087</u>
Total	<u>13,909</u>	<u>7,010</u>	<u>6,899</u>

a/Target inventories were based on a 60-day full burn rate.

The primary cause of the current excess was reduced demand for electricity. Even with the improvements discussed above, coupled with the additional actions TVA plans, the agency will need a considerable period of time to more closely match its inventory levels with actual requirements.

CLEAN AIR COMPLIANCE STATUS

As part of our followup on TVA's coal procurement practices, we updated the status of the information included in our prior reports⁶ about TVA's compliance with clean air standards. We observed that TVA is proceeding toward achieving and maintaining compliance with the requirements established under the consent decrees. According to TVA officials, all but one of TVA's coal-fired plants are in full compliance with these requirements, and they expect the Paradise plant to be in full compliance by December 1983.

⁶"TVA's Clean Air Settlement With EPA" (EMD-80-49, Jan. 14, 1980). "Triennial Assessment of the Tennessee Valley Authority--Fiscal Years 1977-1979" (EMD-80-91, Aug. 13, 1980).

At the time we completed our prior review work, TVA's compliance strategy for the Johnsonville Steam Plant provided for the use of magnesium oxide scrubbers. Subsequent TVA studies showed, however, that the use of lower sulfur coal would be a more cost-effective compliance strategy than the scrubbers. This change was incorporated in the December 22, 1980, consent decree, and it reduced the capital cost of the compliance program at Johnsonville by about \$93 million. TVA advised us that no other significant changes had been made in compliance strategies since our prior reviews. TVA currently estimates the capital cost of its total compliance program at about \$1.1 billion and its annual recurring cost at \$376 million, as shown in table 7.

Table 7

Estimated Cost of Compliance Program (note a)

<u>Plant</u>	<u>Annual recurring cost (note b)</u>	<u>Capital cost</u>
	----- (in millions) -----	
Allen	\$ 6	\$ 10
Bull Run	4	33
Colbert	14	37
Cumberland	50	205
Gallatin	24	49
John Sevier	2	12
Johnsonville	54	96
Kingston	22	71
Paradise	88	303
Shawnee	61	111
Watts Bar	2	2
Widow's Creek	<u>49</u>	<u>153</u>
	<u>\$376</u>	<u>\$1,082</u>

a/This program includes consent decree projects, the projects implemented prior to the consent decree, and one project (the Colbert Steam Plant) implemented after the consent decree.

b/1982 dollars.

ACQUISITION OF NUCLEAR FUEL

As discussed in the previous chapter, TVA initiated a construction program to build 17 nuclear units in the 1970's and 1980's to meet its projected demands for electricity. When the actual demand for electricity fell far below its earlier projections, TVA began deferring construction on some of these units. TVA had concurrently contracted for processed uranium to power

these units; and as nuclear plants were deferred, an excess inventory of nuclear fuel began to accumulate. During fiscal year 1978, TVA's interest expense on nuclear fuel investments exceeded \$20 million and was projected to exceed \$30 million in fiscal year 1979. Further, TVA expected its fuel inventory to exceed \$1 billion by the end of fiscal year 1982, as shown in table 8.

Table 8

Nuclear Fuel Inventory

<u>Year</u>	<u>Cumulative dollar value</u>
	(in millions)
1979	\$ 490.6
1980	642.3
1981	907.1
1982	1,205.7

TVA decided to sell the nuclear fuel and then buy it back as it is needed in its powerplants so that it could take the inventory off its financial statements and defer charging current ratepayers for the interest cost associated with the nuclear fuel inventory. Under such a sale and leaseback arrangement, the current interest charges related to the fuel inventory are expenses of the lessor and would not be paid until TVA uses the fuel to produce electricity.

TVA entered into the sale and leaseback arrangement with the Seven States Energy Corporation in 1979. The 30-year contract, with a 120-day termination notification provision, provided that

- TVA would pay all legal fees to set up the new Seven States corporation to handle the transaction,
- TVA would maintain physical possession and be responsible for all risks associated with the nuclear fuel and would pay all insurance and fees required for such,
- TVA would pay audit costs of Seven States, and
- Seven States would have legal ownership of the fuel.

At the request of Senator Sasser, we reviewed several aspects of the sale and leaseback arrangement. In our March

1982 report,⁷ we pointed out that TVA's arrangement with Seven States was similar to fuel sale and leaseback arrangements made by other utilities but that TVA entered the contract for different reasons. TVA used the arrangement as a means to keep its current electricity rates lower, whereas investor-owned utilities generally entered into such an arrangement because it was the most cost-effective way of borrowing money. Also, in most cases, regulated utilities cannot pass on to their ratepayers as a current expense the interest costs associated with carrying nuclear fuel, but TVA can do so under its enabling legislation.

TVA's nuclear sale and leaseback arrangement was financed through a \$2 billion line of credit from the Federal Financing Bank (FFB) to TVA through Seven States. The financial arrangement involves direct loans from FFB to Seven States with TVA being obligated to make payments to Seven States for the amount of fuel actually consumed. Although we found the financial records of the transaction to be in order, we pointed out that the Office of Management and Budget had expressed concern about this type of transaction through the FFB since the liability was removed from TVA's financial statements which therefore understated the agency's level of liabilities.

In reviewing the basis for the sale and leaseback arrangement, we advised Senator Sasser that TVA did not make a detailed analysis to assess the long-term impact on the agency and the ratepayers; its future financing; or whether, if ever, the contract should be terminated. We concluded that such an analysis was especially important because the transaction (1) affected not only current electric rates but also rates over a 30-year period, (2) resulted in deferred interest costs and enabled TVA to avoid applying a financial test requirement contained in the TVA Act, (3) removed certain financial data from TVA's financial statements, and (4) required the Department of the Treasury to seek additional borrowing to handle loans through the FFB.

We therefore recommended that TVA prepare a 30-year benefit-cost study assessing the full costs of the transaction to TVA and the ratepayer and that, at a minimum, the study should include the most current low, medium, and high demand forecasts; the current nuclear powerplant construction schedule; the cost and source of financing when the \$2 billion FFB ceiling was reached; and the full impact of deferring interest. We also recommended that the legislative oversight committees of the Congress review and establish an approval mechanism for similar future transactions because of their potential impact on the Federal Government's overall borrowing.

⁷"TVA's Nuclear Fuel Sale and Leaseback Arrangement Needs Further Analysis and Congressional Oversight" (EMD-82-52, Mar. 18, 1982).

TVA disagreed with our recommendation and pointed out that preparing a 30-year benefit-cost study would serve no useful purpose. TVA stated that such a study would be meaningless and could not be relied upon because of the many difficulties inherent in attempting to make such long-term projections. In this regard, TVA stated that it could quickly terminate the lease if the conditions became such that cancellation would be advantageous to the ratepayer.

As part of our triennial followup work, we further discussed several aspects of the sale and leaseback arrangement with TVA officials who developed the approach. TVA pointed out that it continuously considers the advantages of the sale and leaseback arrangement in light of constantly changing circumstances. TVA explained that, in looking at the advantages, it compares the ratepayers' opportunity cost to the interest rate on borrowings under the lease. TVA further pointed out that, as long as the borrowing rate from the FFB was lower than the ratepayers' opportunity cost, the lease was advantageous.

During our triennial followup work, TVA, in discussing the economics of the fuel lease, provided a 20-year comparison of the effects on TVA power rates of nuclear fuel ownership compared to leasing. Comparisons were shown on both a nondiscounted and a discounted basis. TVA's comparisons showed that on a nondiscounted basis, the leasing alternative was lower in cost every year through the 14th year when consideration was given to the interest charges which are covered by the ratepayer for the inventory owned. On a discounted basis, TVA's comparison showed that the ownership case resulted in higher present value costs to the ratepayers, regardless of the number of years until fuel was burned, and this was true even if the discount rate representing ratepayers' opportunity cost was lowered to 10 percent. We did not review nor verify the accuracy of the comparisons.

In the context of utility financing practices, TVA officials view the borrowings for the ownership of nuclear fuel to be a perpetual debt since such borrowings would be refunded at maturity. They explained that borrowings under the lease would be repaid as the fuel is burned. We discussed what action the FFB would take if and when TVA requested an increase in the current \$2 billion ceiling. Since TVA has not yet requested an increase, the FFB has not formulated any position on the matter. At this time, TVA is considering options that would keep it from reaching the \$2 billion ceiling. These options include various forms of bringing fuel under ownership of TVA and/or loaning fuel to other utilities.

CONCLUSIONS

At the present time, over 85 percent of the electricity generated by TVA's power system is provided by the agency's coal-fired steam plants and nuclear power plants. The cost of

fuel is a significant part of the operating costs, averaging about 79 percent for coal and about 35 percent for nuclear fuel. Acquiring and managing these fuels is a complicated process, but the success of TVA's efforts to obtain an adequate supply of economical fuel and generate power in compliance with environmental standards is critical to its mission of supplying power at the lowest feasible cost.

Since TVA is one of the Nation's largest consumers of coal, the cost of this fuel is a major expense and thus has a significant impact on electricity rates. It is therefore important that TVA's coal purchasing program be managed effectively in order to keep down coal costs. TVA's actions to date have resulted in cost savings or avoidances of over \$770 million. Considering these and the other actions in process, total benefits will far exceed this amount. Furthermore, TVA expects all of its coal-fired units to be in compliance with State and Federal air pollution control standards by December 1983.

TVA's acquisition and management of nuclear fuel has also been complicated because of the long lead-time for nuclear plant construction and uncertainties inherent in procuring and scheduling fuel for the units as they come on line. Because of these uncertainties, TVA now finds itself (1) with partially completed plants which are not now needed and (2) contractually obligated to excess nuclear fuel inventories which cost over twice the current market price.

In an effort to eliminate the need to fund its investment in unneeded nuclear fuel, TVA entered into a sale and leaseback arrangement. TVA has recently performed analysis which shows that for a 20-year period on a nondiscounted basis, the lease would be beneficial to the ratepayer through the 14th year of the lease. On a discounted basis, TVA's study shows the lease to be beneficial for the full 20-year period. Concerning the \$2 billion ceiling with the FFB, TVA is considering options it could undertake to keep the borrowings below this ceiling.

CHAPTER 4

OVERSIGHT OF TVA OPERATIONS

When the Congress established TVA in 1933, it organized the agency along corporate lines and provided it with considerable discretion in carrying out its assigned mission, particularly its power program operations. The degree of autonomy to be vested in the agency was a highly debated issue when it was established, and the oversight issue has periodically resurfaced over the years in response to major agency decisions such as increasing electric rates and making major adjustments in its nuclear powerplant construction program. It appears, however, that the Congress intended the agency to have a high degree of autonomy; and on the several occasions that the Congress has amended the TVA Act, it has continued to maintain the agency's independence and, in some instances, even expanded the agency's authority.

Because of the continued congressional and public concerns about the lack of external oversight over TVA's power program activities, Senator Sasser in 1981 requested us to review the available opportunities for oversight and specifically determine

- to what extent the TVA Act gives the Congress oversight responsibility for TVA's power program;
- what actions are needed to gain additional oversight of TVA's activities, such as bringing TVA's ratemaking process under the jurisdiction of the Federal Energy Regulatory Commission (FERC); and
- other options available to increase or improve oversight of TVA.

In March 1982, we reported¹ to Senator Sasser that the TVA Board of Directors was in a unique position of autonomy when compared to other utilities or other Federal entities. Our report discussed the extent of oversight provided for under existing legislation and outlined several options to improve oversight over the agency's power program operations and activities.

DEGREE OF OVERSIGHT AND CONTROL CURRENTLY EXERCISED

We reported that, under existing legislation, opportunities for oversight by the Congress, the executive branch, and the

¹"Tennessee Valley Authority--Options for Oversight" (EMD-82-54, Mar. 19, 1982).

public were very limited. Congressional involvement in TVA's power program activities is mandated in only two instances-- first, in Senate confirmation of Board member appointments and, second, in congressional approval of increases in TVA's bond ceiling. Board member appointments occur statutorily once every 3 years (assuming Board members serve out their staggered 9-year terms), and congressional approvals of debt ceiling increases have historically occurred every 4 to 7 years.

The legislation provides the Congress an option of effecting oversight through the removal of Board members and through the hearings process. It also contains several policy parameters and criteria that TVA management must address in operating the power program. These policies provide that preference for TVA power be given to public utilities and domestic and rural customers and that rates for domestic and rural customers be set as low as possible. While not a direct form of oversight, these policies do provide a form of continuing congressional guidance for the TVA power program.

Executive branch and public oversight of TVA's power program is also limited. The President, for example, can exert control through the appointment and removal of Board members and through the review of TVA's budget by the Office of Management and Budget (OMB). OMB does not have the authority, however, to modify TVA's proposed power program budget because these funds are not provided through appropriations. While the TVA Act does not require any public information or involvement programs, TVA voluntarily provides a number of opportunities for public input.

When compared to the management of other Federal and utility entities, however, the degree of oversight exercised over the agency and the accountability of the Board of Directors are extremely limited. This is particularly true in such key areas as requirements for strategic planning, external review and/or approval of budgets, requirements for public information and involvement, and--for utilities--external review and/or approval of power rates. Under existing legislation, the Board has a wide range of authority which provides it considerable discretion--without external oversight by either the Congress, the executive branch, or the public--in managing and directing TVA's operations, especially its power program activities.

OPTIONS FOR IMPROVING OVERSIGHT

Our March 1982 report discussed several options that were available to the Congress for improving oversight over TVA's power program operations and activities. We addressed those options that appeared to be responsive to the current concerns being expressed and that would, in our opinion, minimize negative impacts on the Board's statutory authority and responsibilities for managing the agency. Of the seven options we identified and addressed, two would not require any legislative action, but the remaining five would require amendments to the

agency's enabling legislation. As part of our triennial followup work, we determined that the options shown in table 9 are still potential alternatives for improving oversight over TVA's power program operations.

Table 9

Oversight Options

<u>Option</u>	<u>Legislative action required?</u>
Schedule regular congressional oversight hearings	No
Expand OMB's role in the development and review of the power program budget	No
Place the TVA ratemaking process under FERC	Yes
Require the Board to publish records of decisions on major rate and resource development actions	Yes
Require the Board, or alternatively a regional council, to develop a long-range strategic plan for the regional power program	Yes
Add policy guidance to conservation, and public involvement and participation in the power planning process	Yes
Reduce TVA's bond ceiling	Yes

In the past, congressional oversight hearings have generally resulted from controversy over Board decisions or actions and have not been held on a periodic basis. Regularly scheduled oversight hearings, in our opinion, would provide (1) a forum for TVA to present to the Congress information on its power program, including the identification of any key and controversial issues, and (2) a periodic opportunity for the Congress to provide input to TVA as well as discuss its own concerns about the power program with the Board. Also, expanding OMB's review of the TVA power budget, similar to the review of the Bonneville Power Administration's budget, could provide additional congressional insight into whether the TVA program is consistent with national fiscal and energy policies. We pointed out that neither of these options would require legislative changes and that the impact on the Board's authority and responsibility would be minimal if congressional and OMB input was focused on major policy issues and decisions. Under this arrangement, the

Board would retain its authority to make both day-to-day and long-term management and operational decisions.

The other five options would require changes to TVA's enabling legislation. However, we reported that, taken together, these five options would significantly increase both public and congressional knowledge of TVA's power program plans and operations and would provide for more direct accountability of the Board. Placing the TVA ratemaking process under FERC, for example, would subject TVA to mandatory scrutiny by parties outside of the agency. This action, in conjunction with a requirement to publish records of decisions on major rate and resource development actions, would guarantee the public, States, and local governments, as well as other interested parties, an opportunity to review and comment on all proposed rate changes before they are adopted by the Board. Requiring the Board or a regional council to develop a long-term strategic power plan and adding policy guidance in such areas as conservation and public involvement and participation in the power planning process would further guarantee external oversight and would provide the Congress a statutory basis for assessing the Board's actions. We also reported that a reduction in TVA's bond ceiling was another alternative that would ensure congressional input and review of TVA's nuclear construction program plans.

We pointed out, however, that problems are associated with some of these options. FERC's review and approval of TVA's power rates, for example, could potentially conflict with the Board's current responsibility and accountability for rates and revenues. And using a regional body to develop a strategic long-range power plan also has the potential for reducing the Board's responsibility and accountability for power planning activities. Still, both options would guarantee considerable external input to and oversight of TVA's power program activities.

During our triennial followup work we discussed this report with TVA's General Manager and the Board of Directors to obtain their views on the external oversight and control issue. We were provided with a position paper, dated January 1983, setting out the agency's views on oversight and accountability. The agency's comments are summarized below.

AGENCY VIEWS ON OVERSIGHT AND ACCOUNTABILITY

Based on its analysis of our report, TVA concluded that it should take several steps to improve oversight and accountability of the agency. TVA stated that it:

- Must intensify its efforts to keep the Congress fully informed of its activities, including providing information in advance of major Board decisions and information on issues of special interest.
- Should use various means to routinely document and distribute information on the agency's decision process to ensure that the public understands not only the choices involved and the issues considered, but also how their comments were analyzed and the rationale for Board decisions.
- Needs to establish a procedure for sharing with the public background information used by its managers in strategic planning. As a first step, TVA pointed out that its annual load forecast and associated power supply planning material could be developed in a form for release to the public on a regular basis.

In evaluating the individual oversight options discussed in our report, TVA pointed out that it could not overemphasize the danger of eroding the Board's ultimate responsibility for carrying out its duties under the TVA Act. Its comments and views on each of the seven options discussed in our report are presented below.

Schedule regular oversight hearings

TVA concluded that it needed to intensify its efforts to keep the Congress informed of its activities. It agreed that regularly scheduled oversight hearings could provide a structured opportunity for it to present information to the Congress and to receive policy direction. The agency pointed out, however, that formal oversight hearings are only one of several alternative means of communicating with the Congress, but it questioned how often such hearings would be useful. TVA also pointed out that other, less formal means of communicating with the Congress could provide quicker and more effective means of exchanging information.

