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**T**ennessee  
Valley  
Authority  
Power Annual Report 1979



# Power Annual Report

For the fiscal year ended September 30, 1979  
Tennessee Valley Authority  
A corporation wholly owned by the United States of America

**T**VA is a corporate agency of the United States Government. It was established by Act of Congress in 1933 to develop the Tennessee River system and to assist in the development of other resources of the Tennessee Valley and adjoining areas.

The production and sale of electric power are part of TVA's resource development program. TVA supplies power at wholesale to 160 municipal and cooperative distributors and one privately owned electric system which in turn distribute power to more than 2.7 million customers in parts of seven states. TVA also supplies power directly to 50 industrial

customers with large or unusual power requirements and several Federal nuclear, aerospace and military installations.

Financially, the power program is separate from other TVA programs. It is required to be self-supporting and self-liquidating. Power accounts are kept in accordance with the uniform system prescribed for electric utilities by the Federal Energy Regulatory Commission.

This report deals with TVA's electric power activities. Additional information about power or other activities may be obtained from the Director of Information, Tennessee Valley Authority, Knoxville, Tennessee 37902.

#### Board of Directors

S. David Freeman, Chairman  
Richard M. Freeman, Director  
Robert N. Clement, Director

#### General Manager

William F. Willis

#### Manager of Power

Hugh G. Parris

#### General Counsel

Herbert S. Sanger, Jr.

#### Comptroller

Willard R. Stinson

#### Cover

*Participants in the Home Insulation Program saved \$5 million on utility bills by the end of fiscal year 1979. Combined, TVA's conservation programs will save 15 to 20 billion kilowatthours annually by 1990, eliminating the need for four or five new generating facilities.*

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## Statistical Summary

	Fiscal Year	
	1979	1978
Sales (billion kWh)*	118	118
Revenues (billions)	\$ 2.657	\$ 2.350
Payments in Lieu of Taxes to States and Counties (millions)	\$ 100	\$ 80
Total Operating Expenses (billions)	\$ 2.008	\$ 1.896
Net Interest Charges (millions)	\$ 505	\$ 238
Net Income (millions)	\$ 137	\$ 217
Increase in Retained Earnings (millions)	\$ 68	\$ 155
Total Payments to U.S. Treasury (millions)	\$ 89	\$ 82
Total Assets (billions)	\$12.059	\$ 9.910
Average Annual Residential Use (kWh)	14,680	16,190
Average Cost per Residential Kilowatthour (cents)	3.10	2.68

\*Represents total TVA sales at the delivery point to distributors, industries and Federal agencies. The 1979 total sales to ultimate customers is 113 billion kWh. The difference represents power lost in distribution facilities.

TVA is an equal opportunity employer, and is committed to ensuring that the benefits of programs receiving TVA financial assistance are available to all eligible persons regardless of race, color, national origin, handicap, or age.



“W”hile it is true that the days of conspicuous consumption are over, I do not believe that we are entering a time of austerity. If I were to characterize 1979, I would call it the beginning of the Age of Alternatives. Because, for TVA, this has been a time of unprecedented challenges, with opportunities and with alternatives to match.

We may not be able to do things the way they have always been done. We may not be able to live in quite the same ways. But there will be better ways, greater opportunities, innovative alternatives. Our job is to find them and make them work. Our performance in 1979 says we can.”

*Hugh G. Parris*

## Viewpoint

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**W**e are in a time when energy problems are rivaling every other human concern, when incidents half way around the world are followed closely in the homes of our consumers with a new realization of how remote events can have an immediate and negative impact on life style in the Tennessee Valley.

Because of the heightened sensitivity, we at TVA are operating in the spotlight of public attention to the smallest detail of our performance.

Once, as long as the lights stayed on, our performance was accepted. Today how we produce power, how we transmit it, how we design rate structures, how we will produce power tomorrow, what we are doing to preserve the environment and the pocketbook, are being viewed in great detail.

And that is good. Because we have good news, and hope, and most important, we have alternatives—for the production of power, for the use of power, for the future.

We have the tools to meet the crises and our new visibility will permit us to demonstrate our capabilities and to show the way. And public involvement can provide for vital cooperation that might not have been possible in a more affluent, less concerned time. Today that concern gives us and our customers opportunities to participate in solutions, to take joint responsibility for meeting our energy needs.

The year 1979 is important within this context because it is the threshold of the 80's. The impact of actions this year will be felt far into the future. Within the Office of Power, the actions taken indicate that the Age of Alternatives will be most effective.

**E**arly in 1979, we began inviting public comment on new standards describing the manner of electric services to con-

sumers, as required under the Public Utility Regulatory Policies Act. We set the format for involving our distributors and the public in the most basic levels of service practice decisions. This same system would be repeated at the end of the year as TVA began considering rate design standards. Once again, our consumers would have the opportunity to acquire a basic understanding of the complexities of rate design and to have direct input into decisions that would effect them most directly.

**B**rowns Ferry Nuclear Plant set a record for continuous operation in the early part of the year and set the stage for a year of excellent performance and production with national records in operation and a healthy push for TVA toward what would be our first power credit to customers in 1980.

**I**n March 1979, the Home Insulation Program passed the 100,000 mark in homes surveyed. We could see the tangible benefits of conservation reflected in a slackening electric consumption growth rate. Our customers could see the benefits in lower utility bills and greater comfort.

**T**hroughout the year, our hydro experience was unsurpassed. Heavy rains came and TVA people managed the water for maximum benefit and kept the hydro plants on line reliably for extended periods to generate hydro power worth \$200 million more than was expected.

**T**he Nuclear Task Force, established in response to Three Mile Island, moved promptly to implement enhanced safety measures: more

stringent requirements for operator training, lower allowable levels of radiation for employees, extended evacuation plans, and control room design improvements.

**T**VA committed to full exploitation of renewable energy resources and to the lowest costs for customers. In line with that commitment, we expanded a program to install 1,000 solar water heaters in Memphis to include another 10,000 in Nashville and an additional 1,000 in a less densely populated area of the region. We implemented a wood heater program in rural areas of the Valley and began construction on 44 demonstration solar homes. We committed to build a 1.3-million-square-foot solar-assisted Chattanooga Office Complex to house the Office of Power headquarters and, simultaneously, to demonstrate the feasibility of solar techniques for major commercial ventures.

**I**n our continuing commitment to keeping coal viable and to meeting environmental constraints, we proceeded with plans for a pilot plant and demonstration plant for Atmospheric Fluidized Bed Combustion (AFBC). Down the road, we will be able to burn coal with less harmful emissions and with a saleable byproduct. At the same time, AFBC will enable us to burn the abundant and less expensive high sulfur coal of the Tennessee Valley area. We moved to develop a coal gasification plant that could, by 1990, displace the equivalent of 50,000 barrels of oil per day. The plant will produce a medium-Btu industrial quality gas that may be used in other demonstrations, fuel cells and fuel cell power plants, as well as by new and existing industry.

## Viewpoint Continued

**T**VA declared the first power credit in the history of the Agency in August and \$163 million was turned back to customers in the form of a deferred rate increase. The credit was made possible by unusually favorable operating conditions.

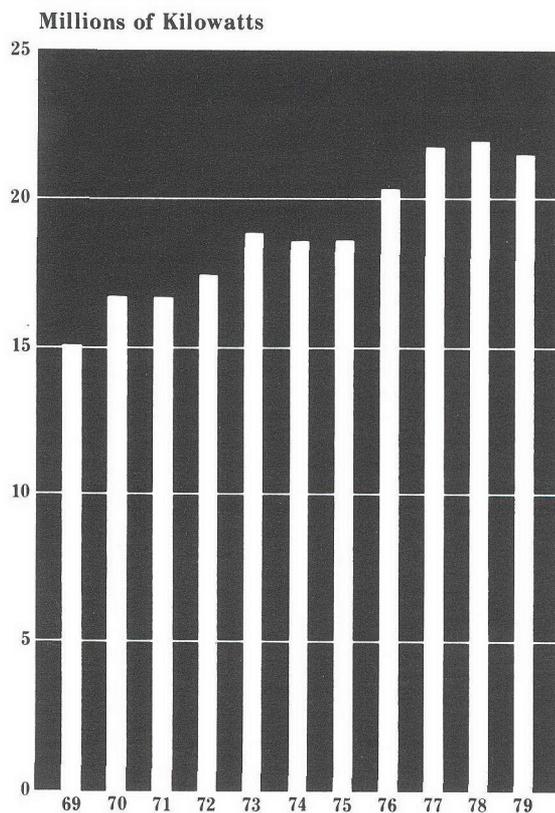
The year 1979 has been one of

challenges and heightened visibility, a year of analysis and exploration of alternatives, a year of solid, sharp response. The performance by the people in the Office of Power has confirmed my conviction that this is the best of all possible places to be, on the cutting edge of that response.