Expand OMB's role in review of power program budget

TVA pointed out that OMB does not now have the authority to modify its budget and operating plan for the power program nor is TVA legally bound to operate its power program in conformity with the budget estimate submitted to the Congress. It pointed out that the TVA Act gave the Board sole authority to operate the power program and that the power program budget was submitted to the Congress for informational purposes only.

Our March 1982 report recognized that OMB does not have explicit approval authority over TVA's power program budget. We did not suggest that OMB should revise the agency's internal budget; we only pointed out that an expansion of OMB's review

could provide the Congress with an outside opinion on whether TVA's power program is consistent with national fiscal and energy policies. For example, OMB could advise the Congress on the levels and types of the agency's conservation efforts; research, development, and demonstration activities; and borrowing levels in comparison with national goals and objectives.

Have FERC review power rates

TVA pointed out that placing TVA's ratemaking process under FERC would conflict with the Board's statutory responsibility for the financial health of the power program and would make it much more difficult to hold anyone responsible for mistakes and failures in carrying out the duties assigned to TVA under the act. The agency also pointed out that FERC's review process could result in significant delays of needed rate increases, which could cause either a continual fiscal crisis for TVA or the implementation of larger rate increases than necessary in order to address contingencies that could occur between rate adjustment periods. TVA also cautioned that FERC rate reviews could reduce the bond rating given to TVA, thus increasing the cost of borrowing money if TVA were to return to the private bond market.

Publish records of major rate and resource development decisions

TVA pointed out that it had taken steps in the past year to ensure that the public has a better opportunity to participate effectively in such decisions. For example, TVA stated that it is now announcing proposed rate increases about 4 weeks rather than 2 weeks before the Board takes final action. TVA believes that this change gives the public more opportunity to analyze proposed rates and offer comments to the Board before its decision.

The agency sees no benefit in amending the act to require that a record of rate decisions be published in the Federal Register and that statutory public hearings be held on all TVA rate proposals before they are adopted. TVA believes that compliance with such rigid procedural requirements would be costly and confusing and would do little to lower rates or to improve the process that it now uses to ensure that public comments are considered prior to such decisions. TVA agreed, however, that it should make every effort to ensure that the public understands not only how its comments were analyzed but why Board members voted as they did. TVA also agreed, as previously discussed, that it could do more in documenting and distributing information on the agency's decisions.

Develop a strategic plan

TVA pointed out that a strategic plan is certainly necessary for efficient and consistent internal management. In this regard, TVA stated that it has been working to strengthen its

strategic planning efforts during the past few years and now has a system in place for identifying policy options, formulating appropriate strategies, and communicating these to its managers. TVA pointed out that its Office of Power has developed a strategic plan for the power system and that work is underway on a comprehensive strategic plan for both the power and nonpower activities of the agency.

TVA also pointed out that our observation concerning public involvement in the agency's planning process deserved consideration; however, it does not believe that a regional planning council would be very effective. TVA pointed out that a formal, statutory planning council would have influence and perceived power but no responsibility for the results of the exercise of that power. TVA stated that, in effect, a planning council would deny the Board the authority it needs to carry out its statutory responsibility for the proper functioning of the power program. TVA also noted that an arrangement of this type would fragment responsibility and, more importantly, accountability for decisions that are of great importance to its ratepayers. In addition to these problems, the agency stated that a regional council charged with power planning would not be likely to implement TVA's broader mandate to promote the social and economic well-being of the valley region.

Provide additional statutory policy guidance

As for additional policy guidance, TVA pointed out what it considers to be several potential dangers of amending the act unless there is a clear, compelling reason to do so. TVA stated that the Congress already has ample opportunity to provide the TVA Board with policy guidance through a variety of much more direct oversight activities. The agency pointed out that it has developed one of the most aggressive and comprehensive energy conservation and renewable resource programs in the Nation. TVA believed that statutory guidance in these two areas is not only unnecessary but could even be detrimental. The agency pointed out, for example, that such guidance would limit the Board's ability to adapt efficiently to changing needs and circumstances.

Reduce the agency's bond ceiling

In considering a reduction in its bond ceiling, TVA stated that several points need to be considered. First, the agency pointed out that its bond ceiling has not proven to be an incentive to borrow more than necessary because TVA has demonstrated its ability to adjust its construction of generating capacity to achieve a proper balance between future electricity demand and new generating capacity. Second, TVA pointed out that the Congress is free to require a full accounting of TVA's activities and power program plans at any time and that there is no reason to defer congressional review until the agency has to seek

additional approval. Third, TVA stated that reducing TVA's bonding authority would have no effect on the efficiency of the agency's design and construction operation or on the total cost of its construction program.

BOND CEILING SHOULD BE REDUCED
TO MAINTAIN PERIODIC OVERSIGHT

A significant number of changes have occurred since the original justification for TVA's \$30 billion debt limit, and it appears that this level of borrowing authority is not now needed to carry out the agency's current planned program. Following is a discussion of TVA's original justification of its current \$30 billion debt ceiling, the significant changes that have altered this requirement, and the agency's future funding requirements.

TVA's power program operations were financed almost entirely through appropriations and power revenues until 1959, when the Congress authorized the agency to sell revenue bonds. From 1960 through 1974, TVA sold its bonds to the general public; in 1974, the agency received approval to sell bonds to the Federal Financing Bank and has since 1975 sold all of its bonds to the FFB. As of September 30, 1982, TVA's short- and long-term indebtednesses totaled \$14.160 billion, consisting of \$12.285 billion owed to the FFB, \$1.725 billion owed to the general public, and \$0.15 billion owed to the U. S. Treasury. TVA has congressional approval to increase its borrowings up to a total of \$30 billion at any one time to assist in financing its power program.

When TVA received the initial approval to sell bonds in 1959, the Congress established a ceiling of \$750 million which could not be exceeded without specific congressional approval. During the hearings that led to this authorization, it was made clear that the \$750 million was to be used by TVA to finance power generating facilities over the next 5 to 7 years and that the Congress would make an in-depth evaluation of TVA's power program before granting an increase in the ceiling. The TVA Board of Directors understood this arrangement and pointed out that the agency would provide both the President and Congress with annual information so that the Congress would have an opportunity to make an in-depth assessment of its plans, programs, and experience under the new legislation.

As its power program operations continued to expand, TVA requested and received several congressional approvals to increase its debt ceiling: the Congress increased the ceiling to \$1.750 billion in 1966, \$5 billion in 1970, and \$15 billion in 1975. And in 1979, the Congress authorized a \$15 billion increase which established TVA's current debt ceiling at \$30 billion. By incrementally increasing the agency's bond debt ceiling, the Congress has provided TVA with sufficient authority to finance its power program operations over a period of several

years without having to justify the need for funds on an annual basis. This approach has also provided the Congress with an opportunity to make a comprehensive review, about every 4 to 7 years, of TVA's justification of the need for generating facilities.

When the Congress approved the \$15 billion debt ceiling increase in 1979, it intended to fully fund TVA's nuclear powerplant program beyond the Browns Ferry plant which was completed at that time. The authorization specifically provided full funding for TVA's Sequoyah, Watts Bar, Bellefonte, Hartsville A and B, Phipps Bend, and Yellow Creek plants. In addition to completing these plants, the \$15 billion increase was to fund investments in conservation facilities and certain additions to and improvements in the power system. The increase also provided full funding for commitments through 1985 for unspecified generating facilities to supply an additional 2,700 to 3,600 megawatts of power then anticipated to be needed to meet energy requirements through 1995.

As discussed in chapter 2, TVA's demand forecasts have shown a downward trend since 1979, and the anticipated requirement for additional capacity never materialized. Further, TVA canceled four of the nuclear power units and deferred four additional units that were included in its original justification. And at this time, TVA has not established a firm date to restart construction on any of the four deferred units. Furthermore, restarting construction of these units is only one of several options that TVA is currently exploring to provide additional generating capacity that TVA believes will be needed by about 1994. These changes have significantly altered TVA's original justification used to support the current \$30 billion debt ceiling, and TVA may not have to request another increase in the ceiling until the year 2000. This time frame would significantly exceed the historical interval of every 4 to 7 years that TVA has had to justify to the Congress its need for additional borrowing authority.

In our discussions with TVA's Office of Power, officials stated that no attempt has been made to specifically quantify the amount of funds that would be needed to fully fund the present construction and conservation programs, but they pointed out that a rough estimate would be about \$20 billion, or \$10 billion less than currently authorized. We did not attempt to further quantify the level of borrowing authority that TVA would need to complete its current nuclear powerplant program or to fund its investments in conservation facilities because the agency is in the process of evaluating a number of alternatives for power generating facilities that it anticipates will be needed beyond completion of its Bellefonte plant. It is evident, however, that TVA needs considerably less borrowing authority than provided for by the current \$30 billion ceiling and an adjustment may be warranted when TVA completes its current evaluation of future generating capacity requirements. While TVA agrees that its current borrowing authority exceeds

its known requirements, it believes that a reduction in the \$30 billion ceiling is unnecessary and inappropriate.

We recognize that the Congress has the authority to make an in-depth review of TVA's power program operations and plans at any time, and we are not questioning the agency's efficiency in operating its power program under the present ceiling. But the Congress has historically aligned the agency's borrowing authority to cover expenditures deemed necessary over a 4- to 7-year period, and this appears to have been the congressional intent when the agency was initially authorized to borrow funds in 1959. Now, however, there is a significant difference between the agency's actual funding requirements and its authorized borrowing level, primarily because of the major adjustments that it has had to make in its nuclear powerplant program. If the Congress intends to maintain the historical interval for making in-depth reviews of the agency's need for additional borrowing authority, a major adjustment would be necessary in the current \$30 billion ceiling.

CONCLUSIONS

The degree of external oversight over TVA's operations and activities is by no means a new issue. This aspect of the agency was a highly debated question when it was established 50 years ago; from the evidence of the many discussions and debates that have transpired over the years, it still is. There is no simple solution to the issue because of the many different viewpoints, even within the Congress, on the degree of external control and oversight to which TVA should be subjected. Advantages and disadvantages are also apparent to the various alternatives that are available to increase the level of external oversight and control over the agency's operations. When compared to the degree of external control exercised over other Federal agencies, and even private utilities, TVA has an unparalleled degree of latitude in carrying out its operations.

In addressing the oversight and accountability issue, TVA pointed out that the Congress deliberately vested within the agency statutory discretion to ensure successful operation of its activities. But TVA agreed that it should take several additional steps to improve oversight and accountability of the agency and that our observation concerning public involvement in its strategic planning process deserves consideration. On the other hand, TVA strongly disagreed with the feasibility of several of the options because it views them as detrimental to the effective and efficient operation of the corporation and contrary to congressional intent.

As for reducing the agency's debt ceiling, TVA's time frame for determining the need for future generating capacity and the option that it selects to meet this requirement will have a direct bearing on the level of borrowing authority that the agency

will need. The basis that TVA used to justify its current \$30 billion debt ceiling is no longer valid because of the downward trend in TVA's demand forecasts since 1979 and the cancellation and/or deferment of eight nuclear units, as well as related factors. While TVA agreed that its current borrowing authority exceeds its known requirements, it believes that a reduction in the current ceiling is unnecessary and inappropriate.

The Congress has, however, historically closely aligned the agency's borrowing authority to cover anticipated requirements over the next 4 to 7 years. This appears to have been the congressional intent when the agency was first authorized to borrow funds in 1959. In view of the major changes that have taken place in TVA's original justification for the current \$30 billion ceiling, coupled with the degree of uncertainty that now exists as to when TVA may need additional generating capacity, an adjustment may be warranted in the agency's level of borrowing authority. An adjustment is particularly warranted if the Congress desires to maintain the historical interval of about every 4 to 7 years to make an in-depth evaluation of TVA's power program because, under the present ceiling, TVA would not have to request an increase until about the year 2000.

We fully recognize the complexity of the issues involved in increasing the present level of external oversight over the agency, including a reduction in its current borrowing authority. However, the fact remains that TVA is a wholly owned Government corporation. We therefore believe that it is important for the Congress to assure itself that TVA is managed and operated in the most efficient, effective, and economical manner possible.

There are limited statutory opportunities now available to the Congress for oversight of TVA as compared to the degree of control and direction it exercises over other Federal departments and agencies. The limited oversight opportunities extend also to the executive branch and the public. The Congress should continue to examine the adequacy of the existing oversight measures and the need for any additional measures, including a reduction in the bond debt ceiling and the steps that the agency suggested in its responses to our oversight report.

MATTER FOR CONSIDERATION
BY THE CONGRESS

If the Congress wants to maintain its historical periodic oversight every 4 to 7 years of raising TVA's debt ceiling, it will need to reduce the current borrowing authority.

CHAPTER 5

INTERNAL AUDIT AND EVALUATION

ACTIVITIES

TVA's initial organization provided for a General Auditor to head up the agency's internal audit activities. Under his or her direction, the internal audit activity was responsible for auditing TVA's financial records, evaluating internal compliance with accounting and reporting procedures, and conducting audits at management's request. In the mid-1970's, TVA expanded its internal audits into several additional areas and established three separate staffs to audit various areas of the agency's operations.

Because of large rate increases in past years, coupled with other factors, concern has been recently expressed about how adequately TVA's internal audit and evaluation activities focus on and emphasize fraud, waste, mismanagement, and program improvements. Questions have been raised as to whether the TVA internal review group is a viable option to a statutory Inspector General (IG). Because of these concerns, Senator Sasser in 1981 requested us to review several aspects of TVA's internal audit operations and activities and to address the issue of establishing an IG at the agency. Specifically, the Senator asked us to

--assess TVA's Office of Audit, focusing on the organizational location of this group, how it identifies and plans areas for review, whether it has access to all areas, to whom its reports are submitted, and whether the reports have had any impact, and

--assess whether TVA's Office of Audit or the Audit Review Group is a viable option to an IG.

In March 1982, we provided Senator Sasser a report¹ addressing the above matters. We concluded that (1) TVA's internal audit functions had not been well planned or prioritized to assure that the right work was being done at the right time, (2) there was no formal followup system on audit reports to ensure that internal audit recommendations were implemented, and (3) TVA's internal audit activities did not fulfill the role of an IG. We therefore recommended that the Chairman of the Board of Directors require the TVA Office of Internal Audit and Evaluation to

--develop, within OMB policies, an annual audit plan which would prioritize planned efforts and which would act as a

¹"TVA's Internal Audit Improved but Inspector General May Still Be Needed" (EMD-82-61, Mar. 19, 1982).

guide in determining the type and scope of audits to be performed and

--establish a formal followup system to ensure that recommendations were acted on.

Our report recognized that neither the Office of Internal Audit and Evaluation (now the Office of Audit and Evaluation) nor the Audit Review Group was fully operational at the time we completed our review, and we therefore suggested that the Congress monitor the agency's actions over the next several months to decide whether TVA needed an IG.

IMPROVEMENTS IN INTERNAL AUDIT ACTIVITIES

Since our report was issued, TVA has improved its internal audit and evaluation activities. The agency completed actions it initiated in late 1981 to combine its three former audit/evaluation groups--Auditing Branch, Corporate and Industrial Engineering Branch, and Program Evaluation Staff--into a new Office of Audit and Evaluation. And in March 1982, TVA appointed a manager for the Office of Audit and Evaluation and elevated the organization to a corporate level within the General Manager's office.

As discussed in our March 1982 report, TVA also established a new organizational entity--the Audit Review Group--in August 1981 to oversee the agency's internal audit and evaluation activities. This group, now operational, is comprised of the General Manager, who serves as chairman; the General Counsel; the Assistant General Manager/Administration; the Manager of Audit and Evaluation; the Manager of Planning and Budget; the Comptroller; and the Director of Public Safety Service. The three TVA Board members serve as ex officio members of the group and participate in its oversight functions.

The Audit Review Group's primary purpose is to test TVA's internal monitoring system. In carrying out this function, the Group is responsible for reviewing audit and other reports on the agency's operations, assessing recommendations made in these reports, and tracking and evaluating corrective actions. The Group also may raise issues and suggest that an audit, investigation, or program evaluation be initiated to address generic problems in the agency. Through these types of actions, the Group is to ensure that the organizational entities responsible for audits, investigations, and/or evaluations are carrying out these functions and are following up on the implementation of recommendations. The Group generally meets about every 6 weeks, and the Board of Directors has attended three meetings during the past 9 months.

In response to our two specific recommendations, TVA significantly improved the planning aspects of its internal audit and evaluation activities and established a formal followup

system to ensure that audit recommendations are implemented in a timely manner.

At the time of our prior review, TVA's audit and evaluation planning process was generally informal and did not meet the provisions of OMB Circular No. A-73² which requires all Federal agencies, at a minimum, to develop annual audit plans which reflect

- all the agency programs and operations subject to audit;
- the programs and operations selected for audit, with priorities and specific reasons for selection;
- the audit cycle or frequency of each audit, the locations to be audited, and why;
- the audit coverage to be provided and the basis for such coverage; and
- any anticipated benefits to be obtained from the audits.

We found that the agency's fiscal year 1982 audit and evaluation plan, for the most part, met the OMB criteria. While the total audit universe--all agency programs and operations subject to audit--was not made a formal part of the audit plan, this data is contained in the material that supports the plan and was considered in its formulation. These improvements in the planning process should add more structure and direction to the internal audit and evaluation activities as well as assist TVA management in assuring that its resources are focused on the types and scope of audits that have the highest potential for improving the economy, efficiency, and effectiveness of TVA operations.

As for our recommendation to establish a followup system to ensure that recommendations are acted on, we observed that TVA established a formal system which should significantly improve this aspect of the agency's internal audit and evaluation activities. The Office of Audit and Evaluation sends all of its audit reports and selected evaluation reports to the General Manager, the Assistant General Manager/Administration, and the Audit Review Group. Summaries of the reports are provided to the Board of Directors, and in some instances Board members have reviewed the entire reports. The reports are also transmitted to TVA officials responsible for direct management overview of the areas and subject matters contained in the reports. These officials have 30 days in which to prepare written responses to the Office of Audit and Evaluation.

²TVA believes it is not obligated to follow OMB guidance; however, it does point out that it tries to adhere to the spirit of OMB Circulars.

The Office of Audit and Evaluation analyzes responses to audit reports and forwards the responses, along with comments on the adequacy of the responses, through the Assistant General Manager, the Board of Directors, and the Audit Review Group. The Office tracks each recommendation through its formal system and prepares management reports which indicate the status of each recommendation and the action or lack of action being taken to implement the recommendation. The Manager of Audit and Evaluation uses these reports as a basis for discussion at the Audit Review Group meetings. The Board of Directors attends Audit Review Group meetings quarterly to receive reports on the status of all audits, evaluations, and improvements and the nature of the followup activity being conducted.

As a part of this process, the Office of Audit and Evaluation take one of two types of followup action. If the audit is of a recurring nature, the auditors assess the extent of corrective action during their next review of the area and comment on the implementation status in their report. If the audit is of a nonrecurring nature, a specific time frame is established for following up on the recommendations. If the recommendations have been satisfactorily implemented, this action is reported in the next Audit Review Group meeting. If the recommendations have not been implemented and the differences cannot be resolved, the differing viewpoints are highlighted for resolution by the Audit Review Group.

The Audit Review Group minutes showed that it is actively reviewing the status of ongoing audits and evaluations as well as the status of corrective actions being taken on recommendations. We also observed that the Board of Directors reviewed and commented on the results of audits and evaluations. This overall process should ensure that top-level TVA management and the Board of Directors are made aware of the status of internal audits and evaluations, recommendations made to improve the agency's operations, and corrective actions taken on these recommendations.

In addition to these improvements, we observed that TVA has significantly expanded the scope of its internal audit activities by including more expanded-scope audits and placing more emphasis on reviews addressing economy and efficiency and program results. In our prior work, we found that most of the internal audit effort was directed toward financial controls and work relating to the year-end audit. At that time, the agency did not do expanded-scope reviews because the general position of TVA, endorsed by the Board of Directors, was that its internal auditors should conduct only financial audits and not concern themselves with broad-scope reviews. Since that time, however, the Office of Audit and Evaluation has begun to conduct expanded-scope, operational, and program results audits.

In fiscal year 1982, for example, the Office of Audit and Evaluation initiated expanded-scope audits of TVA's complete coal management system and of asset disposal at deferred nuclear

plant construction sites. These audits were designed to cover the full range of activities and responsibilities in these areas and to incorporate the primary elements associated with full-scope reviews--financial and compliance matters, economy and efficiency factors, and program results. The long-range audit plan for the 5-year period covering fiscal years 1983 through 1987 shows that over 50 percent of the internal audit and evaluation resources are to be directed toward expanded-scope, operational, program results, and other management-type audits.

TVA's AUDIT AND EVALUATION ARRANGEMENTS
DIFFER FROM THOSE OF THE STATUTORY
INSPECTORS GENERAL

TVA has made many improvements in its internal audit and evaluation activities, but its audit and evaluation arrangements are different from those established for a statutory Inspector General. In the past, there has been some consideration of establishing an Inspector General at TVA. A bill was introduced in the 97th Congress to establish an IG in the agency. Some of the institutional differences between TVA's arrangements and an IG are identified below.

Authority and functions
of an IG office

Many Federal departments and agencies have statutory IG offices. Several departments had statutorily based IGs before the enactment of the Inspector General Act of 1978 (Public Law 95-452) which created IG offices in an additional 12 departments and agencies. Since this act was passed, several more IGs have been statutorily established. The act provides the IG with an unparalleled degree of independence in carrying out the position's prescribed duties and responsibilities. For example:

- The IG is appointed by the President and cannot be fired by an agency head for doing the job too well. Only the President can remove an IG, but in doing so must explain his reasons to the Congress.
- The IG reports only to the agency head or the person next in rank and is not subject to supervision by any other agency official.
- The act specifically prohibits agency heads from interfering with any audit or investigative action or the issuance of any subpoena in connection with this work.

All agency audit and investigative functions are required to be placed under the direction of the IG, who provides policy direction as well as oversees the audits and investigations of all facets of an organization's activities and operations. The IG is required to issue semiannual reports to both the agency head and the Congress containing significant agency problems,

corrective actions taken, a summary of all matters referred for prosecution, a summary of each report made to the agency head, and a list of audits completed in the previous 6 months. While these reports are first viewed by the agency head and agency comments can be submitted along with the semiannual report to the Congress, the agency head is prohibited from changing the reports or preventing them from being sent to the Congress. The Congress established these rigid, noninterference restrictions on agency heads so that IGs would have the requisite independence to effectively carry out their statutory duties and responsibilities.

A bill was introduced in the 97th Congress to establish an IG at TVA which contained most of the provisions in the Inspector General Act of 1978. The bill provided that the IG report directly to the TVA Board of Directors rather than the General Manager. Another difference was that the IG would have been required to submit only annual reports as opposed to semiannual reports to both the Board of Directors and the Congress. After its introduction, the bill was referred to committee for consideration but was not reported out before the congressional session ended. Thus far, no action has been taken to introduce a similar bill in the 98th Congress.

Authority and functions of TVA's Office of Audit and Evaluation and Audit Review Group

As previously discussed, TVA has improved in the implementation and management of its internal audit and evaluation activities. However, an internal audit and evaluation activity, including TVA's newly established Office of Audit and Evaluation, does not have the independence from the agency head that the Congress allows IGs to have in carrying out their legislative mandate. TVA pointed out, however, that it believes that its internal audit and evaluation activities are designed to fit its operations and structure.

The new Office of Audit and Evaluation was elevated to a corporate level within the General Manager's office, which certainly increases the level of independence and degree of visibility within the agency (see figure 4). However, the Manager of the Office of Audit and Evaluation reports, administratively, to the Assistant General Manager for Administration rather than directly to the General Manager or the Board of Directors.

The official job description for the Manager, Office of Audit and Evaluation, states, in part, that he is under the "general supervision" of the Assistant General Manager for Administration but, as appropriate, "may report findings to and take direction" from either the General Manager or the Board of Directors. This affords the Manager of Audit and Evaluation "access" to both the General Manager and the Board of Directors. However, the Manager of Audit and Evaluation told us that

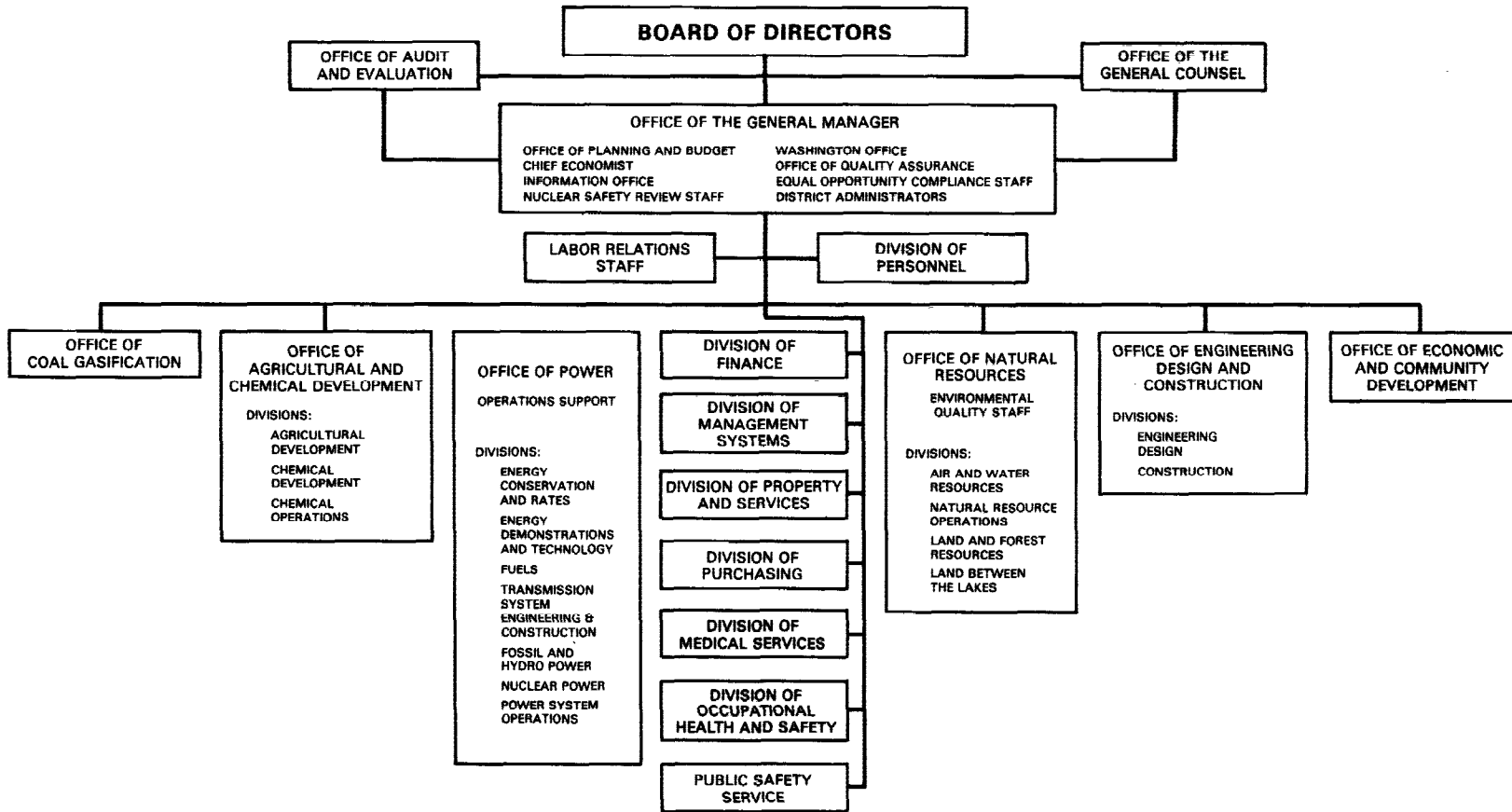
he had not yet exercised this option because he had not encountered any situations where he deemed this course of action necessary. Instead, he mentioned that several vehicles are available to him to interact regularly with the Board:

- Quarterly Audit Review Group meetings where the Board receives status reports on audit, evaluation, and improvement activities.
- Board briefings on recommendations contained in program evaluations. These briefings are conducted by evaluation team members.
- Biweekly key topics report advising the Board members, the General Manager, and others of significant audit findings and resolution of prior audit recommendations, as appropriate.
- Weekly coordination meetings (Board, General Manager, Assistant General Managers, General Counsel, Manager of OPB, and Manager of Audit and Evaluation).
- Occasional other meetings to discuss items of interest with the General Manager and/or Board.

In addition to the level of reporting, there are differences in the independence of TVA's Manager of Audit and Evaluation and an IG in planning internal audits and evaluations. For example, the Manager of Audit and Evaluation formally coordinates his annual and long-range audit and evaluation plans with the Audit Review Group, whereas statutory IGs formulate independent audit and investigation plans. We have no reason to believe that the Audit Review Group would attempt to alter or change any of the planned audits or evaluations proposed by the Manager of Audit and Evaluation; however, he does not have the final authority on audits, evaluations, and improvement activities that will be conducted. Furthermore, the TVA Act does not require the agency's internal audit activity to prepare and issue reports to the Congress, as is required of a statutorily established IG.

Figure 4

ORGANIZATION OF THE TENNESSEE VALLEY AUTHORITY



The TVA Office of Audit and Evaluation includes the Corporate Industrial Engineering Branch which is responsible for evaluations and improvement activities. The Branch performs program evaluations, management reviews, and participates in improvement activities designed to increase economy and efficiency. The management improvement activities often follow findings and recommendations in audits, program evaluations, and management reviews. TVA believes this activity is a positive function for TVA that would not be performed by a statutory IG.

We did not attempt to make an exhaustive comparison of the difference between a statutorily established IG and TVA's Audit and Evaluation Office; however, the examples discussed above illustrate some of the IG authority that is not an inherent part of any internal audit activity. This situation, of course, is certainly not unique to TVA's internal audit and evaluation activities; no internal audit activity can precisely duplicate a statutorily established IG office. Complete independence--the primary cornerstone of an IG office--simply cannot be achieved in an internal audit activity.

Agency views on IG issue

TVA believes that its audit, evaluation, and investigation entities--as now organized and operating--have the necessary degree of independence and sufficient access to the Board of Directors on all substantive matters, such as audit reports and recommendations, audit followups, program evaluations, and major management improvement proposals. TVA pointed out that for its form of organization, this arrangement is superior to the IG approach since it maintains the Board's final responsibility and authority over agency decisions. This, in turn, preserves the authority and responsibility of line managers to manage efficiently. TVA also pointed out that its Office of Audit and Evaluation has the capability not only to identify problems, but also to devise proposed management solutions and ensure their implementation.

During the fiscal year 1983 appropriation hearings, a TVA Board member reemphasized the superiority of the agency's approach over the establishment of a statutory IG. The Board member pointed out that it was important to remember that the objective of TVA and its Board of Directors was to manage the agency's operations in an effective manner. In dealing with audit matters, he pointed out that it was extremely important for auditors to have independence but that managers must maintain the power that goes with their responsibility. In designing TVA's present approach to its internal audit and evaluation activities, the Board member said that the agency had provided for an effective audit function without taking away the necessary power of managers to carry out their assigned responsibilities.

The Board member further stated that he believes the agency has achieved this very delicate balance between an effective audit function and the powers that managers must retain. He pointed out that the establishment of an IG would destroy this delicate balance and that he was therefore opposed to an IG at the agency.

CONCLUSIONS

TVA has substantially improved its internal audit activities by increasing their independence and visibility, providing a more structured approach to the planning process, expanding the scope and types of internal audits to be conducted, and establishing a formal followup process to ensure that report recommendations are implemented. These improvements have also brought about changes which directly involve top-level management, including the TVA Board of Directors and General Manager, in the agency's internal audit and evaluation activities. These improvements should assist management in assuring that its internal audit resources are focused on areas that have the highest potential for improving economy, efficiency, and effectiveness in the agency's operations and activities.

Although TVA has substantially improved its internal audit and evaluation activities from both an organizational and functional standpoint, its Office of Audit and Evaluation will never have the inherent power, authority, independence, and external reporting requirements vested in a statutorily established IG. TVA's situation, however, is not unique--no internal audit activity can completely fulfill the role of an IG. TVA agreed with this observation, but it also believes that its approach to internal audit and evaluation is appropriate for its operations.

As discussed earlier, we agree that TVA's actions have certainly improved and strengthened its internal audit and evaluation functions; however, it will be some time before the effectiveness of these organizational and procedural changes can be measured and assessed in quantitative and qualitative terms. For example, the Office of Audit and Evaluation has only recently started to conduct expanded-scope, operational, and program results audits. It will be important to monitor and assess how effectively these reviews are carried out, the actions taken by agency management in responding to the deficiencies disclosed and corrective actions suggested, and the overall impact that the reports have on improving the agency's effectiveness and efficiency in carrying out its various operations and activities.

CHAPTER 6

MANAGEMENT SUPPORT ACTIVITIES

We have reviewed and reported on various aspects of TVA's management activities during the past 3 fiscal years, including the control and protection of its material inventories and equipment used to support agency operations, the acquisition and management of automatic data processing equipment, and certain personnel matters.

To support its large power construction and operation program, TVA acquires large quantities of equipment, spare parts, small tools, materials, and supplies. Some of this material and equipment is maintained in storerooms located throughout the agency's service area and is requisitioned by the users as needed. In addition to the inventories maintained in the agency's storerooms, large quantities of equipment, small tools, supplies, etc., are located at various construction sites, operating powerplants, and other sites.

In addition to its large inventories of equipment and material, TVA uses many computers in project planning, engineering design, construction activities, and power operations. While power production is the agency's largest activity, TVA also has many other statutory missions such as agricultural and regional community development, navigation and flood control, and national fertilizer research. TVA also uses computers in accomplishing these missions. In addition, TVA relies heavily on automatic data processing (ADP) equipment in complying with the various environmental regulations applicable to many of its production facilities, and the agency requires a large amount of ADP resources for general and administrative purposes.

In carrying out its various operations, TVA employs a large number of people; however, over the past 2 fiscal years, it has reduced its work force from about 52,000 to about 40,000, a reduction of about 23 percent. According to TVA, these reductions were necessary because of decisions to defer and/or cancel nuclear powerplants; reductions in appropriations for such activities as economic and community development; natural resources and agricultural and chemical development; and cost reduction efforts in the power program. Over the next 5 fiscal years, TVA plans to reduce its overall employment level to about 31,000 which, if accomplished, will represent a 22 percent reduction from its fiscal year 1982 personnel levels.

MANAGEMENT AND CONTROL OF MATERIALS AND EQUIPMENT

During the past 3 fiscal years, we have examined the adequacy of TVA's management of its power stores inventory and its security and control procedures over equipment and material located at powerplant and construction sites. The results of

our work in these two areas and the actions that TVA has taken to improve its management of this equipment and material are discussed below.

Improvements in power
stores operations

TVA's Power Stores, an organizational entity of the Office of Power, is responsible for maintaining an inventory of materials, supplies, and spare parts to serve the needs of the agency's power program operations. Power Stores, headquartered in Chattanooga, Tennessee, assists operating organizations in planning for material requirements; purchasing, receiving, storing, issuing, and inventorying the materials and supplies for transmission system construction, power maintenance, and operation activities; and salvaging and disposing of surplus and obsolete materials and equipment.

In carrying out these responsibilities, Power Stores currently operates 20 major field storerooms consisting of 2 base storerooms, 2 district storerooms, and 16 storerooms at steam powerplants. These storerooms, the Office of Power's primary storage locations, are staffed with full time personnel and operate independently of each other under the supervision of Power Stores. TVA also maintains selected inventory items at 28 hydroelectric plants and at 36 area locations, but these 64 storage sites are not staffed full-time. As of September 30, 1982, the inventory at these locations contained 274,000 different line items valued at \$206 million. The value of TVA's power stores inventory has increased over fourfold--from \$44 to \$206 million--since 1974, and it will probably continue to grow as additional nuclear plants are completed and placed in operation.