This has been the year when we defined and established our alternatives. As we move into the 80's, we will be determining which of them work the best. And we will be keeping our consumers informed so they may knowledgeably help us to make those decisions.

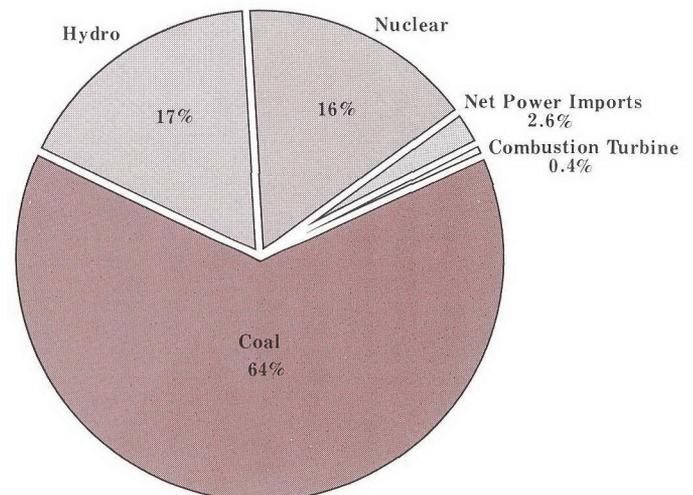
Hugh Parris

### PEAK LOAD



### TVA POWER SUPPLY

Fiscal Year 1979



# Sales

**P**ower sales in the TVA area were nearly flat at 117.7 billion kilowatthours in 1979, compared to 117.9 billion in 1978.

Sales to Federal agencies were down by 500 million kilowatthours below 1978 levels because of lower sales to the U.S. Department of Energy uranium enrichment plants. DOE has, through contractual agreement, reduced loads since 1978 during TVA's winter and summer peak periods which has reduced peak demands during these peak load seasons. These voluntary reductions will continue through 1981.

Despite a slight easing in the economy, sales to directly served industries increased 8.9 percent or 2 billion kilowatthours for a total of

24.9 billion kilowatthours in 1979.

Paper industries in the area operated at higher levels during the year with an 8.8-percent increase in kilowatthours purchased over 1978. Production of chlorine, a product used by the paper industry, was strong during the year. The chlorine producers purchased 6.2 percent more energy in 1979 than in 1978.

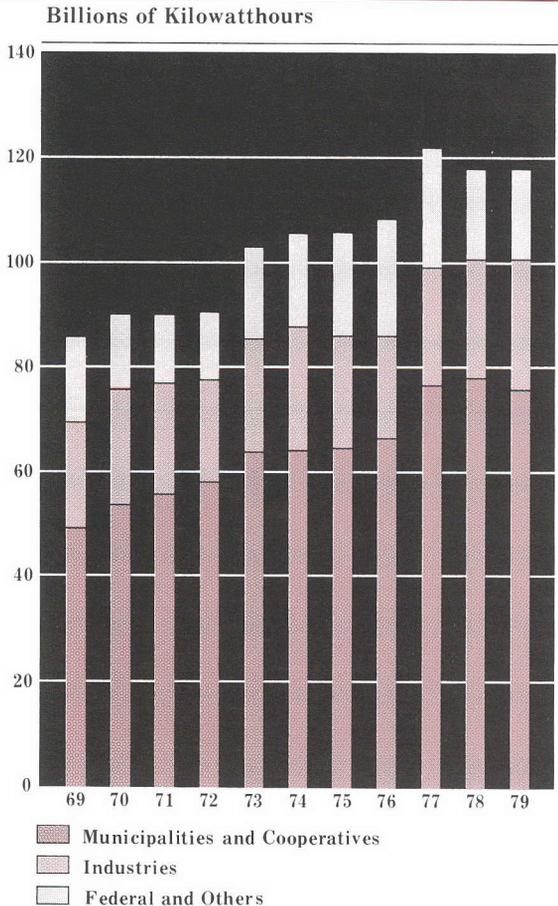
Sales to municipal and cooperative electric systems in 1979 totaled 75.9 billion kilowatthours, about 2.5 percent less than for the preceding year. The much milder weather during fiscal year 1979 contributed to the decrease in sales to residential customers which totaled 2.7 billion kilowatthours less than in 1978. A significant difference in weather and a continuing emphasis on conserva-

tion helped reduce the residential annual average use from 16,190 kilowatthours in 1978 to 14,680 in 1979. There was little change in the national residential average which went up from 8,828 kilowatthours to 8,834 over the same period. The power distributor's commercial and industrial sales increased 2.8 percent to 35.6 billion kilowatthours.

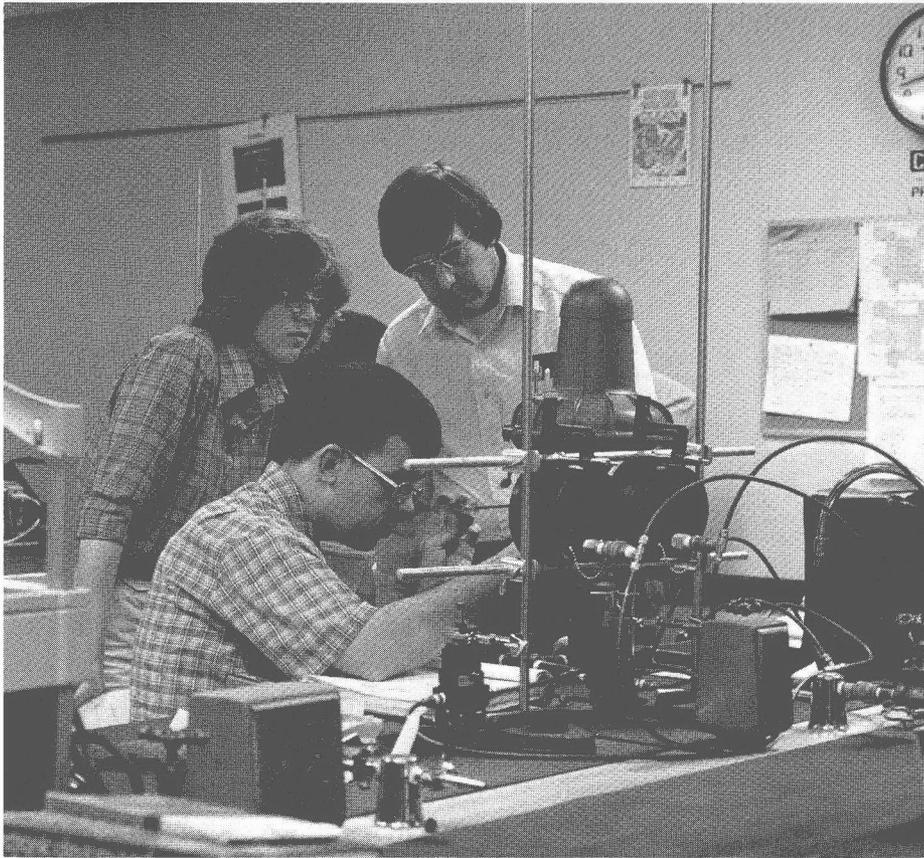
Electrically heated residential customers used an average of 19,290 kilowatthours. This is down from the average use of 22,230 for fiscal year 1978.

The average should continue to decrease, even after adjusting for weather variations, as more and more residents are brought into the TVA energy conservation programs.