In view of the increasing dollar value of this material and equipment, we examined the adequacy of the agency's management of its power stores inventory and issued a report¹ in January 1980 to the Chairman, TVA Board of Directors, advising him of several basic weaknesses in the agency's inventory management process which had resulted in the accumulation and storage of about \$51 million in excess material. We also estimated that the agency was spending about \$10 million annually to store this unneeded material. We determined that the excess inventory had resulted primarily because

--stock objectives were being determined by individual plant superintendents rather than being based on past usage,

¹"TVA Needs To Improve Management of Power Stores Inventories" (LCD-80-32, Jan. 25, 1980).

- excess stocks were not systematically identified and redistributed to locations needing the material to avoid new purchases,
- inactive items were not regularly reviewed and removed from inventory to reduce carrying costs and the risk of obsolescence, and
- material was incorrectly classified as standby stock which resulted in the retention of larger quantities than needed to satisfy demand.

To strengthen management controls over power stores operations and to optimize inventory levels, we recommended that TVA establish an organizational entity within the Office of Power for the purpose of developing standard material management policies and procedures and directing their implementation throughout the power stores system. We also recommended that these policies and procedures be designed to ensure that

- stock objectives are established at reasonable levels in accordance with an acceptable demand-based formula,
- the power stores system is screened for excess stocks on a regular basis and the excess is redistributed to those activities needing the material,
- a program is established to regularly and systematically identify inactive items and remove them from inventory, and
- standby stock is properly defined and the definition is consistently applied throughout the power stores system.

TVA generally agreed with our findings and observations, and our followup work in this area showed that the agency had taken actions to implement the intent of our two recommendations. As for our first recommendation, TVA established a new organizational position of Assistant Manager of Power (Administration)² and assigned this individual the responsibility for materials management throughout the Office of Power. Also, an independent group (materials management services staff) was established in the Assistant Manager's organization to develop and direct the implementation of standard materials management policies, goals, objectives, and procedures.

²As a result of a reorganization, responsibility for power stores material management was subsequently transferred to the Manager of Operations Support, Office of Power.

On September 24, 1980, the Assistant Manager of Power (Administration) issued a comprehensive policy statement dealing with power stores inventory. The policy statement contained a number of objectives and goals for controlling materials from requisitioning through purchase, storage, issue, use, and disposal and covered all categories of items--materials for inventory, direct charge, expensed, capitalized, and tagged items. Subsequent to issuance of the overall policy statement, revised detailed procedures were issued containing operating guidance and instructions for managing the inventories.

We examined the policies and implementing instructions and found that they addressed each of the factors that we recommended be incorporated. Our limited followup work also showed that the policies and procedures are being implemented. We noted, for example, that the agency has examined and revised its stock objectives to better align them with actual demand usage. As a result, TVA reported net reductions in its power stores inventories of \$3.3 million for fiscal year 1981 and \$2.9 million for fiscal year 1982. By screening requisitions for items and comparing quantities requested with inventory levels, the agency has been able to achieve a \$1.2 million cost avoidance by canceling and/or revising requisitions and transferring stock items between storerooms. We also noted that the agency identified and disposed of 3,065 inactive items valued at \$3.4 million, which also eliminated holding costs for this excess material. As part of the disposal process, the agency placed 2,027 items valued at \$7.8 million in a standby category using the standard criteria that were developed for this category of material.

TVA's actions have improved and strengthened its management and control over power stores inventories and should result in a more cost-effective operation. Because of time constraints, we did not make an in-depth assessment of such factors as the adequacy of stock objectives or inventory levels; however, in fiscal year 1983, TVA's Office of Audit and Evaluation plans to initiate a review of inventory controls at power facilities.

Security control improvements still needed at construction and powerplant sites

TVA has experienced inventory and security control problems over the past several years at its construction and power sites. Because of these problems, we initiated a review in 1980 of TVA's procedures to inventory and account for material and

equipment located at these sites and to provide security measures to protect against loss and theft. We issued a report³ in March 1981 to the Chairman, TVA Board of Directors, informing him of a number of problems and weaknesses in both security and inventory control procedures at powerplant and construction sites.

Because no central authority existed for overall security at these sites, we pointed out that major agency offices and divisions had developed their own security programs; however, we found that many of the policies and plans developed were not being fully implemented. As a result, we reported that equipment theft losses at construction and powerplant sites were excessive; inventories of materials and equipment were not periodically taken at construction sites and, when taken, substantial quantities of high-dollar value equipment items could not be located; procedures for issuing and controlling small tools were inadequate; theft reporting practices were not standardized and varied widely among construction and powerplant sites; and excessive purchases appeared to have been made for such items as raincoats, padlocks, and gloves.

We recommended several corrective actions the Board of Directors could take to establish and maintain an effective inventory and security system at construction sites and powerplants. Our recommendations were to

- establish standard accountability procedures for small tools at all construction projects and power plants;
- develop a system for conducting tagged equipment inventories at TVA construction projects at acceptable intervals;
- standardize TVA's theft reporting practices at all its projects and powerplants, and require that missing items be reported to the Public Safety Service for investigation;
- appoint an official at General Manager staff level to be responsible to the General Manager for overall TVA security, and provide this official with authority to resolve any interoffice disputes and remove any budgetary restrictions to implementing valid security recommendations;
- place the Power Security Section, the Public Safety Service, and any other office involved in security under the direction of the TVA security official to

³"The Tennessee Valley Authority Needs To Improve Security and Inventory Controls at Power Sites" (EMD-81-60, Mar. 10, 1981).

ensure that policies could be implemented and enforced without unnecessary administrative levels;

--ensure that the Internal Auditing branch continues to make periodic reviews, follows up on previous recommendations, and holds exit conferences with TVA security officials in attendance; and

--require periodic progress reports to the General Manager and Board of Directors concerning results in reducing thefts and vandalism and in improving control over TVA tools, equipment, and inventories.

In commenting on our prior report, TVA acknowledged deficiencies and problems in inventory controls and security at construction and power production plant sites and pointed out that it had initiated a broad range of management actions to address the shortcomings discussed in our report. During our followup work, we found that the agency had issued instructions and guidelines that generally satisfy the intent of most of the above recommendations.

The agency, for example, developed policies and implementing instructions which (1) standardize accountability procedures for small tools at construction sites and power production plants, (2) provide for a formal system of conducting biennial inventories of tagged equipment at all construction sites and the appointment of property clerks to carry out these physical inventories, and (3) standardize theft reporting practices at construction and powerplant sites and require that missing items be reported promptly to the Public Safety Service for investigation.

In addition to strengthening its policies and procedures, TVA assigned the Office of Audit and Evaluation the responsibility for reviewing and reporting semiannually to the General Manager on the status of these efforts to control the theft and loss of tools and equipment. The Nuclear Safety Review Staff was also required to report semiannually to the General Manager on implementing nuclear powerplant security measures. Further, the General Manager designated a member of his staff to serve as a security coordinator overseeing inventory, and physical plant security and monitoring the implementation of the corrective actions being taken in the area.

While the above actions have improved the procedural controls over materials and equipment at construction and powerplant sites, the agency is still experiencing problems in several areas, particularly in the area of physical control and accountability over tagged equipment. The Office of Audit and Evaluation issued a report in November 1982 which showed that the Division of Construction could not locate an average of 41 percent of tagged equipment at TVA construction sites. The percentage of missing equipment items ranged from a low of 3 percent at the Pickwick Lock site to a high of 62 percent at the

Bellefonte nuclear powerplant site. A summary of the number of tagged items listed on the inventory records by site along with the number of items that could not be located is shown in table 10. The audit report also showed that large quantities of tagged equipment could not be located within other TVA organizational entities. These percentages ranged from 16 to 43 percent as shown in table 11.

We were unable to readily determine the total dollar value of the 25,341 missing items of tagged equipment; however, the total value may amount to several million dollars. For example, we were able to determine that 4,081 items missing from eight of the nonconstruction sites are valued at about \$1.4 million. At the time we completed our work in this area, the Office of Audit and Evaluation was still in the process of evaluating the responses received from the various organizations responsible for controlling and accounting for the tagged equipment. An official of this Office told us, however, that the transfer of tagged equipment between organizations without adjustments to the inventory records appeared to be one of the major factors contributing to this problem.

We discussed these large discrepancies with both the TVA Board of Directors and the General Manager, and they acknowledged that serious problems apparently still exist in implementing control and accountability procedures over tagged equipment items throughout the agency. The General Manager told us that they were in the process of evaluating what additional measures needed to be taken to resolve the problem. He also pointed out that it was obvious that he must take much stronger measures in holding individual organizational managers responsible and accountable for controlling this kind of equipment. Since top-level agency management, including the Board of Directors, is fully aware of the problems and corrective measures are being assessed, we decided not to pursue the matter further during our current work. However, the Board of Directors, in our opinion, should closely monitor the actions being taken and ensure that the equipment is located and brought under proper management controls.

Table 10

Results of Tagged Item
Inventory at Construction Sites

<u>Construction site</u>	<u>Number of items on</u> <u>inventory records</u>	<u>Number of items</u> <u>not located</u>	<u>Percent of items</u> <u>not located</u>
Bellefonte	11,276	7,019	62
Watts Bar	9,806	4,438	45
Hartsville	14,607	4,882	33
Yellow Creek	5,553	1,073	19
Pickwick Lock	1,047	29	3
Other sites	<u>5,606</u>	<u>2,177</u>	39
Total	<u>47,895</u>	<u>19,618</u>	41

Table 11

Result of Tagged Item
Inventory at Other Locations

<u>Organization/location</u>	<u>Number of items</u> <u>on inventory records</u>	<u>Number of items</u> <u>not located</u>	<u>Percent of items</u> <u>not located</u>
Personnel	363	68	19
Office Service Branch	1,868	294	16
Office of Natural Resources	12,441	1,959	16
Division of Nuclear Power	5,881	1,262	21
Systems Dispatching and Protection Branch	253	110	43
Colbert Steam Plant	1,542	391	25
Cumberland Steam Plant	1,708	380	22
Paradise Steam Plant	2,107	611	29
Widows Creek Steam Plant	1,861	375	20
Johnsonville Steam Plant	<u>1,378</u>	<u>273</u>	20
Total	<u>29,402</u>	<u>5,723</u>	19

ACQUISITION AND MANAGEMENT OF
AUTOMATIC DATA PROCESSING RESOURCES

Because of congressional concerns about the adequacy of TVA's management of its ADP resources, the Chairman, House Committee on Government Operations, requested in March 1980 that we review TVA's noncompetitive ADP procurement practices and evaluate the progress that the agency was making toward a fully competitive replacement of its large-scale ADP resources. In November 1980, we issued a report⁴ to the committee chairman advising him that TVA could have avoided substantial expenditures to supplement the processing capacity of its central computing system by making full practical use of its ADP resources. We also pointed out that numerous delays in the agency's progress toward fully competitive specifications for the procurement tended to limit competition. In addition, we pointed out that TVA could not assure itself that acquiring additional equipment was the most economical means of meeting its requirements until it (1) completed a validation study of its current and future ADP requirements and (2) developed and implemented management policies and procedures to ensure full practical use of its current ADP resources.

We recommended that the TVA Board of Directors require that agency actions be expedited to (1) validate existing and future ADP requirements and (2) develop and implement policies and procedures for assuring the full practical use of ADP equipment. We also recommended that the TVA Board of Directors delay the contract for replacing large-scale ADP equipment until the agency had validated its ADP requirements and was efficiently using its existing equipment. TVA generally agreed with the intent of our recommendations to improve its planning and use of ADP equipment and initiated steps to implement the recommendations, including delaying the contract award for replacing its large-scale ADP equipment until the validation study was completed and existing equipment was being used as efficiently as possible.

Before the report discussed above was issued, the Chairman, House Subcommittee on Energy and Water Development, requested that we continue our review of TVA's computer acquisition planning and requirements analysis and validation, specifically with regard to ongoing general purpose equipment and proposed acquisitions of scientific processing support and minicomputers. The subcommittee chairman also requested that we work with TVA on a definitive requirements analysis and validation methodology. Pursuant to this request, we continued our review of the agency's management and acquisition of ADP resources, including

⁴"Review of the Tennessee Valley Authority's Procurements of Automatic Data Processing Equipment" (EMD-81-20, Nov. 7, 1980).

followup work on the actions being taken by TVA to implement the recommendations contained in our November 1980 report.

We periodically briefed the subcommittee chairman's staff during the course of our work to assist them in the fiscal year 1982 appropriation process and provided a written report⁵ on the overall results of our review in June 1982. We reported that TVA had made substantial progress toward achieving improved management of its ADP resources and activities and had validated its needs for ADP support. Based on its May 1981 definitive requirements analysis of its ADP workload validation for the period 1981 through 1987, for example, TVA reduced its ADP resource requirements by about \$41 million. The agency also instituted differential pricing for ADP timeshifts to ensure full and more practical use of its existing computer resources.

Although TVA had made substantial improvements in managing its ADP resources, we reported that some problems still existed. We found, for example, that TVA needed to incorporate the workload validation methodology⁶ into its business and ADP planning process. Also, TVA needed to complete its cost accounting and reporting system and application software inventory system and to provide for a direct relationship between corporate business planning and information systems planning activities. In addition, we concluded that a full implementation of a formal information system development methodology was needed.

To achieve more efficient and effective use of ADP resources, we recommended that the TVA Board of Directors:

- Incorporate the workload validation discipline into its information systems planning process and formally integrate its information systems planning into its business planning.
- Develop and maintain an inventory of its application software because the effective performance of information systems planning requires the full appreciation of all resources used.

⁵"TVA's Computer Needs Are Valid and ADP Management Is Improving" (AFMD-82-24, June 9, 1982).

⁶This is a process through which an agency assesses whether its existing and planned computer capacity will meet its future needs.

- Emphasize the systematic management control of its ADP resources by implementing and enforcing a formalized systems development methodology. Procedures should specify the management level at which reviews and approvals are required, based on clearly defined thresholds of cost, schedule, and scope.
- Develop a policy that will balance the opportunities for using low-cost computers with the need for maintaining control of them.

TVA agreed with each of our recommendations and initiated actions to implement them. As for our first recommendation, TVA issued ADP policy directives in August 1982 which incorporated the workload validation discipline into the ADP planning process and formally integrated its information systems planning into its corporate business plan and budgeting process. In its ADP Planning Manual, dated September 1982, and APD Planning Guidelines, dated October 1982, the agency provided detailed instructions to implement both of these policy directives. To develop and maintain an inventory of its application software, TVA is currently developing an ADP Applications Inventory System. When completed, this system will provide for collecting, storing, maintaining, and reporting information for every TVA ADP application which is operational, under development, or planned for management's use in planning and controlling applications software.

In response to our recommendation dealing with systems development methodology, TVA issued a draft regulation in October 1982 which established formal levels of management review and approval based on the size, scope, complexity, risk, and critical nature of each proposed project. Offices are also required to establish cost thresholds for each proposed project and corresponding management review and approval levels. The draft regulation is currently being reviewed by TVA's ADP organizational elements, and it will be formally issued after comments have been reviewed and considered. As for our last recommendation, TVA is in the process of developing a policy directive which will address the issues associated with the use and control of microprocessors and minicomputers.

The actions that TVA has already taken, coupled with the actions that are still in process, appear to satisfy the intent of our recommendations from a procedural standpoint. As discussed above, however, some of the policies, procedures, and systems have not yet been completed; therefore, we are unable at this time to comment on their adequacy. The satisfactory completion and implementation of these ongoing actions, however, should result in more efficient and effective management and use of the agency's ADP resources. As part of our followup work in this area, we noted that TVA's Office of Audit and Evaluation plans to review during fiscal year 1983 several aspects of the ADP operations and activities, including the justification

process used to procure ADP equipment and services, the ADP resource requirements forecast, and the systems documentation methodology for all TVA offices. The results of these reviews should provide TVA management with additional insight into the effectiveness and efficiency of the agency's ADP operations and activities.

PERSONNEL AND ADMINISTRATIVE MATTERS

During the past 3 fiscal years, the Congress has expressed concern about several aspects of TVA's personnel management and administrative procedures and practices and has asked us to examine (1) the cost impacts of internal reorganizations, (2) the use of agency employees to construct projects versus contracting for this effort, and (3) the agency's planned use of retention contracts to provide compensation to some of its executives above their basic salary levels. As part of our triennial followup work, we determined the current status of each of these areas.

Cost impacts of reorganizations

At the request of Congressman John Duncan, we reviewed the operating costs of selected organizational units and looked into whether reorganizations were resulting in higher administrative costs and higher electric power rates. In our February 1981 response⁷ to Congressman Duncan, we advised him that TVA had made several significant organizational changes in fiscal years 1979 and 1980 and that some of the increases in administrative costs could be attributed to these changes. Based on our tests, however, we pointed out that the increased administrative costs were primarily attributable to higher personnel and related costs resulting from workload growth and from new and expanded functions and programs. We also pointed out that administrative and general expenses, as well as overall operating costs, of the three offices we tested had a negligible impact on power production costs because of their relative insignificance in comparison with other production costs. We determined, for example, that administrative and general expenses represented only about 0.34 percent of power production costs in fiscal year 1978, about 0.43 percent in fiscal year 1979, and about 0.45 percent in fiscal year 1980.

As part of our triennial assessment, we performed limited followup work in the administrative and general expense area to determine if there had been any significant changes since our February 1981 report. Since that time, TVA has continued to make organizational changes that it deemed necessary to carry out its operations and activities, and administrative and general expenses have continued to increase during fiscal years

⁷"Cost Impacts of Reorganizations at the Tennessee Valley Authority" (EMD-81-54, Feb. 25, 1981).

1981 and 1982. However, these expenses still had a negligible impact on power production costs during this period.

Use of in-house employees for design and construction projects

Over the years, TVA has used in-house employees for most of its design and construction work except for work requiring specialized skills, such as design and construction of cooling towers for nuclear plants, or for work that the agency does not do in-house. In the March 1981 oversight hearings before the Senate Committee on Environment and Public Works, one of the issues addressed was whether it was more economical for TVA to contract for construction or perform the work with in-house employees.

Because of conflicting views over which approach was the most economical, Senator Howard Baker and Congressman Robin Beard requested that we address the following questions:

- Does TVA have a policy whereby the cost to build a particular project using its own employees is compared to the cost of using a private contractor?
- If TVA has such a policy, what criteria are used to determine the least-cost approach and are the criteria reasonable? Is such a policy followed on all projects?
- How does TVA calculate overhead and are administrative costs included or excluded from comparisons? How does this allocation of cost compare with industry or other Government construction projects?
- What factors should TVA consider in developing an appropriate method of comparing costs between in-house construction and construction by private contractors?

In March 1982, we reported⁸ the results of our work to Senator Baker and Congressman Beard, and we also issued a report⁹ to the Chairman, TVA Board of Directors. We reported

⁸"A Process To Determine Whether To Construct Projects In-house or by Private Contractor Is Needed by the Tennessee Valley Authority" (EMD-82-50, Mar. 15, 1982).

⁹"The Tennessee Valley Authority Needs To Develop a Formal Process for Determining Whether To Construct Projects In-house or by Private Contractor" (EMD-82-49, Mar. 15, 1982).

that TVA did not have a formal policy to routinely compare the cost of constructing a particular project using its in-house work force to the cost of using a private contractor and that the agency did not have established criteria to use when such cost comparisons were made. We pointed out that in the absence of an overall policy, cost comparisons had not been routinely prepared, and in many cases little documentation was available to verify that TVA's decisions were as cost-effective as feasible. We pointed out, however, that our examination of several comparisons that were made showed that TVA's use of its in-house force was, in those cases, more economical than contracting for the work. We also pointed out that TVA had contracted for construction when its cost comparisons showed this approach to be more economical.

Before we issued our reports, a TVA task force completed its evaluation of the agency's construction policies and practices. The task force's January 1982 evaluation report concluded that the agency's decisionmaking process in this area had not been formalized and that decisions reached had not been sufficiently documented even though a number of factors were considered in deciding whether to perform work in-house or by contract. The task force therefore recommended that TVA adopt a process that would result in a well-documented decision, considering all appropriate factors, to construct a project in-house or by private contractor. We pointed out in our report that the task force recommendation was a good first step but that the recommendation was too general in nature and more specific actions needed to be taken to ensure that valid cost comparisons were made.

We therefore recommended that the TVA Board of Directors require the development of detailed implementing procedures and criteria for cost comparisons that would ensure consistent comparisons and well-documented decisions. We also recommended that the criteria developed should provide for cost comparisons which included the same scope and level of performance, the same cost factors, and all costs, including indirect overhead.

In commenting on our reports, TVA pointed out that the Board of Director's had adopted the following overall policy for "make-or-buy" decisions:

"TVA will maintain a core of design and construction personnel to act as its own architect/engineer and constructor and use contractors to the extent their use is cost-effective."

To implement the above Board policy, TVA advised us that it had instructed each of its offices involved in design or construction work to develop procedures with an appropriate level of detail to meet the criteria established by the policy.

Pursuant to this direction, TVA's Offices of Power, Engineering Design and Construction, and Agricultural and Chemical Development have developed procedures and guidelines outlining the process that they will follow to determine if work should be performed in-house or by contract. These procedures and guidelines were provided to the Office of General Manager and a working group was established to determine if uniform directions and guidelines for decisions on performing work in-house versus contract could be applied agencywide. The working group combined parts of each of the three Offices' individual procedures and guidelines into a proposed single, agencywide policy document which, at the time we completed our review work, was being circulated within the agency for review and comment.

Since TVA was still evaluating whether uniform procedures and guidelines on "make-or-buy" decisions could be applied agencywide, we decided not to assess the procedures developed by TVA's three principal design and construction offices. The actions already taken by TVA in this area represent a significant improvement over the conditions that existed at the time of our prior review. We believe, however, that completing and issuing uniform, agencywide procedures and guidelines would result in more consistent cost comparisons and better documented decisions.

Planned use of retention agreements rescinded

Because TVA believed that it was losing too many of its senior executives to higher paying jobs with private utilities or other firms, the TVA Board of Directors on October 7, 1981, approved a plan for the agency to enter into retention contracts with up to 75 of its executives. These contracts would have allowed these executives to receive up to \$36,000 annually in addition to their regular salaries provided they agreed to remain with TVA for 3 years. In approving this plan, the Board of Directors stipulated that no more than \$1 million per year could be committed for retention contracts and that expenditures under such contracts would be made from power revenues rather than appropriated funds.

At the time the Board of Directors approved the plan, a board member's salary or "basic pay" was \$52,750 a year. Paying selected employees up to \$36,000 a year in addition to their regular salaries would have allowed these individuals to receive more yearly pay than Board members. But a provision in the TVA Act stipulates that "no regular officer or employee of the Corporation shall receive a salary in excess of that received by the members of the board."

The Board's approval of the retention contract plan generated several congressional requests for our opinion on the legality of the plan. Since the TVA Board of Directors made a

"determination of necessity" under 16 U.S.C. 831h when adopting the plan, we had no jurisdiction to issue a binding decision on the agency; however, we did prepare and issue an advisory opinion on November 16, 1981.

We pointed out in the advisory opinion that TVA officials suggested that the additional pay would constitute "compensation" but not "salary" under the terms of the TVA Act and that the use of retention contracts was therefore legally permissible. Since 1955 TVA has interpreted the word "salary" as used in the above quoted section of the act to mean an employee's "basic compensation," or "annual rate of compensation," not including overtime compensation, occasional bonuses, retirement fund contributions, and miscellaneous fringe benefits.

We agreed with the agency's interpretation of the statute; however, we pointed out that the new pay plan was clearly designed to circumvent the statutory limitation on salary and that the additional pay would constitute a part of an executive's basic "annual rate of compensation," i.e., his or her "salary." We therefore concluded that the new pay plan improperly contravened the salary limitations imposed by the TVA Act. The TVA Board of Directors subsequently rescinded the retention contract plan as a means of providing additional compensation to its top management executives.

When the Board adopted the retention contract plan on October 7, 1981, it also authorized the General Manager to designate certain positions within the agency that require the incumbents to work overtime on a continuous basis and to establish and authorize overtime payments for these individuals. The Board, in adopting this overtime policy, did not limit the amount of such payments. As part of our followup work, we made a limited review of the payments made to TVA employees during 1981 and 1982 to determine whether such payments resulted in employees receiving more pay than the Board members. For 1981, 37 managers received salary plus overtime in excess of the salary received by Board members.

In December 1981, at the direction of the Board of Directors, the General Manager reestablished the Board's 1955 policy that the total of an individual's basic salary and overtime payments could not exceed the salary of members of the Board. In applying this limitation, however, the General Manager pointed out that all other categories of employee compensation and benefits were not salary. These categories included such special payments as reactor license premiums, nuclear plant management license incentive payments, nuclear plant management incentive payments, FICA contributions, merit incentive supplemental retirement income plan credits, retirement contributions, and other benefits.

Subsequent to the General Manager's directive, we noted that only four employees received more compensation than Board

members during 1982 and that only two of these exceeded the limitation because of overtime payments. Because of public and congressional concerns about TVA's overtime policy, the Board of Directors formally canceled its previous policy on overtime and stipulated that no employee's overtime and basic salary could exceed the salary of Board members. Based on the agency's interpretation of the TVA statute, however, its employees can still receive more total compensation than Board members' rate of basic pay through the various other categories of compensation that TVA provides for its employees.

As part of our followup work, we noted that the TVA Act requires the agency to provide the President and the Congress in March of each year a financial statement and a complete report on the business of the Corporation covering the preceding fiscal year. As part of this report, the act requires TVA to include the total number of employees and the names, salaries, and duties of those receiving compensation at the rate of more than \$1,500 a year. We examined the salary information included in TVA's 1981 Annual Report and noted that it included only the basic pay schedule for employees and did not reflect such additional payments as reactor license premiums, FICA contributions, merit incentives, retirement contributions, and overtime. As discussed above, however, TVA does not consider these amounts to be within the term "salary" as used in the TVA Act.

We discussed the compensation issue with the TVA Board of Directors and were told that they had no plans to reinstate the retention contract plan and, at this time, were not considering any other specific plans to provide agency executives with additional compensation. They reemphasized, however, their concerns about adequate compensation for agency employees and the problems being experienced in retaining key personnel. During our followup effort, we did a limited amount of work to update our information on the compensation and employee turnover issue.

TVA personnel officials provided us with the results of several national surveys of executive salaries at private utilities. TVA compared the 1983 salary levels of some of its top executives with the salary data compiled and published by the American Management Association. Table 12 summarizes the comparison.

Table 12

Salary Comparison
Between Private Utilities and TVA

<u>Private utility industry</u>		<u>TVA</u>	
<u>Position</u>	<u>1982-1983 salary</u>	<u>1983 salary</u>	<u>Position</u>
Chief Executive Officer	\$296,300	\$68,400	Board Chairman
Chief Operating Officer	211,200	67,000	General Manager
Executive Vice President	158,800	66,750	Manager of Power
Top Legal Executive	120,300	66,750	General Counsel
Top Marketing Executive	107,900	65,500	Deputy Manager of Power Use (note a)
Top Engineering Executive	87,500	65,500	Manager of Engineering Design
Controller	87,200	64,500	Comptroller
Industrial Relations Executive	83,100	64,500	Director of Personnel
Top ADP Executive	79,100	64,500	Director of Management Systems

a/Position vacant as of January 20, 1983.

We did not independently review the salary data compiled for private utility and other executives; however, TVA personnel officials told us that they had checked previous salary data published by the American Management Association by surveying selected private utility, construction, and architect-engineering firms headquartered or operating in the Southeast. They told us that the results of their own surveys generally supported the data compiled by the American Management Association.

Concerning employee turnover, TVA provided information which showed that 27 executives in the agency's top five grade levels (currently earning from \$54,000 to \$67,000) left the agency during fiscal years 1980 through 1982. Of these 27 executives, 17 voluntarily resigned, 9 retired, and 1 was terminated through a reduction-in-force (RIF) action. Of the 17 voluntary resignations, 8 resigned during a RIF-related situation, leaving 9 who resigned under normal attrition. Over the past 3 fiscal years, 112 employees associated with operating TVA's nuclear powerplants have left as shown in table 13.

Table 13

Voluntary Nuclear Operator Turnover

<u>Position</u>	<u>Fiscal year</u>					
	<u>1980</u>		<u>1981</u>		<u>1982</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Shift engineer	0	0	9	18.0	3	5.3
Assistant shift engineer	0	0	4	7.4	3	4.7
Licensed operators	5	13.8	2	5.8	3	8.8
Unit operators	1	5.0	3	8.6	6	10.9
Assistant unit operators	<u>12</u>	5.5	<u>23</u>	12.2	<u>38</u>	16.3
Total/average percent- ages	<u>18</u>	4.7	<u>41</u>	11.3	<u>53</u>	11.9

NOTE: Percentages computed based on total employment levels in these positions.

These personnel are responsible for operating the nuclear plants, including the startup, operation, and shutdown of the reactors; plant safety and security; initiation of corrective action in the event of emergencies; and fuel handling. The assistant unit operators comprised a large part of those who voluntarily resigned, particularly in fiscal years 1981 and 1982. These are primarily entry-level employees who have been trained by TVA and are receiving additional on-the-job training.

CONCLUSIONS

TVA has already taken or is in the process of taking actions to improve the effectiveness of various aspects of its management support activities. For example, TVA has taken actions to implement the intent of our prior recommendations in the area of power stores management and operation. These actions have improved and strengthened its control over this material and have resulted in a more cost-effective operation. By revising its stockage objectives, as we suggested, TVA was able to make a net reduction of \$6.2 million in its inventory levels over the past 2 fiscal years. By screening requisitions and comparing items requested with available inventory throughout the system, TVA has avoided procurement of \$1.2 million worth of items that were already available. The agency has also identified and disposed of over 3,000 inactive items valued at \$3.4 million which eliminated unnecessary administrative and storage costs associated with these items.

As for inventory controls and protection of equipment at its construction sites, power production sites, and other locations, TVA developed and issued a number of procedures and guidelines that were directed toward satisfying the intent of our prior recommendations in this area. While these actions have considerably improved the procedural controls over this type of equipment and material, the agency appears to have serious implementation problems--it recently was unable to locate over 30 percent of these items at its construction sites, powerplants, and other locations. The total dollar value of these items could amount to millions of dollars.

The TVA Board of Directors and the General Manager are fully aware that serious problems still exist in implementing control and accountability procedures throughout the agency. In our discussions with the General Manager, he stated that TVA is currently evaluating additional measures that need to be taken but that it was obvious much stronger actions are required to hold managers responsible for controlling this equipment. In view of the General Manager's current actions, we did not pursue the problem further during our followup work. In view of the dollar value of missing equipment, however, we believe that the Board of Directors should closely monitor the actions being taken to ensure that policies and procedures for safeguarding equipment are brought under management control.

As for the agency's acquisition and management of its ADP resources, TVA has also taken action or is in the process of taking action on our prior recommendations for improvements. From a procedural standpoint, it appears that these actions will satisfy the intent of our recommendations, but some key policies, procedures, and systems have not been completed. However, the actions already taken, coupled with those that are still underway, should result in more effective management and use of the agency's ADP resources.

In the personnel and administrative management area, we observed that TVA has made a number of organizational changes but that the expenses associated with such changes still had a negligible impact of less than 1 percent on power production costs. TVA has also acted to develop procedures and criteria for determining whether work should be constructed by its in-house work force or by private contractors. At the time we completed our followup work, the agency's three main design and construction entities had completed individual procedures and guidelines, but the agency was still evaluating whether uniform, agencywide procedures and guidelines could be developed. While the three organizational sets of procedures represent a significant improvement over the conditions that existed at the time of our prior work, we believe that it is important for the agency to continue working toward uniform, agencywide procedures and guidelines in order to ensure consistent cost comparisons and documentation requirements among all of its organizational offices. Furthermore, we believe that the Board of Directors needs to expedite the completion of these procedures and guidelines.

In the area of personnel compensation, TVA rescinded its planned use of retention contracts to provide additional pay to its top-level executives because of what the agency considered to be high turnover rates at this management level. While the TVA Board of Directors has no plans to reinstate the retention contracts, it is still concerned about adequate compensation for agency employees.

RECOMMENDATIONS

We recommend that the Board of Directors of the Tennessee Valley Authority take necessary actions to:

- Ensure that the procedures and controls for safeguarding tagged equipment and materials be brought under proper management controls.
- Ensure the completion and issuance of the agencywide procedures and guidelines to be used in deciding whether design and construction should be done in-house or by private contractors along the lines we suggested in our March 15, 1982, report.

CHAPTER 7

POWER RESEARCH, DEVELOPMENT, AND DEMONSTRATION

Over the past several years, TVA has conducted a wide range of research, development, and demonstration (RD&D) projects and activities directed toward providing technologies, techniques, and procedures to reduce power operating costs, increase system reliability and security, reduce capital investment requirements, increase the efficient end use of electricity, and ensure development of electric generating options to meet future requirements.

To finance its research and development work, TVA uses funds from congressional appropriations, its power revenues, and other sources. Over the past 3 fiscal years, TVA has spent about \$308 million on research and development-related activities. Of this amount, \$169 million was from power revenues, \$109 million was from congressional appropriations, and the remaining \$30 million was from other sources. TVA's other funding sources include DOE; the Environmental Protection Agency; the Electric Power Research Institute (EPRI)¹ private industry; and State, county, and local governments. Table 14 contains an overall summary of TVA's research and development (R&D) expenditures over the past 3 fiscal years and the general areas in which work was done. As can be noted, over \$173 million, or about 56 percent, of the \$308 million in expenditures was for national energy demonstration projects.

USE OF POWER PROGRAM REVENUES FOR R&D ACTIVITIES

As part of an evaluation we made of TVA's RD&D program in 1980, we noted that TVA had established an informal policy that limited expenditures of power funds for RD&D activities to no more than 2 percent of its annual gross power system revenues. We reported² in November 1980 that this expenditure level would place TVA among the utility industry leaders in R&D spending. We also pointed out that the informal 2 percent policy was apparently established during budget review meetings and that

¹EPRI serves as the major focal point for conducting electric utility-related research and development and focuses on developing technologies that can be readily applied to improving existing technologies. It participates with various activities in energy-related pilot and demonstration projects requiring significant funding.

²"Tennessee Valley Authority Needs a Written Policy on the Use of Power System Revenues for Research, Development, and Demonstration" (EMD-81-16, Nov. 25, 1980).

Table 14
Schedule of TVA Expenditures for Energy Research,
Development, and Demonstration Effort (Note a)

	Fiscal year 1980				Fiscal year 1981				Fiscal year 1982			
	Appropriation	Power	Other	Total	Appropriation	Power	Other	Total	Appropriation	Power	Other	Total
(in thousands)												
<u>National energy demonstrations</u>												
Solar/biomass	\$4	\$7,385	\$—	\$7,389	\$3,291	\$396	\$—	\$3,687	\$562	\$270	\$—	\$832
Transportation	314	708	727	1,749	166	1,309	60	1,535	24	656	315	995
Fuel cells	883	1,497	—	2,380	1,856	—	—	1,856	419	—	12	431
Atmospheric fluidized-bed combustion	2,001	15,446	60	17,507	23,183	16,888	1,186	41,257	11,829	14,685	1,475	27,989
Coal gasification	4,434	—	—	4,434	19,716	—	—	19,716	37,206	—	—	37,206
Waste heat and energy	1,478	1,077	—	2,555	1,178	416	—	1,594	—	111	—	111
Other	—	126	—	126	—	1	—	1	—	2	—	2
Total	\$9,114	\$26,239	\$787	\$36,140	\$49,390	\$19,010	\$1,246	\$69,646	\$50,040	\$15,724	\$1,802	\$67,566
<u>Power research projects</u>												
Environmental	—	\$4,844	\$8,246	\$13,090	—	\$3,849	\$4,499	\$8,348	—	\$6,099	\$1,920	\$8,019
Nuclear	—	506	4	510	—	347	3	350	—	545	—	545
Advance energy	—	948	1,559	2,507	—	542	1,620	2,162	—	616	2,685	3,301
Conservation	—	1,389	—	1,389	—	686	—	686	—	973	—	973
Total	—	\$7,687	\$9,809	\$17,496	—	\$5,424	\$6,122	\$11,546	—	\$8,233	\$4,605	\$12,838
<u>Contributions</u>												
Clinch River Breeder Reactor Project	—	b/(1,432)	\$—	b/(1,432)	—	\$—	—	\$—	—	\$—	—	\$—
Electric Power Research Institute	—	17,625	—	17,625	—	20,456	—	20,456	—	23,274	—	23,274
Other	—	1,181	—	1,181	—	3,064	—	3,064	—	3,147	—	3,147
Total	—	\$17,374	—	\$17,374	—	\$23,520	—	\$23,520	—	\$26,421	—	\$26,421
<u>Miscellaneous research</u>												
Administrative expense	—	\$1,106	\$2,014	\$3,120	—	\$2,359	\$1,966	\$4,325	—	\$3,991	\$1,619	\$5,610
	—	\$3,577	—	\$3,577	—	\$3,789	—	\$3,789	—	\$4,791	—	\$4,791
Total	\$9,114	\$55,983	\$12,610	\$77,707	\$49,390	\$54,102	\$9,334	\$112,826	\$50,040	\$59,160	\$8,026	\$117,226

a/The data used for compiling this schedule was provided by TVA, and we did not verify the accuracy or completeness of the information.

b/Represents an accrued contribution that was not made.

some TVA personnel were uncertain about the criteria that should be used for identifying expenditures that would be subject to the 2 percent ceiling.