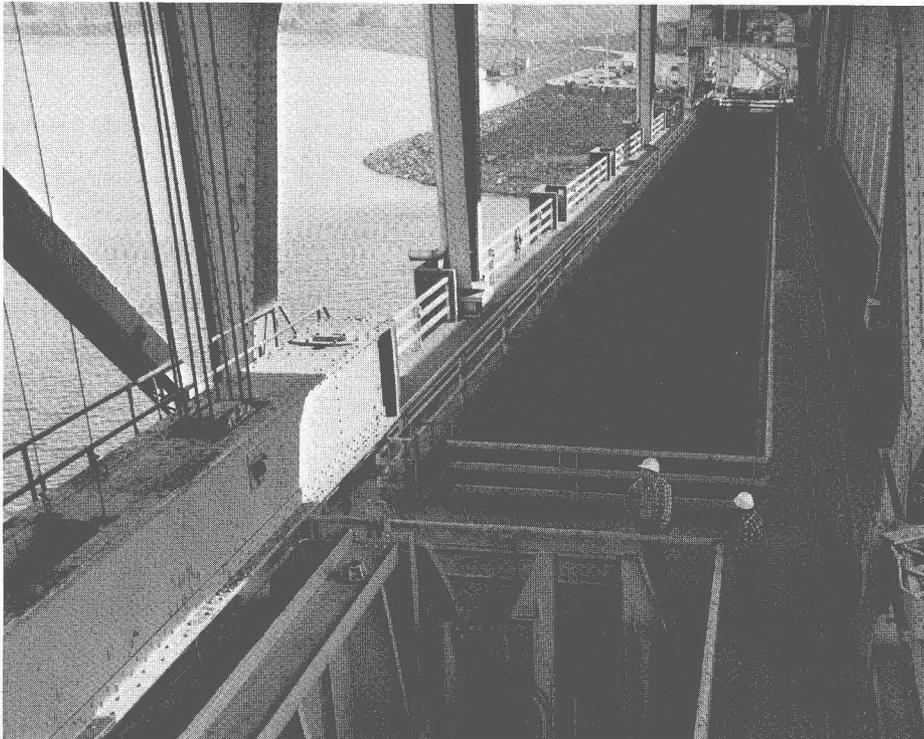
## SALES



## Revenues and Expenses



*Training for nuclear operators was extended in 1979 from 22 to 26 months.*



*Massive gates at Chickamauga Dam symbolize the significant savings realized through good rainfall and excellent operations.*

**R**evenues increased \$307 million over the preceding year to cover rising interest expense and fuel costs. Total revenues for 1979 were nearly \$2.7 billion.

Excellent performance by Browns Ferry Nuclear Plant, greater than average rainfall providing additional hydro power, and greater efficiency in coal-fired generation combined to reduce the need for purchased power and combustion turbine operation.

Imported power expenses of \$66 million were \$101 million lower than the year before. Oil-fired combustion turbine generation was reduced from 2.2 percent of the total system output in 1978 to less than one-half of one percent in 1979.

Coal costs increased substantially in 1979 up to \$29.65 average cost per ton from \$24.67. Those costs were mitigated primarily by improved coal quality and to some extent by improved maintenance procedures. Some 34.7 million tons of coal was burned in 1979, compared to 36.1 million in 1978. Yet, 1979 coal-fired production was almost 78.1 billion kilowatthours compared to 77.9 billion kilowatthours in 1978.

Hydroelectric plants, for the second year in a row, offered a greater volume of low-cost energy, contributing 17 percent of the power produced by the system or 21.4 billion kilowatthours. Browns Ferry Nuclear Plant accounted for 16 percent of total production at 19.8 billion kilowatthours, up nearly 3 percent from last year. The pace-setting nuclear operation and production provided an increase in energy of 4 billion kilowatthours over last year's production of 15.8 billion kilowatthours.

Overall system fuel expense was 11.27 mills per kilowatthour generated, up from last year's just under 11 mills.

Production expenses were up by only \$55 million, reflecting the benefits of reduced reliance on higher cost imports and combustion turbine generation which largely offset increases in the costs of coal, labor and materials.

# Revenues and Expenses Continued

TVA makes payments in lieu of taxes to states and counties equal to 5 percent of revenues from sales of electric energy for the previous year, excluding revenues from Federal agencies. As revenues increase, these payments increase. In 1979, TVA paid \$100 million to states and counties. In addition, the municipal and cooperative distributors of TVA power paid \$57 million to states and local governments in taxes and tax equivalents during their fiscal year for a total of \$157 million in payments to state and local governments.

TVA also paid \$89 million to the Federal Government. Before Congress enacted the 1959 bond financing amendment to the TVA Act, TVA power facilities were financed largely by Federal appropriations.

The TVA Act requires TVA to pay a return or dividend to the U.S. Treasury on outstanding appropriations invested in the power system and repay a portion of the appropriations each year.

This year's dividend was \$69 million and the repayment amount was \$20 million, bringing the year's total payments to the Treasury to \$89 million.

Interest payments on the borrowed capital necessary to build generating plants and other power facilities came to about one-fourth of revenues at \$659 million. Of that amount, \$505 million was allocated to operations.

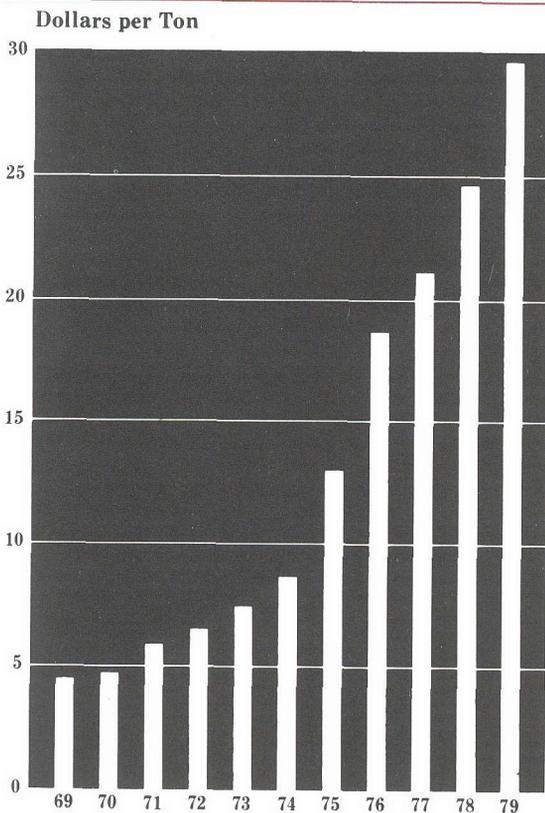
Net income decreased from \$217 million in 1978 to \$137 million in 1979. Retained earnings increased by \$68 million or 2.6 percent of

revenues.

Of total net power proceeds of \$865 million, \$118 million remained for investment in the power system after paying interest on debt and making the required payments to the Treasury.

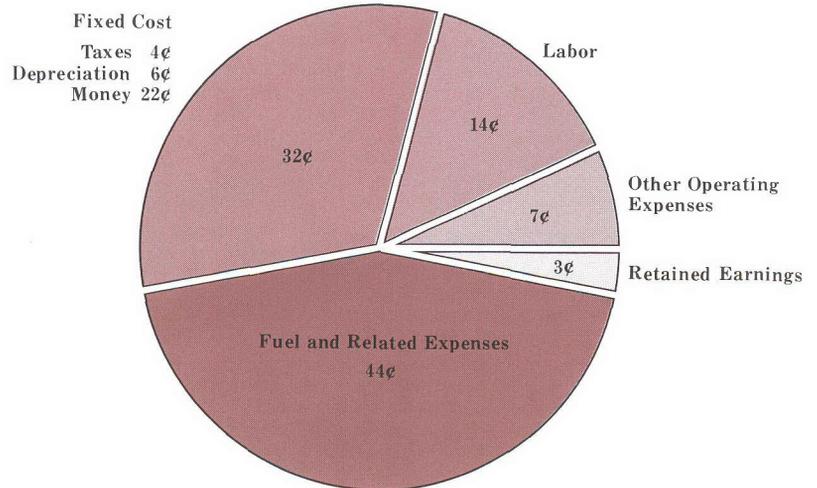
Operating income (operating revenues less operating expenses) was equal to 99 percent of current year interest charges, up from 93 percent in the previous year. This represented a significant improvement and established a positive trend toward TVA's ultimate objective of bringing operating revenues to 110 percent of interest charges. TVA has adopted this objective in the interest of preserving its ability to borrow funds publicly under most any reasonable market conditions.

## AVERAGE COST OF COAL BURNED



## DISTRIBUTION OF TVA REVENUE DOLLAR

Fiscal Year 1979



# Borrowings

**N**et borrowings to finance new power plants and other assets increased \$1.805 billion during the year to a total of \$9.0 billion outstanding. Three bond issues of \$500 million each were sold to the Federal Financing Bank: one 10-year bond at 9.296 percent, one 8-year bond at 9.155 percent, and one

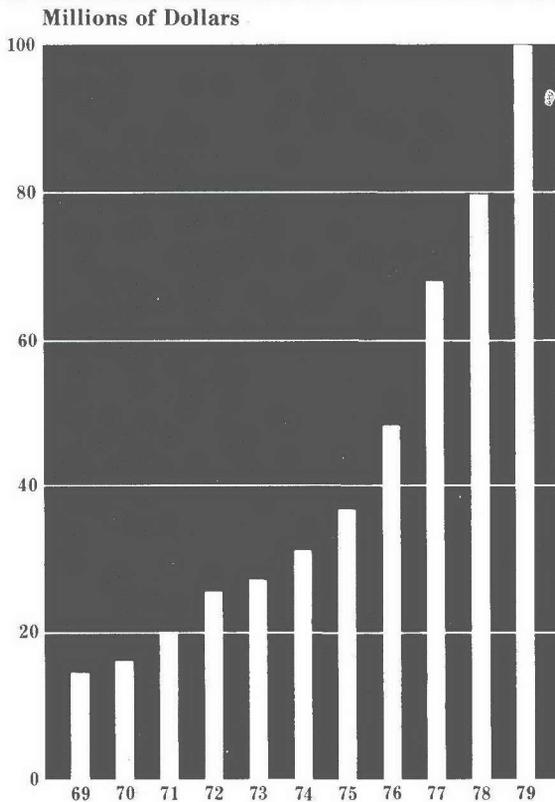
25-year bond at 9.195 percent. A 5-year, \$100-million bond issued to the public in 1974 was paid at maturity in April 1979.

Short-term borrowings increased by \$405 million to a total of \$2.075 billion at the end of the year.

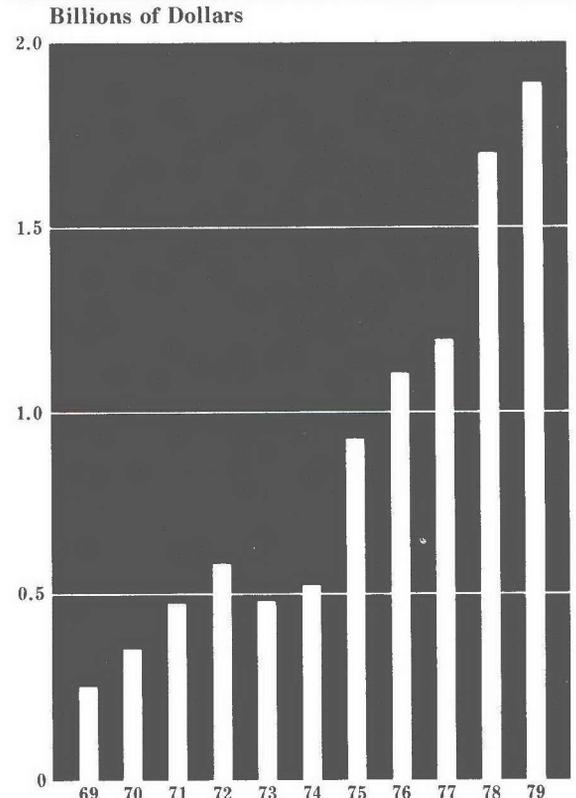
TVA power bonds have been sold only to the Federal Financing Bank

in recent years. But the potential for resuming public sales in the primary market and the continued trading of TVA bonds in the secondary market cause TVA to pay close attention to the quality of its public debt. TVA power bonds were sold to the public from 1960 to 1974.

## TVA PAYMENTS IN LIEU OF TAXES

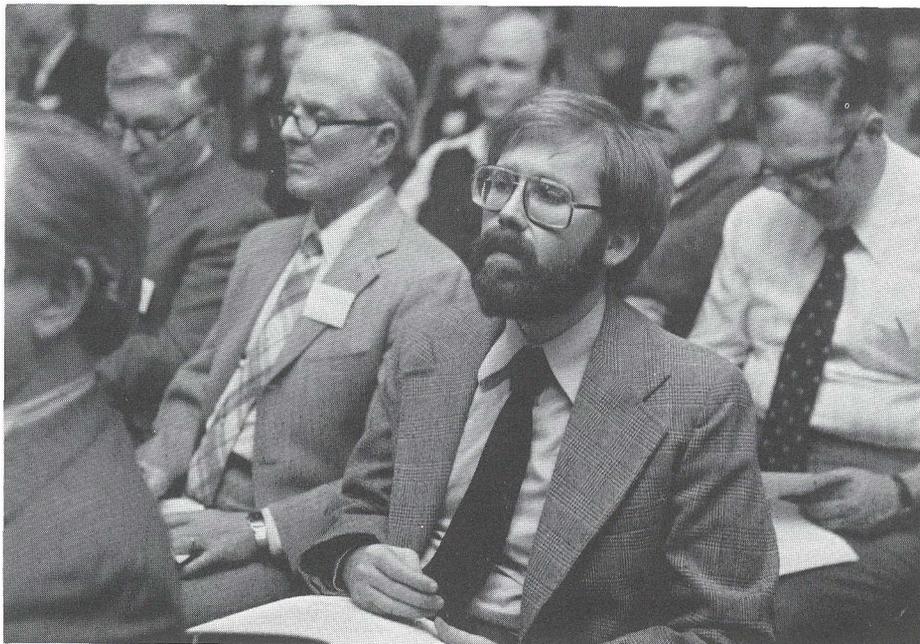


## CONSTRUCTION EXPENDITURES\*



\*Includes allowance for borrowed funds used during construction.

# Rates



*In hearings and workshops across the Tennessee Valley, TVA rate experts defined alternatives for ratemaking procedures to the public.*

**R**ates were set early in the fiscal year to cover increases in the costs of labor, fuel, materials, and interest charges. In February new estimates indicated the need for an additional increase over 1978 revenues and a corresponding adjustment to distributors' resale rate schedules.

However, hydroelectric and nuclear power production combined to reduce costs \$263 million below budget estimates. Of that gain, \$100 million was utilized to delay in March 1979, and then cancel in May 1979, a 7.1-percent rate increase. The \$163 million remaining at fiscal year-end in September 1979 is being returned to customers in the form of the first power revenue credit in TVA's 46-year history. As a result, a 10.8 percent rate increase approved and effective in October of 1979 will not be actually felt by customers until the April 1980 billing when the power credit is exhausted.

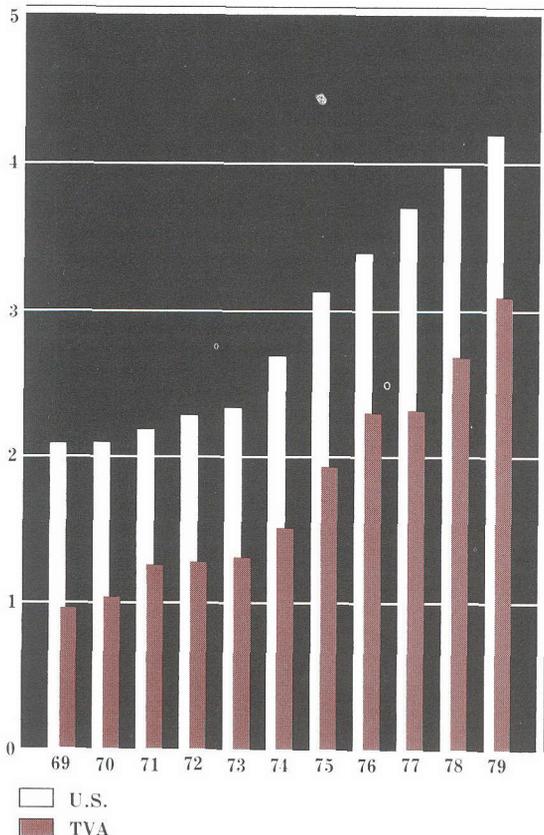
Monthly adjustments for fuel and purchased power costs applicable to retail bills were ended in January 1979. The charges for these fuel costs were levelized for the remainder of the year.