While it did not appear that the informal ceiling had been exceeded, we concluded that more formal policy guidance was needed in the area and recommended that the TVA Board of Directors issue a written policy addressing

- the level of power funds TVA was willing to spend annually on RD&D,
- the rationale for selecting that level of spending, and
- the criteria to be used in identifying the types of expenditures covered by the spending ceiling.

In commenting on our report, TVA pointed out that the 2 percent limit was established as an internal planning guideline for funding RD&D projects and that it should not be viewed as a specific spending target. TVA also pointed out that (1) its RD&D managers had to justify to top-level management both ongoing and new projects for which funding was proposed in a budget year and (2) it used its power revenue funds only for those projects that were applicable to the power system's current or future needs and were not being pursued by other research activities. TVA further stated that the Board of Directors had to retain sufficient flexibility in determining levels of R&D expenditures from power proceeds to be able to adapt to changing technological and regulatory circumstances.

As part of our followup work, we found that the TVA Board of Directors had issued a written policy containing the guidance we recommended. Moreover, we found that the Office of Power had been issuing specific written guidance for its energy demonstrations and technology efforts as part of its annual power planning process. The written guidelines issued for fiscal year 1982, for example, contained specific instructions on RD&D program goals, funding levels to be considered, and work to be accomplished on individual projects in the current and future fiscal years. This kind of guidance eliminates the uncertainty that existed at the time of our prior review about the kind of effort that was to be funded using power revenue proceeds. We also noted that TVA was well within its 2 percent ceiling general guideline for fiscal years 1980 through 1982 and that expenditures from power revenue proceeds during this period amounted to 1.8 percent, 1.4 percent, and 1.5 percent, respectively, of gross revenues. For these reasons, we are not making any further recommendations in this area.

REDIRECTION OF EFFORT ON DEMONSTRATION PROJECTS

When the current administration took office in January 1981, it proposed an energy program significantly different from

the previous administration's program and altered several of the congressional mandates contained in earlier legislation. The new administration's policy is designed to limit the Government's energy program to include only long-term, high-risk, and high-payoff research and development which industry could not be expected to undertake. This policy was predicated on the assumption that, as a technology moves closer to demonstration and commercialization, the Government's role should be curtailed and that industry should then provide financial support for such technologies. Significant reductions were therefore made in Federal energy R&D funding. The administration's fiscal year 1983 energy R&D budget request, for example, amounted to \$2.3 billion, or \$2.4 billion less than the fiscal year 1981 funding level of \$4.7 billion.

Over the past 2 fiscal years, the Congress has reviewed TVA's requests for appropriated funds for RD&D projects along the lines of the administration's current energy policy. In its review of the agency's fiscal year 1982 budget request, for example, the Senate Committee on Appropriations cautioned TVA to manage its national energy demonstration program so that its role would be of limited duration, leaving commercialization decisions to the consumer and market forces. In commenting on TVA's fiscal year 1983 budget, the committee pointed out that TVA should reevaluate programs and activities initiated in the past and that it should not be involved in development demonstration efforts outside the Tennessee Valley region unless specifically authorized and approved by appropriate legislative committees and the Committees on Appropriations.

The change in the Government's policy on energy research and development has affected TVA's RD&D program activities. The agency, for example, did not request any appropriated funds for its RD&D program for either fiscal year 1983 or 1984. As a result TVA has redirected some of its programs and phased others out. In addition to the direct impact on its appropriated funds, funding from other Federal departments and agencies has also decreased because of reductions in their energy-related appropriations. In addition, competition for research funds from private organizations has intensified and funding from these sources is now more difficult to obtain.

As shown in table 15, TVA plans to expend \$122.4 million for RD&D activities for fiscal year 1983; however, \$63.8 million of this amount is a carryover from prior year appropriations, leaving a balance of \$58.6 million that will be financed from power revenues or other sources, such as EPRI. Excluding carryover appropriations, TVA's planned expenditures of \$58.6 million for fiscal year 1983 represent about half the \$115 million that it averaged spending in fiscal years 1981 and 1982. TVA is planning approximately the same level of power revenue expenditures in fiscal 1983 as in each of the previous 3 fiscal years.

Table 15

Fiscal Year 1983
Projected Expenditures for
Research and Development Activities (Note a)

	Funding source			<u>Total</u>
	<u>Appropriations</u> (note b)	<u>Power</u>	<u>Other</u>	
	----- (in thousands) -----			
National energy demonstrations:				
Solar biomass	\$ 80	\$ -	\$ -	\$ 80
Transportation	-	550	500	1,050
Fuel cells	700	-	200	900
Atmospheric fluidized-fed combustion	-	5,338	3,000	8,338
Coal gasification	63,000	-	-	63,000
Waste heat and energy	20	-	-	20
Other	-	-	-	-
Total	<u>63,800</u>	<u>5,888</u>	<u>3,700</u>	<u>73,380</u>
Power research projects:				
Conservation/renewable resources	-	9,010	240	9,250
Power system improvements	-	3,025	-	3,025
Environmental	-	1,920	860	2,780
Coal research	-	1,865	-	1,865
Biothermal research	-	836	-	836
Total	<u>-</u>	<u>16,656</u>	<u>1,100</u>	<u>17,756</u>
Contributions:				
EPRI	-	22,459	-	22,459
Other	-	1,462	-	1,462
Total	<u>-</u>	<u>23,921</u>	<u>-</u>	<u>23,921</u>
Miscellaneous research	-	1,942	1,615	3,557
Administrative expense	-	3,735	-	3,735
Total	<u>\$63,800</u>	<u>\$52,142</u>	<u>\$6,415</u>	<u>\$122,357</u>

a/The data used for compiling this schedule was provided by TVA; we did not verify the accuracy or completeness of the information.

b/These funds represent carryover appropriations from prior fiscal years.

The appropriation funding for the national energy demonstration area has also been reduced. Excluding carryover appropriations, TVA plans to spend about \$9.6 million in fiscal year 1983 as compared to its average expenditure level from all sources of about \$68.5 million during the 2 prior fiscal years. Most of the reduction is the result of the completion of the 20 megawatt atmospheric fluidized-bed combustion (AFBC) plant which accounted for approximately \$35 million of appropriated funds in fiscal years 1981 and 1982.

TVA is also continuing work on several of its major demonstration projects, including such efforts as the AFBC project, the electric vehicle program, fuel cells, and the coal gasification project. All of these projects, however, have been affected by funding constraints, and TVA is in the process of seeking alternative financing sources. Of the \$173 million that TVA spent on national energy demonstrations over the past 3 fiscal years, about \$148 million, or about 85 percent, was spent on two projects--AFBC and the coal gasification process. We therefore selected these two projects to provide updated status data and to illustrate the agency's current activities in national demonstration projects.

Atmospheric fluidized-bed combustion

The AFBC program of TVA is designed to demonstrate the commercial feasibility of the AFBC system for central-station electric power generation. AFBC would permit burning high-sulfur coal from the large eastern coal reserves in an environmentally acceptable fashion, and the technology would eliminate the need for scrubbing the flue gas and also the related sludge disposal problems associated with conventional coal-fired steam plants. According to TVA, the AFBC system represents a highly promising alternative to conventional coal-fired and nuclear powerplants for utilities needing central-station generating capacity in the early to mid-1990's.

TVA initiated work on its AFBC program in the 1970's and planned to design and construct a 20-megawatt equivalent pilot plant to be followed by a 200-megawatt demonstration plant. We discussed the status of TVA's AFBC program in a November 1979 report³ which addressed the Government's overall progress in fluidized-bed combustion technology, and reported that the technology's concept was sound and that several small-scale units had already been operating successfully for several years. We also reported that the AFBC technology had the potential to burn coal more efficiently and economically than conventional coal-fired boilers with pollution control equipment. However,

³"How To Burn Coal Efficiently and Economically, and Meet Air Pollution Requirements--The Fluidized-Bed Combustion Process" (EMD-80-12, Nov. 9, 1979).

we pointed out that in order to commercialize the technology, its reliability under industrial and utility loads had to be demonstrated and that DOE should intensify its efforts to demonstrate the AFBC's commercial feasibility.

We concluded that DOE should make every effort to accomplish the necessary demonstration and made several recommendations designed to expedite this effort. One of our recommendations was that DOE should enter into an interagency agreement with TVA for hosting its planned 200-megawatt demonstration plant. While DOE agreed that a cooperative agreement with TVA to pursue an AFBC demonstration plant was feasible, it pointed out that TVA's program at that time had not progressed to a point where such an agreement would be practical.

During fiscal years 1980 and 1981, TVA continued its work on the pilot plant and its planning for the 200-megawatt demonstration plant. As part of an analysis of Federal funding for utility research, we again reviewed the status of TVA's AFBC program and reported⁴ in September 1981 that the current administration's policy on federally supported R&D would have a significant impact on energy demonstration projects, including TVA's AFBC program. We pointed out that TVA had its 20-megawatt pilot plant ready for operation and that the pilot plant was to be followed by a 200-megawatt demonstration plant. At that time, TVA and EPRI planned to fund 50 percent of the cost of the demonstration plant, and DOE was expected to fund the remaining cost. We pointed out, however, that DOE was not supporting utility-related efforts for the AFBC technology and did not request funds for it in fiscal year 1982. At that time, TVA and EPRI officials told us that lack of Federal funds would certainly delay and could eliminate the planned commercial demonstration of the technology.

The 20-megawatt equivalent pilot plant was completed in March 1982 at a cost of about \$68.4 million, and TVA accepted the facility from the contractor in June 1982. Since that time, the plant has been operated over 1,000 hours, and TVA is conducting a 42-month test program at the plant. The test program, estimated to cost about \$28.5 million, is being funded by \$18.5 million from EPRI and \$10 million from TVA power revenues.

As a result of funding constraints, coupled with several other factors, TVA reassessed its overall AFBC program in 1981 and decided to terminate its prior plans for a stand-alone demonstration plant, which would have cost an estimated \$600 million, and to pursue an option consisting of an add-on boiler and powerhouse at its Shawnee Steam Plant at an estimated cost of about \$200 million. As part of its evaluation of the AFBC

⁴"Analysis of Federal Funding for Electric Utility R&D Projects" (EMD-81-145, Sept. 28, 1981).

program, TVA also reduced the size of the demonstration project from 200 to 160 megawatts in order to better match the compatibility of the pilot plant to the Shawnee plant. According to TVA, this approach will provide essentially the same benefits as the 200-megawatt facility at a substantial cost reduction.

Because of the administration's current policy on energy demonstration projects, however, TVA did not request any appropriations for the demonstration project in its fiscal year 1983 or 1984 budget submissions, but it is in the process of exploring several sources of potential financing.

In February 1983, Duke Power Company of North Carolina, the State of Kentucky, and TVA signed an agreement to apply to EPRI for \$100 million to support a jointly designed, built, and operated 160-megawatt AFBC demonstration plant. The plant is estimated to cost \$200 million, and other utilities and coal companies will be approached to join with Duke, Kentucky, EPRI, and TVA to finance the remaining costs.

EPRI is exploring the potential interest among private utilities to host a co-sponsored 100- to 200-megawatt demonstration facility and has received positive responses from more than 10 utilities. EPRI has selected several sites, including TVA's proposed add-on at its Shawnee Steam Plant, for detailed evaluation. According to TVA, EPRI plans to select the host utility by mid-1984 for detailed design and construction of the project. TVA advised us that its future plans for an AFBC demonstration project would in part depend on EPRI's decision.

Coal gasification

Using appropriated funds, TVA initiated work in 1979 on a coal gasification plant, called the North Alabama Coal Gasification Project. TVA planned to construct the plant in several modules with the first module being ready for operation in early fiscal year 1986.

TVA estimated that the cost of the project would approach \$2 billion; however, the agency could not use power proceeds because there were no near-term benefits to the ratepayers. TVA therefore received appropriated funds of \$210 million in fiscal years 1980 and 1981. When completed, the plant was to have been owned and operated by TVA, which planned to repay the appropriations from the sale of synthetics produced by the plant. As a result of the redirection of Federal policy on funding demonstration projects and the establishment of the Synthetic Fuels Corporation (SFC), the Congress in mid-1981 rescinded \$85 million of the previous appropriations, leaving TVA with \$125 million to continue preliminary work on the project.

The Congress directed TVA to continue its efforts to organize and establish a consortium of private firms to fund the project with financial assistance from the SFC. Under this arrangement, the consortium would own and operate the plant and

sell the synthetics and by-products produced. As part of the arrangement, the Congress also directed that TVA repay the Federal investment out of the proceeds from the project. TVA has been working on several parallel activities to advance the status of the project. Thus far, five firms having about one-half of the required equity have joined the consortium, and TVA and the financial agent for the consortium are actively seeking the additional equity partners needed. The consortium is also seeking a combination of loan and price support agreements from the SFC.

TVA currently plans to sign a contract with the consortium in late fiscal year 1983. The contract would transfer ownership to the consortium and include appropriate repayment terms for TVA's investment. This projected schedule, however, is contingent on the consortium being completed by that time and on the status of negotiations between the consortium and the SFC for financial assistance. If this schedule is met, TVA projects that the \$125 million in appropriations would be obligated and all but \$5 million would be expended by the end of fiscal year 1983. This schedule would also permit the plant to be completed in early 1987 and to begin commercial operations in late 1987.

CONCLUSIONS

For a number of years, TVA has been actively engaged in conducting research on various energy-related technologies that showed promise of contributing to more efficient and economical production and transmission of electric power. As part of this effort, TVA has also conducted a number of demonstration projects to determine the feasibility of commercializing several of the technologies. The new energy policy designed to limit the Government's support of long-term, high-risk, and high-payoff research and development, however, resulted in Federal funding for energy demonstration projects being significantly curtailed, including those being carried out by TVA.

Some of the projects that TVA is continuing to fund from its power revenues and other sources appear to have considerable merit, especially the AFBC demonstration project. This technology appears to represent a highly promising and cost-effective alternative to conventional coal-fired and nuclear powerplants for utilities, including TVA, that may need central-station generating capacity in the early to the mid-1990's. The AFBC process, for example, would permit the burning of high-sulfur coal from the large eastern coal reserves in an environmentally acceptable manner without the need for certain expensive pollution control devices required for conventional coal-fired steam plants.

GAO REPORTS/TESTIMONYCITED IN EACH REPORT CHAPTERCHAPTER 1

"Triennial Assessment of the Tennessee Valley Authority--
Fiscal Years 1977-1979," EMD-80-91, August 13, 1980.

CHAPTER 2

"Electric Energy Options Hold Great Promise for the Tennessee Valley Authority," EMD-78-91, November 29, 1978.

"Triennial Assessment of the Tennessee Valley Authority--
Fiscal Years 1977-1979," EMD-80-91, August 13, 1980.

Statement of J. Dexter Peach, Director, Energy and Minerals
Division, before the Committee on Appropriations, U.S.
Senate, December 11, 1980.

Statement of J. Dexter Peach, Director, Energy and Minerals
Division, before the Committee on Environment and Public
Works, U.S. Senate, March 16, 1981.

"TVA Is Justified in Deferring the Yellow Creek Unit 1
Nuclear Power Plant," EMD-82-114, July 30, 1982.

"Analysis of the Feasibility of Tennessee Valley Authority
Power Being Made Available Through Power Exchange
Arrangements to General Public Utilities," EMD-82-129,
September 30, 1982.

CHAPTER 3

"TVA's Coal Procurement Practices--More Effective Management
Needed," EMD-81-65, August 14, 1981.

"TVA's Clean Air Settlement With EPA," EMD-80-49,
January 14, 1980.

"Triennial Assessment of the Tennessee Valley Authority--
Fiscal Years 1977-1979," EMD-80-91, August 13, 1980.

"TVA's Nuclear Fuel Sale and Leaseback Arrangement Needs
Further Analysis and Congressional Oversight," EMD-82-52,
March 18, 1982.

CHAPTER 4

"Tennessee Valley Authority--Options for Oversight,"
EMD-82-54, March 19, 1982.

CHAPTER 5

"TVA's Internal Audit Improved but Inspector General May Still Be Needed," EMD-82-61, March 19, 1982.

CHAPTER 6

"TVA Needs To Improve Management of Power Stores Inventories," LCD-80-32, January 25, 1980.

"The Tennessee Valley Authority Needs To Improve Security and Inventory Controls at Power Sites," EMD-81-60, March 10, 1981.

"Review of the Tennessee Valley Authority's Procurements of Automatic Data Processing Equipment," EMD-81-20, November 7, 1980.

"TVA's Computer Needs Are Valid and ADP Management Is Improving," AFMD-82-24, June 9, 1982.

"Cost Impacts of Reorganizations at the Tennessee Valley Authority," EMD-81-54, February 25, 1981.