Wholesale costs to municipal and cooperative distributors of TVA power averaged 2.39 cents per kilowatthour. This was .41 cents more than fiscal year 1978. Residential customers of the distributors paid an average of 3.10 cents per kilowatthour compared to 2.68 cents in 1978. The national average was 4.2 cents.

Industries directly served by TVA paid an average 2.40 cents per kilowatthour compared to 1.99 cents the year before. Federal agencies paid 2.28 cents compared to 1.83 cents a year ago.

## AVERAGE RESIDENTIAL RATE

Cents per Kilowatthour



# Rates Continued

Since late 1978, TVA has been engaged in a comprehensive review of existing and alternative electric rate structures, both to comply with the requirements of the Public Utility Regulatory Policies Act of 1978 (PURPA) and in order to develop rates that would encourage conservation and give customers the proper

price signals for using and conserving electricity.

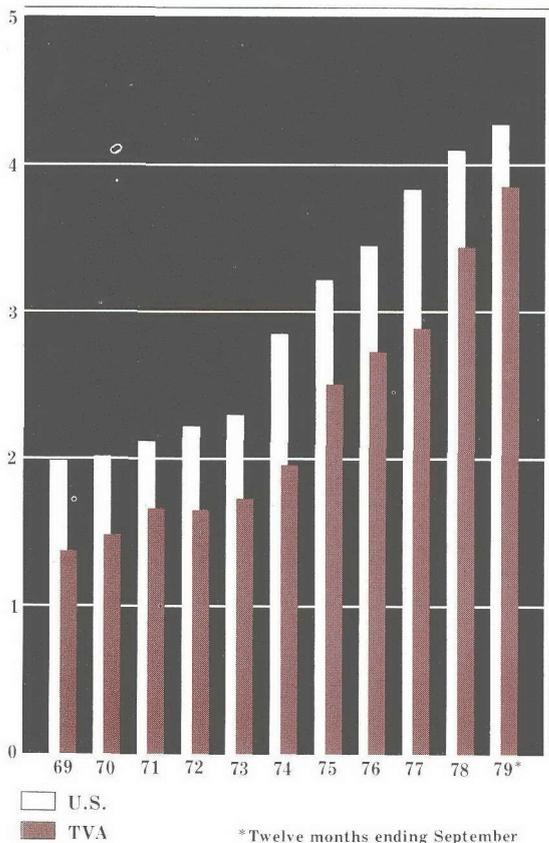
Seven rate standards are being evaluated to determine the extent to which they will encourage conservation, be equitable to all customers, and stimulate efficient use of energy resources. The new rate standards will be given extensive public review

in 1980 and may be adopted by the end of the year.

The probable effects of rates and rate structures on the use of power are being determined through a variety of research programs with both residential and commercial and industrial customers.

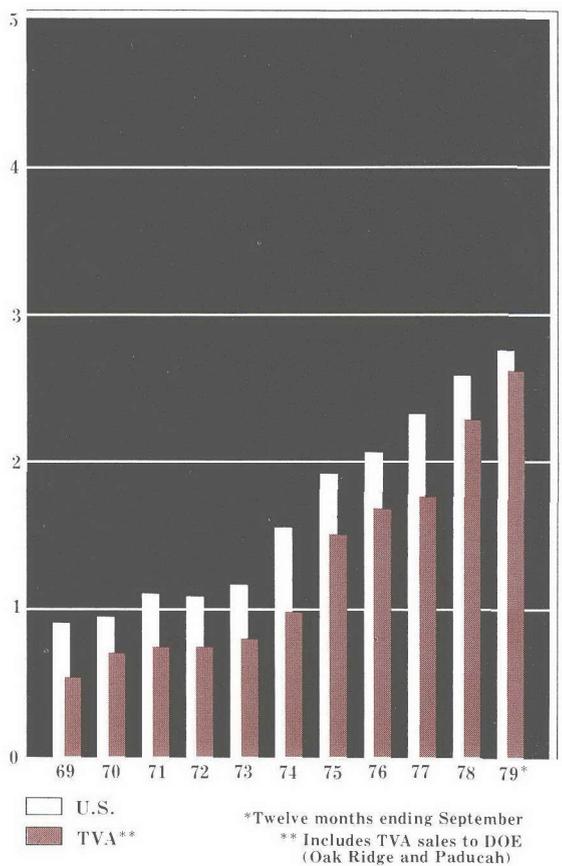
## AVERAGE INDUSTRIAL RATE

(Small Light and Power)  
Cents per Kilowatthour



## AVERAGE INDUSTRIAL RATE

(Large Light and Power)  
Cents per Kilowatthour



# Energy Conservation



*For people in rural areas with access to wood supplies, wood burning heaters available through a TVA conservation program provide more than a sense of nostalgia. They represent a very real savings in heating costs.*

**T**he effective, efficient use of energy has become more and more important to TVA and to consumers of TVA power because, as costs have increased, the economic benefits of energy conservation have increased. In response, TVA today has initiated energy conservation programs that could save \$9 billion by 1990 by eliminating the need for four or five new TVA generating units.

The programs work through ensuring against the waste of energy. They are designed to hold the overall energy use growth rate to that actually needed for an acceptable quality of life in the Tennessee Valley and thereby delay the need for added TVA power plant construction.

Through the Home Insulation Program, TVA provides free energy surveys for residential customers, followed by interest-free loans to finance recommended conservation measures, such as attic and floor insulation, caulking, storm windows, insulated doors, and weather stripping.

More than 165,000 homes were surveyed through this program and 88,495 families received loans by the end of 1979. Those participating in the loan program were saving 183 million kilowatthours annually and enjoying the benefits of some \$5 million saved on utility bills. By 1986, the program will save 2.75 billion kilowatthours annually with a customer benefit of \$81 million.

To help residential consumers save on energy costs and to encourage the adoption of energy efficient systems, TVA developed the Heat Pump Financing Program as an adjunct of its Home Insulation Program.

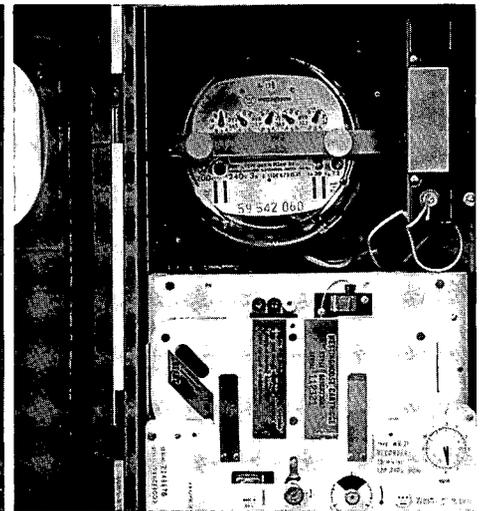
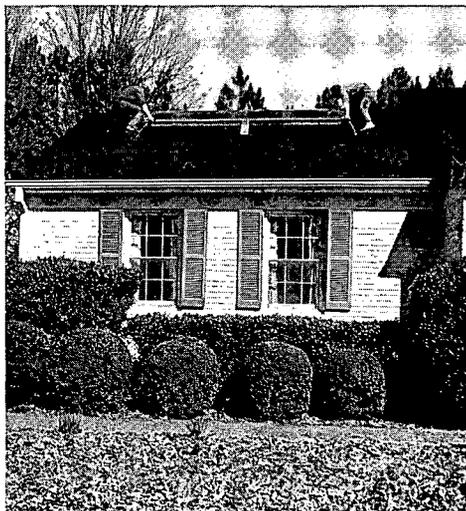
The financing provision, operating through participating power distributors, provides qualifying consumers loans for the purchase and installation of the units.

The Heat Pump Financing Program will cost TVA about \$5.9 million over the next eight years, but it will save the agency about \$12 million through reduced energy supply costs.