"A Process To Determine Whether To Construct Projects In-house or by Private Contractor Is Needed by the Tennessee Valley Authority," EMD-82-50, March 15, 1982.

"The Tennessee Valley Authority Needs To Develop a Formal Process for Determining Whether To Construct Projects In-house or by Private Contractor," EMD-82-49, March 15, 1982.

CHAPTER 7

"Tennessee Valley Authority Needs a Written Policy on the Use of Power Systems Revenues for Research, Development, and Demonstration," EMD-81-16, November 25, 1980.

"How To Burn Coal Efficiently and Economically, and Meet Air Pollution Requirements--The Fluidized-Bed Combustion Process," EMD-80-12, November 9, 1979.

"Analysis of Federal Funding for Electric Utility R&D Projects," EMD-81-145, September 28, 1981.

Coopers
& Lybrand

certified public accountants

To the Board of Directors of
Tennessee Valley Authority

We have examined the balance sheets (power program and all programs) of Tennessee Valley Authority as of September 30, 1982 and 1981, and the related statements of income and retained earnings (power program), net expense and accumulated net expense (nonpower programs), and changes in financial position (power program and all programs) for each of the three years in the period ended September 30, 1982. 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 (Exhibits I through IV).

In our opinion, the financial statements referred to above present fairly the financial position of the power program and all programs of Tennessee Valley Authority as of September 30, 1982 and 1981, and the results of operations of the power program and nonpower programs and the changes in financial position of the power program and all programs for each of the three years in the period ended September 30, 1982, in conformity with generally accepted accounting principles applied on a consistent basis.

Our examinations were made for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplemental Schedules A through F are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the examination of the basic financial statements, and in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.



Knoxville, Tennessee
December 21, 1982

TENNESSEE VALLEY AUTHORITY

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

BALANCE SHEETS SEPTEMBER 30, 1982 AND 1981

ASSETS

	Power program		All programs	
	1982	1981	1982	1981
	(Thousands of Dollars)			
PROPERTY, PLANT, AND EQUIPMENT				
substantially all at original cost				
Completed plant; schedule A				
Multipurpose dams; note 1	\$ 529,486	\$ 506,496	\$ 1,269,045	\$ 1,260,824
Single-purpose dams	359,863	359,799	359,863	359,799
Steam production plant	3,170,209	2,802,487	3,170,209	2,802,487
Nuclear production plant	2,522,322	1,876,256	2,522,322	1,876,256
Other electric plant	2,553,265	2,342,877	2,553,265	2,342,877
Other plant	-	-	222,600	213,713
	<u>9,135,145</u>	<u>7,887,915</u>	<u>10,097,304</u>	<u>8,855,956</u>
Less accumulated depreciation and depletion; note 2	<u>2,377,512</u>	<u>2,184,898</u>	<u>2,581,561</u>	<u>2,380,007</u>
Completed plant, net	<u>6,757,633</u>	<u>5,703,017</u>	<u>7,515,743</u>	<u>6,475,949</u>
Construction in progress; schedule B and note 3	5,034,542	6,650,267	5,337,149	6,886,225
Deferred nuclear generating projects, net; schedule B and note 3	<u>2,614,643</u>	<u>1,587,418</u>	<u>2,614,643</u>	<u>1,587,418</u>
	<u>7,649,185</u>	<u>8,237,685</u>	<u>7,951,792</u>	<u>8,473,643</u>
Nuclear fuel; schedule B	318,297	255,635	318,297	255,635
Less accumulated amortization; schedule B and note 2	<u>301,901</u>	<u>229,612</u>	<u>301,901</u>	<u>229,612</u>
Nuclear fuel, net	<u>16,396</u>	<u>26,023</u>	<u>16,396</u>	<u>26,023</u>
Total	<u>14,423,214</u>	<u>13,966,725</u>	<u>15,483,931</u>	<u>14,975,615</u>
INVESTMENT FUNDS				
at amortized cost				
Bond retirement; note 4	32,291	-	32,291	-
Decommissioning of nuclear plant; note 4	<u>26,775</u>	<u>-</u>	<u>26,775</u>	<u>-</u>
Total	<u>59,066</u>	<u>-</u>	<u>59,066</u>	<u>-</u>
CURRENT ASSETS				
Cash	65,430	105,595	219,669	322,710
Accounts receivable	450,598	413,450	461,915	421,264
Inventories, principally at average cost	<u>788,695</u>	<u>583,965</u>	<u>811,131</u>	<u>607,231</u>
Total	<u>1,304,723</u>	<u>1,103,010</u>	<u>1,492,715</u>	<u>1,351,205</u>
DEFERRED CHARGES AND OTHER ASSETS				
Loans and other long-term receivables	294,847	240,573	329,341	261,941
Unamortized cost of cancelled nuclear generating units; note 3	1,291,538	-	1,291,538	-
Mine and mill development costs, net; schedule B and note 2	289,913	284,403	289,913	284,403
Energy conservation cost, net; schedule B and note 2	65,876	45,350	65,876	45,350
Unamortized debt issue and reacquisition expense; note 2	<u>7,153</u>	<u>7,703</u>	<u>7,153</u>	<u>7,703</u>
Total	<u>1,949,327</u>	<u>578,029</u>	<u>1,983,821</u>	<u>599,397</u>
Total assets	<u>\$17,736,330</u>	<u>\$15,647,764</u>	<u>\$19,019,533</u>	<u>\$16,926,217</u>

Notes 1 through 11 following the exhibits are an integral part of the financial statements. Certain amounts were reclassified in 1981 for comparative purposes.

*Deduct

APPENDIX II

APPENDIX II

CAPITALIZATION AND LIABILITIES

	<u>Power program</u>		<u>All programs</u>	
	<u>1982</u>	<u>1981</u>	<u>1982</u>	<u>1981</u>
	(Thousands of Dollars)			
PROPRIETARY CAPITAL				
Appropriation investment; note 5				
Congressional appropriations	\$ 1,413,243	\$ 1,391,602	\$ 3,864,145	\$ 3,735,054
Transfers of property from other Federal agencies, net	23,846	23,855	58,139	58,105
	<u>1,437,089</u>	<u>1,415,457</u>	<u>3,922,284</u>	<u>3,793,159</u>
Less repayments to General Fund of the U.S. Treasury; note 6	555,059	535,059	596,785	576,785
Appropriation investment	882,030	880,398	3,325,499	3,216,374
Retained earnings reinvested in the power program; exhibit II	1,396,753	1,115,830	1,396,753	1,115,830
Accumulated net expense of nonpower programs; exhibit III	-	-	1,230,930*	1,127,059*
Total	<u>2,278,783</u>	<u>1,996,228</u>	<u>3,491,322</u>	<u>3,205,145</u>
LONG-TERM DEBT				
Principal; note 7	13,425,000	11,325,000	13,425,000	11,325,000
Less unamortized discount; note 2	4,923	5,299	4,923	5,299
Total	<u>13,420,077</u>	<u>11,319,701</u>	<u>13,420,077</u>	<u>11,319,701</u>
OTHER LIABILITIES				
Accumulated provisions for				
Decommissioning of nuclear plant	26,784	19,892	26,784	19,892
Disposal of spent nuclear fuel	53,629	48,275	53,629	48,275
Cancellation costs for nuclear generating units; note 3	212,334	-	212,334	-
Total	<u>292,747</u>	<u>68,167</u>	<u>292,747</u>	<u>68,167</u>
CURRENT LIABILITIES				
Short-term debt; note 7				
U.S. Treasury	150,000	150,000	150,000	150,000
Federal Financing Bank	585,000	1,310,000	585,000	1,310,000
Short-term debt	735,000	1,460,000	735,000	1,460,000
Accounts payable	623,226	484,212	665,959	528,095
Employees' accrued leave	29,062	28,614	47,836	43,990
Payrolls accrued	27,017	32,886	36,174	43,163
Interest accrued	330,418	257,956	330,418	257,956
Total	<u>1,744,723</u>	<u>2,263,668</u>	<u>1,815,387</u>	<u>2,333,204</u>
COMMITMENTS AND CONTINGENCIES; notes 3, 8, and 10				
Total capitalization and liabilities	<u>\$17,736,330</u>	<u>\$15,647,764</u>	<u>\$19,019,533</u>	<u>\$16,926,217</u>

TENNESSEE VALLEY AUTHORITY
POWER PROGRAM
STATEMENTS OF INCOME AND RETAINED EARNINGS
FOR THE YEARS ENDED SEPTEMBER 30, 1982, 1981, AND 1980

	1982		1981		1980	
	kWh	Amount	kWh	Amount	kWh	Amount
			(Thousands)	(Dollars)		
OPERATING REVENUES						
Sales of electric energy						
Municipalities and cooperatives	75,681,355	\$2,815,440	76,680,264	\$2,525,399	78,682,040	\$2,130,429
Federal agencies	16,670,674	670,902	14,807,292	474,928	16,922,000	429,000
Industries	15,490,317	626,437	22,180,276	714,921	23,862,225	647,000
Electric utilities	353,778	13,828	709,336	27,748	707,890	20,660
Interdivisional	350,764	14,277	477,943	17,218	394,600	10,000
Revenue credit due customers; note 11	-	183,732*	-	-	-	57,000
Total sales of electric energy	<u>108,546,888</u>	<u>3,957,148</u>	<u>114,855,105</u>	<u>3,760,216</u>	<u>120,570,198</u>	<u>3,183,459</u>
Rents		16,737		16,346		19,100
Discounts and penalties		868		524		190
Other miscellaneous revenues		7,049		2,965		1,450
Total operating revenues		<u>3,981,802</u>		<u>3,780,051</u>		<u>3,204,279</u>
OPERATING EXPENSES; schedule C						
Production						
Fuel		1,322,235		1,449,443		1,301,220
Other		534,903		561,752		479,298
Transmission		45,107		34,049		11,550
Customer accounts		9,059		841		500
Power consumer services		9,095		4,724		
Demonstration of power use		16,890		10,936		5,400
Research, development, and demonstrations		58,777		52,461		47,190
General and administrative		76,635*		140,417		130,300
Payments in lieu of taxes		163,461		137,438		113,560
Provision for depreciation		225,095		198,244		169,030
Total operating expenses		<u>2,461,257</u>		<u>2,590,305</u>		<u>2,278,400</u>
Operating income		<u>1,520,545</u>		<u>1,189,746</u>		<u>925,879</u>
OTHER INCOME AND DEDUCTIONS						
Interest income		1,343		1,379		8,874
Amortization of loss on cancelled nuclear generating units; note 3		256,647*		400,000*		-
Other, net		3,298*		11,923*		6,597*
Total other income and deductions		<u>258,602*</u>		<u>410,544*</u>		<u>2,277*</u>
Income before interest charges		<u>1,261,943</u>		<u>779,202</u>		<u>928,156</u>
INTEREST CHARGES						
Interest on long-term debt		1,260,832		961,083		673,296
Other interest expense		121,481		211,372		207,563
Allowance for borrowed funds used during construction; note 2		511,745*		178,243*		154,666*
Amortization of long-term debt discount and expense; note 2		974		966		958
Net interest charges		<u>871,542</u>		<u>995,178</u>		<u>727,151</u>
NET INCOME (LOSS)		390,401		(215,976)		201,005
Return on appropriation investment; note 6		109,478		86,417		78,413
Increase (decrease) in retained earnings reinvested		280,923		(302,393)		122,592
Retained earnings reinvested at beginning of period		<u>1,115,830</u>		<u>1,418,223</u>		<u>1,295,631</u>
Retained earnings reinvested at end of period		<u>\$1,396,753</u>		<u>\$1,115,830</u>		<u>\$1,418,223</u>

Notes 1 through 11 following the exhibits are an integral part of the financial statements.
#Beginning in 1982, employee benefits were included with labor charges to functional accounts.

*Deduct

TENNESSEE VALLEY AUTHORITY
STATEMENTS OF CHANGES IN FINANCIAL POSITION
FOR THE YEARS ENDED SEPTEMBER 30, 1982, 1981, AND 1980

	Power program			All programs		
	1982	1981	1980	1982	1981	1980
	(Thousands of Dollars)					
SOURCE OF FUNDS						
Program sources						
Net power income or loss*; exhibit II	\$ 390,401	\$ 215,976*	\$ 201,005	\$ 390,401	\$ 215,976*	\$ 201,005
Items not requiring funds; note a	20,019	447,838	22,807	20,019	447,838	22,807
Funds from power operations	410,420	231,862	223,812	410,420	231,862	223,812
Sale of power assets, principally nuclear fuel	312,055	189,604	702,114	312,055	189,604	702,114
Funds from power program; note b	722,475	421,466	925,926	722,475	421,466	925,926
Net expense of nonpower programs; exhibit III				103,871*	91,833*	85,932*
Add items not requiring funds; note a				9,519	7,090*	5,595
Funds used in nonpower operations				94,352*	98,923*	76,337*
Sale of nonpower facilities				916	30,326	459
Funds used in nonpower programs				93,436*	68,597*	75,878*
Debt sources						
Long-term bonds						
Issues	2,100,000	2,300,000	2,400,000	2,100,000	2,300,000	2,400,000
Redemptions	-	-	300,000*	-	-	300,000*
Short-term notes						
Issues	3,870,000	6,660,000	7,312,000	3,870,000	6,660,000	7,312,000
Redemptions	4,595,000*	6,985,000*	7,602,000*	4,595,000*	6,985,000*	7,602,000*
Total debt sources	1,375,000	1,975,000	1,810,000	1,375,000	1,975,000	1,810,000
Other sources						
Liability for cancellation costs for nuclear generating units	212,334	-	-	212,334	-	-
Congressional appropriations	1,677	992	928	129,162	201,936	222,673
Property transfers	10*	47	163	36*	320	432
Total other sources	214,001	1,039	1,091	341,460	202,256	223,105
Total source of funds	\$2,311,476	\$2,397,505	\$2,737,017	\$2,345,499	\$2,530,125	\$2,883,153
DISPOSITION OF FUNDS						
Expended for plant and equipment, excluding allowance for borrowed funds used	\$1,807,230	\$2,220,560	\$2,212,560	\$1,904,940	\$2,296,635	\$2,299,425
Less:						
Depreciation and depletion allowances charged to construction clearing accounts and other asset categories	9,301	8,778	6,128	12,424	11,339	8,663
Cost of removing retired facilities and salvage from retained materials	3,149*	3,571*	2,875*	9,211	12,869*	3,529*
	1,801,078	2,215,353	2,209,307	1,883,305	2,298,165	2,294,291
Payments to U.S. Treasury; note 6	109,478	86,417	78,413	109,478	86,417	78,413
Return on appropriation investment	20,000	20,000	20,000	20,000	20,011	20,005
Repayments of appropriation investment	129,478	106,417	98,413	129,478	106,428	98,418
Investment funds	59,066	-	-	59,066	-	-
Deferred charges and other assets changes						
Loans and other long-term receivables	54,274	118,795	121,179	67,401	137,529	124,412
Mine and mill development cost	24,310	20,998	67,289	24,310	20,998	67,289
Energy conservation cost	35,231	33,534	20,982	35,231	33,534	20,982
Cancellation costs for nuclear generating units	212,334	-	-	212,334	-	-
Debt issue expense	48	40	48	48	40	48
	326,197	173,367	210,098	339,324	192,101	212,731
Changes in working capital (increase or decrease*)						
Cash	40,165*	102,534	1,158	103,041*	142,757	65,023
Accounts receivable	37,148	3,924	12,046*	40,651	83*	12,925*
Inventories	204,730	161,074*	134,048	203,900	159,430*	138,024
	201,713	54,616*	123,160	141,510*	16,756*	190,122
Less other current liabilities (excluding short-term debt)	206,056	43,016	96,039*	207,184	49,813	87,591*
	4,343*	97,632*	219,199	65,674*	66,569*	277,713
Total disposition of funds	\$2,311,476	\$2,397,505	\$2,737,017	\$2,345,499	\$2,530,125	\$2,883,153

*Deduct

TENNESSEE VALLEY AUTHORITY
 STATEMENTS OF CHANGES IN FINANCIAL POSITION
 FOR THE YEARS ENDED SEPTEMBER 30, 1982, 1981, AND 1980

NOTES:

a. Items not requiring funds:

	Power			Nonpower		
	1982	1981	1980	1982	1981	1980
	(Thousands of Dollars)					
Provision for depreciation	\$225,095	\$198,244	\$169,032	\$9,297	\$ 9,819	\$9,464
Amortization of loss on cancelled nuclear units	256,647	400,000	-	-	-	-
Net loss or gain* on retirements and disposals of property, plant, and equipment	3,298	11,923	4,499	222	16,909*	131
Amortization of energy conservation cost	14,705	7,067	2,098	-	-	-
Provision for writeoff of uranium properties	18,800	3,000	-	-	-	-
Provision for disposal of spent fuel	5,354	4,881	886	-	-	-
Provision for decommissioning nuclear plants	6,891	-	-	-	-	-
Amortization of long-term debt discount and expense	974	966	958	-	-	-
Allowance for borrowed funds used during construction	511,745*	178,243*	154,666*	-	-	-
	<u>\$ 20,019</u>	<u>\$447,838</u>	<u>\$ 22,807</u>	<u>\$9,519</u>	<u>\$ 7,090*</u>	<u>\$9,595</u>

b. Net power proceeds (see note 7) may be derived as follows:

	Year ended September 30		
	1982	1981	1980
	(Thousands of Dollars)		
Funds from power program	\$ 722,475	\$ 421,466	\$ 925,926
Add back interest	<u>1,382,313</u>	<u>1,172,455</u>	<u>880,859</u>
Net power proceeds	<u>\$2,104,788</u>	<u>\$1,593,921</u>	<u>\$1,806,785</u>

Notes 1 through 11 following the exhibits are an integral part of the financial statements.

*Deduct

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 \$1,269,045,000 in completed multipurpose dams at September 30, 1982, is classified as follows:

	Investment		
	Direct	Multiple-Use	Total
	(Thousands)		
Power	\$323,892	\$205,594	\$ 529,486
Navigation	164,260	161,721	325,981
Flood control	65,364	183,003	248,367
Recreation	6,259	115,009	121,268
Local economic development	144	43,799	43,943
Total	<u>\$559,919</u>	<u>\$709,126</u>	<u>\$1,269,045</u>

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. 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 are derived from engineering studies of useful life and are reviewed each year. Depletion of coal land and landrights and phosphate land and mineral rights is provided on a unit of production basis.