# Energy Conservation Continued



*Conservation takes many forms. Residential energy audit will provide significant savings in energy costs.*



*Left, solar panels are installed to fuel a solar water heater. Center, time-of-day meter helps to monitor on-peak and off-peak usage of power. Right, a magnetic tape recorder provides hard data for rate design by recording energy usage every 15 minutes.*

## Energy Conservation Continued



*For commercial and industrial customers energy audits and low-interest loans enable economical and effective use of energy.*

About two-thirds of all TVA power is used by the commercial and industrial sector. Many of the distributor-served customers lack the technical expertise to reduce their energy consumption. The 50 commercial and industrial customers served directly by TVA often have competent engineering staffs, but they are frequently delayed in implementing conservation projects because of competing demands for capital. To overcome these obstacles, the TVA Commercial and Industrial Energy Conservation Program is offering free energy audits and financing to help customers eliminate energy waste. The program is expected to reduce

peak demand by 1,000 megawatts and annual energy use by 5.6 billion kilowatthours by 1988.

A major conservation effort for TVA is the encouragement of cogeneration. Cogeneration allows greater efficiency in the use of energy resources because waste fuels and heat required for industrial process are utilized to produce additional electrical power for all customers on the power system.

Through the program, TVA will purchase power from cogenerators at rates based on the value of the energy produced. TVA provides standby power and technical assistance to potential cogenerators.

Currently, six customers on the TVA system have onsite cogeneration with a total capacity of 173 megawatts. Since the program was initiated, interest expressed by 15 new potential generators could increase onsite capacity by 136 to 224 megawatts.

The program should result in installed cogeneration capacity of more than 1,800 MW over the next 20 years. The installation of more expensive new TVA capacity will be deferred and all TVA customers will enjoy lower rates than might otherwise have been possible.

In order to provide comprehensive and detailed information upon which to base its decisions, TVA continued a cooperative load research program with the Chattanooga Electric Power Board to survey the hourly use patterns of 600 customers. That survey will be extended in 1980 to four additional distributors and 3,000 additional customers.

The year also brought the completion of a test in Knoxville to measure the effectiveness of time-of-day rates for residential customers.

Residential customers account for 50 percent of peak demand, a demand that fluctuates both each day and each season. The cost to TVA of producing peaking energy can be up to three times higher than offpeak costs. In the Knoxville test, customers paid up to three times more for power used during the peaks and less for nonpeak power usage.

Preliminary indications were confirmed in 1979. The test customers used 31 percent of energy during peak compared to 34 percent peak usage by the control group customers. Some shifted offpeak significantly, enough to save 20 percent on their regular monthly bills. Three-quarters of the people involved saved something, however small, on their bills.

Other alternatives are being investigated, both in the residential and commercial areas, to enable delivery of TVA power at the lowest possible rates.

# Energy Conservation Continued

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## Solar Applications

Under the solar applications program, TVA is investigating and demonstrating the possibility of various renewable energy sources.

A program to place 1,000 solar water heaters in Memphis homes continued in 1979 with 269 units being installed. Estimates are that customers will save about 65 percent annually on their cost for heating water with the aid of a solar water heater.

The program has been expanded to offer 10,000 domestic solar water heaters in Nashville by December 1983. A further extension of the program will provide another 1,000 solar water heaters for the rural Middle Tennessee area.

For customers who live in environmentally approved rural areas and who have access to wood, TVA is sponsoring a wood heater demonstration program that will provide users up to 90-percent reduction in heating costs. Through this program, customers served by participating power distributors can receive a no-interest loan of up to \$800 for the purchase and installation of an approved wood heater. TVA will provide the loan as well as a free onsite inspection to assure that the heaters are correctly installed. An opportunity will be available for more than 6,000 families in 52 counties to participate in the no-interest loan program.

Under a broad program, TVA has initiated the construction of approximately 44 passive solar homes for the Valley. Sited in areas of varying climate and terrain, eleven different houses were designed to incorporate passive solar energy techniques to

provide maximum efficiency in energy use at a construction cost not significantly different from nonsolar homes.

TVA will demonstrate the energy savings and potential of solar applications for major office construction with its own proposed 1.3-million-square-foot Chattanooga Office Complex. Combining solar techniques with ground water cooling and utilization of computer waste heat, the solar-assisted building will cut typical energy costs by 70 percent. Construction is scheduled to begin in 1980 with completion planned in 1982. Based on 1979 dollars, the complex is estimated to cost approximately \$65 per square foot, or only \$5 more than the typical square footage cost for a conventional building.

## Load Management

Energy production costs vary from less than one-tenth of a cent per kilowatthour for hydro power up to 5.7 cents per kilowatthour for oil-fired combustion turbines. In operating the power system, TVA brings on the least expensive base load generation first and uses the more costly power plants last. Two major daily power peaks are caused mainly by residential consumers whose energy use patterns can move TVA into the most expensive production.

A major goal has been to design programs to aid in leveling those demands and lowering the peaks, without inconveniencing the consumer.

One program, developed in 1979, will cycle central air conditioners on and off, interrupting the compressor,

but not the fan, for seven and a half minutes per half hour during peak hours of the summer. The consumer will be virtually unaware of the effects, yet TVA will shave thousands of expensive kilowatts off the total power demand. Ten distributors will participate initially to deliver a projected 50,000 power consumers committed by 1983.

TVA is implementing a 3-year test on thermal storage systems. In this program, homes are provided with a thermal storage unit that will produce and store heat during power system offpeak hours and release that heat during peak hours to warm the home. As an incentive, participants will be charged less for offpeak usage than for on-peak usage.

Consumers will have the opportunity to directly understand and change their own usage in a test involving Energy Use Display Meters (EUDM). The minicomputers, installed in the home, give a readout in dollars and cents, including accumulated and projected costs. Consumers can modify their energy use and costs on a day-to-day or even hour-to-hour basis according to the amount they want to budget for energy.

## Conservation Summary

TVA has launched an energy conservation program that is considered to be the most aggressive and comprehensive in the Nation. Through this program, by 1990, we anticipate savings of 4,000 to 6,000 megawatts and 15 to 20 billion kilowatthours per year, thereby reducing power supply costs and offsetting the need for costly generating facilities.

# Energy Demonstration and Technology

As the energy crisis has deepened, TVA's national role in demonstrating new technologies and in developing and demonstrating programs that may help solve America's energy problems has assumed critical importance.

In response to the heightened demand for innovative technologies and practical demonstration, the Division of Energy Demonstrations and Technology was created in 1979.

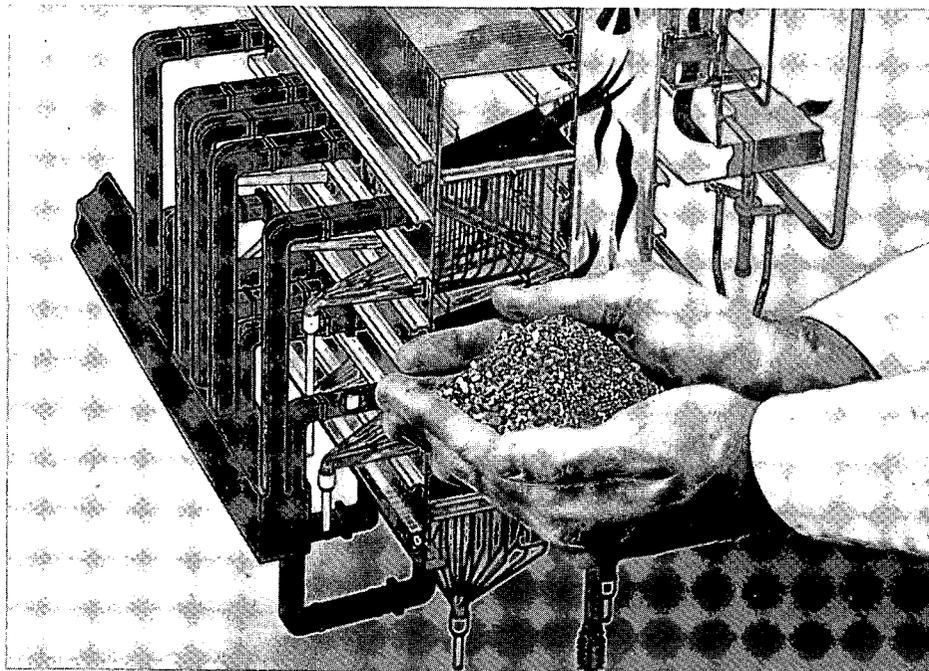
Funding is based upon a determination of the primary beneficiaries of the research. When it can be demonstrated that a project involves direct benefits to power consumers in the TVA region, TVA power funds are used to finance the research. Research and demonstration primarily for national benefit may be funded through Congressional appropriations or other sources such as the Department of Energy, Environmental Protection Agency, and the Electric Power Research Institute.