Decommissioning--Provisions for decommissioning costs of nuclear generating units are derived through engineering studies of useful life and estimated costs based on the dismantling/removal method. The present cost estimates for decommissioning are based on a current dollar basis amounting to \$42 million and \$55 million per unit, respectively, for pressurized water and boiling water reactors.

Allowance for funds used--The practice of capitalizing an allowance for funds used during construction is followed in the power program. In accordance with the TVA Board of Directors criteria for establishing wholesale power rates, the allowance is applicable to construction in progress excluding generating facilities in a deferred status. The amount of interest capitalized is limited to the amount of depreciation and other noncash charges less the amount of the repayment of the appropriation investment to the U.S. Treasury. 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.

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--Nuclear fuel is obtained directly from vendors and through contractual arrangements for mining, milling and fabrication of raw materials obtained from land leased by TVA. During fiscal year 1980, TVA entered into an agreement whereby it will sell and lease back nuclear fuel on hand except prior to the milling stage or in a spent condition. The lease meets the criteria of a capital lease as defined by statement of Financial Accounting Standards No. 13 but is not accounted for as such

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS--CONTINUED

in accordance with the ratemaking process. Certain nuclear fuel amounts included in the balance sheet at September 30, 1982, represent acquisition transactions that will be included in the sale-lease agreement during ensuing months. The nuclear fuel costs are charged to operations on a unit of production basis in amounts equal to lease payments (the cost of fuel burned plus finance charges) and a provision for spent nuclear fuel disposal.

Energy conservation cost--Certain energy conservation program costs are deferred and charged to operations over a five-year period.

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. A determination has been made that the cost related to certain uranium properties may not be recovered from future operations and that an estimated unrecoverable amount should be charged to operations over a five-year period beginning in fiscal year 1981 with a reevaluation of the provision to be made annually. An estimated amount of \$15 million was established in fiscal year 1981 and increased to \$94 million in fiscal year 1982.

Operating revenues--Revenues from the sale of electric energy are recorded only when billed. Revenue credits due customers are recorded in accordance with authorization of the Board of Directors.

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.

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--The construction budgets for fiscal year 1983 are \$2,061,377,000 for power projects and \$69,698,000 for multipurpose and nonpower projects. Substantial commitments have been incurred for these projects.

In August 1982, the TVA Board of Directors approved cancellation of construction of four previously deferred nuclear generating units, two units at Phipps Bend plant and two units at the Hartsville plant site. The plants being constructed were to meet forecasted load requirements based upon projected growth in demand for electricity at the time construction began. Present trends in the demand for electricity indicate that the forecasts upon which the plants were being constructed may not be realized by the time the plants had been scheduled for completion, or during the time covered by present forecasts. Because of the probability of permanent curtailment of certain nuclear generating units in a deferred construction status, the estimated minimum cost of such curtailment of \$400 million for one unit was included in the expenses of TVA for fiscal year 1981.

The costs incurred to the date of cancellation of \$1.9 billion, including estimated cancellation of \$212 million, less \$400 million provided during fiscal year 1981, will be recovered through rates from customers and accordingly is being reflected as deferred charges on the financial statements. Annual amortization of these costs is calculated as the amount equivalent to the allowance for funds used less other noncash charges plus the amount of the repayment of the appropriation investment to the U.S. Treasury. By resolution of the TVA Board of Directors, the total amount must be amortized within ten years of date of cancellation. For the fiscal year 1982, the amount of the amortization of the loss on cancelled plants was \$257 million.

During 1982, the Board deferred construction on three nuclear generating units which brought the total to four units at two sites in a deferred status at September 30, 1982. At September 30, 1982, cost incurred on these deferred units was approximately \$2.6 billion. If these deferred units are not completed, additional losses for permanent curtailment of these projects will be recognized.

4. Investment funds--On September 30, 1982, investments of power funds totaling \$59.1 million were made in U.S. Government securities to provide for the accumulation of funds required for retirement of bonds and decommissioning of nuclear plants. The bond retirement fund was established to provide funds to retire \$1.85 billion of bond debt by the end of the 20th year from the date of the cancellation of construction of four nuclear units. The decommissioning fund was established to provide funds for estimated nuclear plant decommissioning costs when incurred at the end of the life of the plants. Annual deposits into the funds will be based upon annual calculations of the requirements considering rates of return, inflation, and revised estimates for decommissioning.

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS--CONTINUED

5. Appropriation investment--Changes in appropriation investment during the years ended September 30, 1982 and 1981, were as follows:

	<u>Power program</u>		<u>All programs</u>	
	<u>1982</u>	<u>1981</u>	<u>1982</u>	<u>1981</u>
	(Thousands)			
Congressional appropriations, net	\$ 21,642	\$ 927	\$ 129,162	\$ 201,936
Transfers of property from other Federal agencies	10*	47	36*	320
	<u>21,632</u>	<u>974</u>	<u>129,126</u>	<u>202,256</u>
Less repayments to General Fund of the U.S. Treasury	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,011</u>
Increase or decrease* for the period	1,632	19,026*	109,126	182,245
Balance, beginning of period	<u>880,398</u>	<u>899,424</u>	<u>3,216,373</u>	<u>3,034,129</u>
Balance, end of period	<u>\$882,030</u>	<u>\$880,398</u>	<u>\$3,325,499</u>	<u>\$3,216,374</u>

*Deduct

An appropriation of \$129 million for the fiscal year beginning October 1, 1982, has been approved.

6. 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.

Required payments have been made as follows:

	<u>Return</u>	<u>Repayment</u>	<u>Total</u>
	(Thousands)		
Total to September 30, 1981	\$1,198,601	\$350,000	\$1,548,601
Year ended September 30, 1982	<u>109,478</u>	<u>20,000</u>	<u>129,478</u>
	<u>\$1,308,079</u>	<u>\$370,000</u>	<u>\$1,678,079</u>

For fiscal year 1983 the required payments will be \$106,567,000 as a return on the appropriation investment at the computed average interest rate of 12.082 percent and \$20,000,000 as a repayment, a total of \$126,567,000.

In addition to the payments from net power proceeds, certain nonpower proceeds are paid to the U.S. Treasury under the provisions of Section 26 of the TVA Act. There were no payments made in 1982, but previous payments from nonpower proceeds amount to \$41,726,000.

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.

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS--CONTINUED

7. Borrowing authority--Section 15d of the TVA Act authorizes TVA to issue bonds, notes, and other evidences of indebtedness up to a total of \$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, 1982, 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
10.545% 1979 Series D, due October 31, 2004 (FFB)	400,000
11.225% 1980 Series A, due January 31, 2005 (FFB)	500,000
12.955% 1980 Series B, due March 31, 2005 (FFB)	500,000
10.475% 1980 Series C, due June 30, 2005 (FFB)	500,000
10.890% 1980 Series D, due August 31, 2005 (FFB)	500,000
12.425% 1980 Series E, due November 30, 2005 (FFB)	500,000
12.735% 1981 Series A, due March 31, 2011 (FFB)	500,000
12.925% 1981 Series B, due April 30, 2011 (FFB)	500,000
13.255% 1981 Series C, due June 30, 2011 (FFB)	500,000
14.905% 1981 Series D, due September 30, 2011 (FFB)	300,000
13.035% 1981 Series E, due December 31, 2011 (FFB)	650,000
13.565% 1982 Series A, due April 30, 2012 (FFB)	700,000
13.575% 1982 Series B, due May 31, 2012 (FFB)	300,000
14.125% 1982 Series C, due July 31, 2012 (FFB)	350,000
11.945% 1982 Series D, due September 30, 2012 (FFB)	100,000
Total long-term debt	<u>13,425,000</u>
Short-term debt	
U.S. Treasury	150,000
Federal Financing Bank (FFB)	585,000
Total short-term debt	<u>735,000</u>
	<u>\$14,160,000</u>

A \$200 million bond issue, 10.725 percent 1982 Series E, due November 30, 2012, was sold to the Federal Financing Bank in November 1982.

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS--CONTINUED

During fiscal years 1982, 1981, and 1980, the maximum amount of short-term borrowings outstanding was \$1,790,000,000, \$2,000,000,000, and \$2,122,000,000, respectively, and the average amount (and weighted average interest rates) of such borrowings was approximately \$880,000,000 (13.8 percent), \$1,450,000,000 (14.5 percent), and \$1,790,000,000 (11.6 percent), respectively.

8. Lease obligations--At September 30, 1982, TVA had sold and leased back approximately \$1.2 billion of nuclear fuel. Estimated lease payments (exclusive of finance charges) are estimated to be: 1983, \$101 million; 1984, \$127 million; 1985, \$180 million; 1986, \$248 million; 1987, \$284 million. These estimates include additional sale-lease transactions. Lease payments for nuclear fuel charged to operations for the years ended September 30, 1982, 1981, and 1980, amounted to approximately \$84 million, \$57 million, and \$45 million, respectively.

At September 30, 1982, the aggregate minimum gross rental commitments of TVA under all noncancelable operating leases are as follows: 1983, \$18,672,000; 1984, \$16,952,000; 1985, \$10,084,000; 1986, \$6,544,000; 1987, \$6,141,000; and thereafter, \$62,381,000. The total rentals charged to power operating expenses and other operating clearing accounts for the years ended September 30, 1982, 1981, and 1980, amounted to approximately \$32,206,000, \$26,759,000, and \$23,159,000, respectively.

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. The option will be exercised on December 31, 1984.

9. 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, including amortization of unfunded prior service costs over the average future careers of active members, was \$71,955,000 in 1982, \$70,241,000 in 1981, and \$59,978,000 in 1980. These costs are charged to all TVA activities in relation to direct labor charges.

The valuation information as of September 30, 1981 and 1980, the latest actuarial valuation dates, follows:

	<u>1981</u>	<u>1980</u>
Assumed rate of return used in determining actuarial present value of accumulated plan benefits	8.5%	8.5%
Actuarial present value of accumulated plan benefits (thousands)		
Vested	\$614,887	\$543,308
Nonvested	38,940	19,209
	<u>\$653,827</u>	<u>\$562,517</u>
Net assets at market value available for benefits	<u>\$684,737</u>	<u>\$646,034</u>

10. Litigation--A consent decree, incorporating the terms of a settlement agreement in five cases, was approved and entered by the United States District Court for the Middle District of Tennessee in December 1980. The citizens' suits had been filed in five different district courts under the Clean Air Act. The complaints alleged that the sulfur dioxide emissions from eight of TVA's coal-fired steam plants and the particulate emissions from six coal-fired plants violate the emission standards set by the States. Plaintiffs include the Commonwealth of Kentucky and the United States of America at the request of the Environmental Protection Agency (EPA). The cases were consolidated in the United States District Court for the Middle District of Tennessee. A consent decree, incorporating the terms of a settlement agreement covering two plants in Alabama, was approved and entered by the United States District Court for the Northern District of Alabama in October 1979. Both settlements specify compliance schedules to control sulfur dioxide and particulate emissions at TVA steam plants and provide for stipulated daily penalties if TVA does not meet these compliance schedules. TVA liability for penalties and fines for past violations is waived. TVA's August 1979 proposal to delete the Cumberland scrubber project and any reference to activities in lieu of penalties and TVA's August 1980 proposal to delete the Johnsonville scrubber project and substitute therefore a low-sulfur coal compliance strategy for that plant were agreed to by all parties and incorporated into the settlements. TVA is potentially subject by law to mandatory noncompliance penalties under section 120 of the Clean Air Act Amendments of 1977 which, if levied by EPA, will be separate from the court action. Temple, Barker & Sloane, Inc., in a report prepared for EPA, estimated TVA's potential liability, calculated from July 1979 to the date TVA's plants will achieve compliance, at about \$320 million. Since the report was issued, EPA has promulgated final regulations implementing section 120. These final regulations provide for calculation of penalties from the date of receipt of a notice of violation until compliance is achieved and do not consider preceding periods of noncompliance. Under EPA regulations, notices of violation will be issued to noncomplying sources in phases commencing no sooner than January 1, 1981. It is EPA's stated policy to issue notices first to those sources not in compliance with approved compliance schedules. When TVA would be

TENNESSEE VALLEY AUTHORITY
NOTES TO FINANCIAL STATEMENTS--CONTINUED

issued such a notice is unknown, and it is therefore impossible to calculate the amount of penalties TVA might be assessed. However, since the penalties are not retroactive and TVA is rapidly bringing its plants into compliance, the penalties which TVA may ultimately have to pay would be substantially less than the Temple, Barker & Sloane, Inc., estimates. Petitions for review of EPA's section 120 regulations have been filed with the Circuit Court of Appeals for the District of Columbia by several parties, including TVA. It is TVA's position that under the Clean Air Act no penalties are due.

The United States Court of Appeals for the Sixth Circuit has affirmed the judgment and adopted the opinions of the United States District Court dismissing a complaint for declaratory relief against TVA and finding for TVA on its counterclaim. The plaintiff, which purchased electricity directly from TVA under a power contract, challenged the validity of certain of the contractual provisions including the minimum bill provision. TVA counterclaimed for unpaid minimum bills and late payment charges and was awarded \$1,616,114.79, plus statutory interest in lieu of late payment charges after the date of the court's liability decision. Plaintiff's time for seeking certiorari has not yet expired.

A direct power customer has filed suit to have its December 31, 1980 power contract declared void because of alleged misrepresentations by TVA, and seeking unspecified amounts of damages, court costs, and attorneys' fees. TVA has counterclaimed for amounts due under the contract.

A former TVA hourly construction worker sought reinstatement to his previous job at a TVA construction project after a period of full-time active duty training in the Tennessee National Guard. TVA denied reinstatement and the Merit Systems Protection Board affirmed on the grounds that the petitioner had been in a "temporary" position and thus had no statutory rights to reinstatement under the statute he relied upon. On petition for review, the Sixth Circuit reversed and remanded for reconsideration under the court's definition of "temporary." Both parties have petitioned for rehearing. Recovery by petitioner would mean that TVA could be liable to grant military leave in accordance with statute to its hourly trades and labor construction employees with the appropriate military backgrounds, and also paid annual and sick leave. TVA does not now accord to such employees any of these kinds of paid leave because TVA believes they are ineligible under the statutes. The financial effects of such a holding are presently unknown and are not now calculable.

The United States District Court in Chattanooga has dismissed the suit, mentioned here last year, challenging the reconstruction and operation of the Ocoee No. 2 hydroelectric project. The court granted TVA's motion for summary judgment, finding that the TVA Board's reconsideration and reaffirmation of its decisions concerning the project complied with the law, and further concluding that the National Environmental Policy Act of 1969 "does not dictate that the TVA direct power resources or funds to nonpower purposes." Plaintiffs' time to appeal has expired. The United States District Court in Nashville has ruled that TVA does not need a permit from the Tennessee State Water Quality Board in order to divert the river from its bed for hydroelectric generation purposes. This issue is now before the United States Court of Appeals for the Sixth Circuit.

TVA has been permitted to intervene in a proceeding brought by the State of New York in the Sixth Circuit Court of Appeals to review an action by the Administrator of the Environmental Protection Agency. New York seeks to reverse the Administrator's approval of a portion of the Tennessee State Implementation Plan which increased allowable sulfur dioxide emissions from the Kingston Steam Plant, claiming that New York's air quality will be adversely affected thereby. Final nonapproval of the increase in emissions could increase TVA's air quality compliance costs at Kingston by about \$35 million per year.

On November 18, 1977, TVA filed antitrust suits against 10 foreign uranium producers and 3 domestic firms. The complaints were filed in United States 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 has not yet been precisely determined. The cases were consolidated in Chicago for pretrial purposes by the Judicial Panel on Multidistrict Litigation. To date, settlements have been reached with seven foreign defendants and two domestic defendants. The benefits to TVA of this partial settlement of the suit total hundreds of millions of dollars. The case against two defendants was dismissed. Discovery is continuing against the remaining defendants, Gulf Oil Corporation and Gulf Minerals Canada Ltd. It is likely that the case will go to trial early in 1983.

A suit filed in the United States District Court for the Middle District of Tennessee challenges TVA's charging of rates to produce revenues to pay interest costs on funds borrowed for construction of new facilities. Plaintiffs seek a declaratory judgment that TVA's action is unlawful and an injunction requiring TVA to "refund" to consumers about \$1 billion in alleged "overcharges," representing current interest charges collected from ratepayers. TVA has moved to dismiss or for summary judgment. In TVA's opinion, plaintiffs are unlikely to prevail.

11. Revenue credit due customers--In August 1982, the TVA Board of Directors authorized that the amount received from power sales exceeding operating expenses and interest coverage rates of 1.10 would be returned to customers. The revenue credit of \$183,732,000 for fiscal year 1982 will be used to offset future rate increases with \$140 million being applied to rates that went into effect October 1982. During fiscal year 1980, the Board authorized a revenue credit of \$57 million that was returned to customers during fiscal year 1981.

TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE 37902

OFFICE OF THE BOARD OF DIRECTORS

March 25, 1983

The Honorable J. Dexter Peach
Director
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

The Tennessee Valley Authority welcomes the opportunity to comment on the General Accounting Office report, "Triennial Assessment of the Tennessee Valley Authority--Fiscal Years 1980-82," (GAO/RCED 83-123).

In general, we find that the report represents accurately TVA's views on the subjects examined by GAO. With respect to TVA's coal management, we would point out that TVA has previously commented on an earlier GAO report on this matter. In this response we noted that many of the coal contracts during the late 1970s were made necessary by TVA's obligations to implement the air quality settlement through purchase of low sulfur coal for TVA's coal-fired steam plants. TVA will continue the many activities cited in its earlier response to GAO that pertain to dealing with the increasing uncertainty in meeting future coal requirements. We are also developing more sophisticated tools and methods in order to achieve maximum flexibility in managing TVA's coal procurement.

We appreciate the cooperation of the GAO staff in preparing the assessment and in considering TVA's views.

Sincerely,



C. H. Dean, Jr.
Chairman

Enclosure

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