In 1979, \$18.5 million was spent by Energy Demonstrations and Technology. Of that, \$11.5 million came from power funds, \$1.5 million from Congressional appropriations, and the remainder from DOE, EPA, EPRI, and other sources.

TVA contributes funds to EPRI each year based on kilowatt-hour sales to ultimate consumers and a rate agreed upon by the EPRI Board. In 1979 TVA's contributions to EPRI totalled \$15.5 million. The EPRI contract setting the amount of the contribution is reviewed annually.

## Atmospheric Fluidized Bed Combustion

A primary effort for 1979 was the development of the utility application of the Atmospheric Fluidized Bed Combustion process. Through this system, coal is burned in a bed of



*A solid byproduct and the potential for clean burning of high-sulfur coal make the atmospheric fluidized bed combustion process a promising alternative for the future.*

limestone while air jets maintain an almost fluid texture. The process results in a 90 percent capture of sulfur dioxide pollutants, with less nitrogen oxide emissions than other conventional methods.

A major asset of the AFBC process is that it permits the use of lower cost high sulfur coal which is abundant in the eastern United States.

TVA will begin constructing a 20-megawatt pilot plant at the Shawnee Steam Plant site near Paducah, Kentucky, in 1980. If the test results continue to be positive, a 200-megawatt AFBC demonstration unit will be completed by the mid-1980's.

## Coal Gasification and Fuel Cells

Coal Gasification and Fuel Cells are interrelated projects which hold the promise of lessening our dependence on foreign oil and providing

clean, quiet, environmentally acceptable power generation.

In 1979, using appropriated funds, TVA took the first step to provide a demonstration commercial-scale coal gasification plant with the authorization of Phase One, a \$5 million program to complete the initial architectural and engineering studies for the plant. By 1989, the completed facility could convert 20,000 tons of coal each day into the equivalent of 50,000 barrels of oil.

A major potential use of the gas would be to power fuel cells. In late 1979, TVA authorized the first phase of a 7-year program to develop fuel cells for the generation of electricity in the late 1980's and beyond. The first step will include the design and fabrication of a 240-kilowatt-hour phosphoric fuel cell pilot plant. TVA will also begin the design of a 10,000-kilowatt-hour cogenerating phosphoric fuel cell demonstration plant, to be constructed if the initial pilot plant results are favorable.

# Energy Demonstration and Technology Continued

## Energy from Waste

Opportunities to displace 72,000 barrels of oil per year and free the 16 acres of land that would be needed annually for landfill are two benefits of the solid waste disposal facility near Gallatin, Tennessee.

The facility, which is being built by the Resource Authority of Sumner, Tennessee, will incinerate 150 tons of municipal waste per day, produce industrial process steam and generate 600 kilowatts of electricity.

In 1979, TVA initiated a \$2 million loan from appropriated funds for the

purchase of part of the plant equipment.

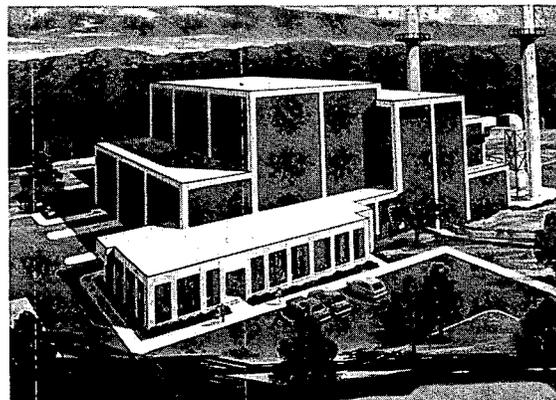
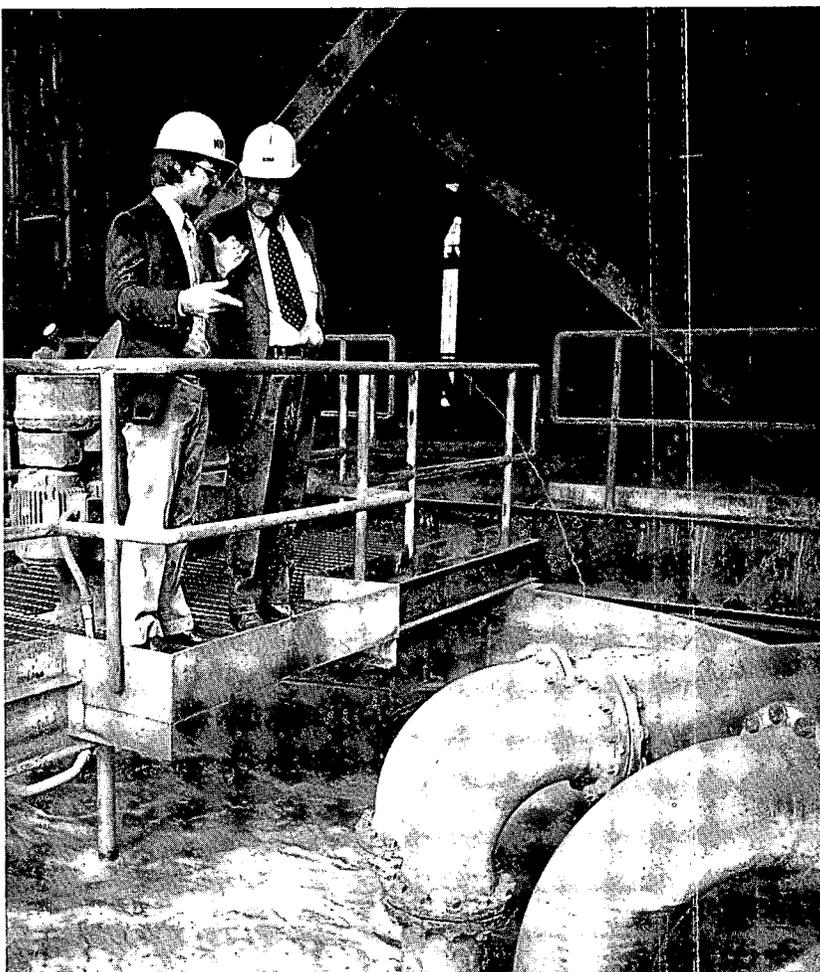
If the program tests out as well as projected, it will provide a model for other rural areas to band together to accomplish solid waste disposal and produce energy.

## Watts Bar Waste Heat Park

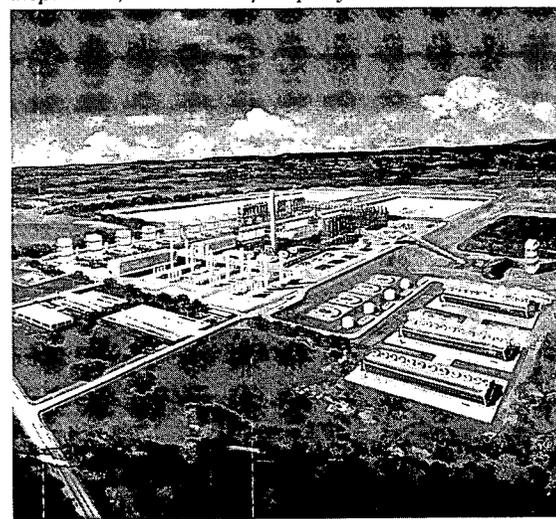
More than 50 percent of the heat produced in the generation of electricity is wasted by dissipation in air or water as "waste." If only 10 percent of the "waste" generated nationally could be utilized, nearly 50 million barrels of crude oil could be saved

annually. TVA is working toward demonstrating the profitable use of waste heat at its Watts Bar Nuclear Plant with an adjacent industrial park.

The two units at Watts Bar will produce some 820,000 gallons of heated water per minute. TVA will tap 100,000 gallons per minute to encourage greenhouses, aquaculture, and industries which use warm water in their manufacturing process. During 1979, \$2.3 million was authorized to purchase piping valves and other hardware to get the heated water to the park.



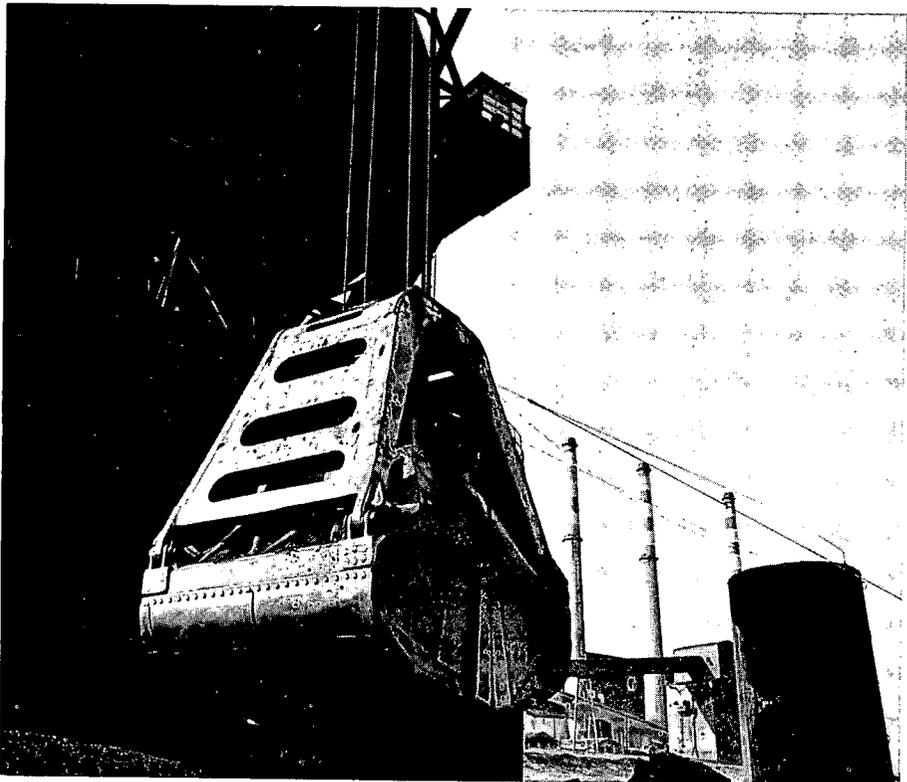
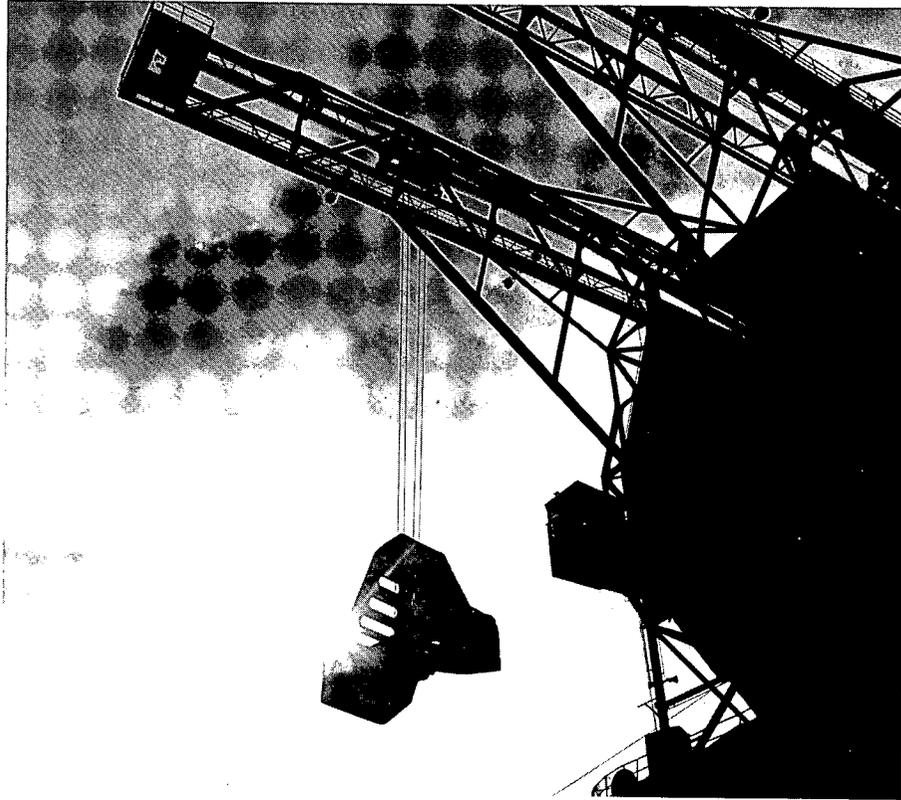
*Solid waste disposal facility at Gallatin, Tennessee, will displace 72,000 barrels of oil per year.*



*Proposed coal gasification facility could displace 50,000 barrels of oil per day by 1987, converting 20,000 tons of coal into a medium Btu gas.*

*TVA's energy initiatives work to control pollution and meet energy needs. Complex scrubbers at Widow's Creek Steam Plant in North Alabama remove up to 90 percent of the SO<sub>2</sub> from stack gas.*

# Fuel and Power Supply



*Coal, the solid backbone of TVA, provided 64 percent of power supply in 1979.*

**E**xcellent performance by the Browns Ferry Nuclear Plant and Raccoon Mountain Pumped-Storage Plant (when available) and by the hydroelectric system in 1979 greatly reduced the need for fuel oil and purchased power. Augmenting that trend, the purchase of higher quality low sulfur coal to meet environmental standards brought about a situation in which less coal was being burned to produce more energy.

More than 34 million tons of coal was burned in 1979 compared to 36 million in 1978. Yet TVA coal-fired plants produced 141.40 million kilowatt-hours more in 1979 than in 1978. Each pound of coal burned in 1979 produced 11,300 Btu compared to 10,920 Btu per pound in 1978.

Construction continued during the year on two coal-washing plants, which will be among the largest in the Nation. The plants at Breckenridge County, Kentucky, and at the Paradise Steam Plant will remove sulfur from the coal being supplied to the Cumberland and Paradise Steam Plants. Construction continued during the year on a wet limestone sulfur dioxide scrubber for the 500-MW Widows Creek Steam Plant Unit 7. Construction work was started on sulfur dioxide recovery scrubbers for Johnsonville Steam Plant and the contract was awarded for limestone sulfur dioxide scrubbers for Paradise. The estimated cost of these new scrubber projects and the coal-washing plants is about \$534 million. A wet limestone sulfur dioxide scrubber continues to operate at the Widows Creek Plant Unit 8.

Coal with less sulfur requires larger, more energy consumptive equipment to control fly ash emissions. During the year, construction was completed on new electrostatic precipitators at the Gallatin Steam Plant and construction was begun on new precipitators at Cumberland Steam Plant and continued at Paradise Steam Plant Unit 3.

# Fuel & Power Supply Continued

Construction also continued on what will be the Nation's largest utility baghouse installation at Shawnee Steam Plant. The estimated cost of these new fly ash control projects is about \$350 million.

Equipment problems delayed the opening of Raccoon Mountain pumped-storage facility by nearly two years. But during 1979, the four units came on line sequentially between January and September. The units provided a valuable source of low-cost energy during peak hours and greatly lessened TVA's dependence on costly oil-fired com-

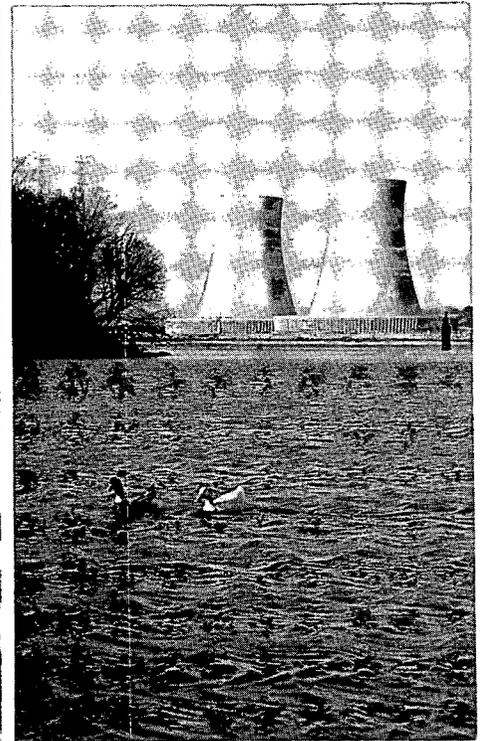
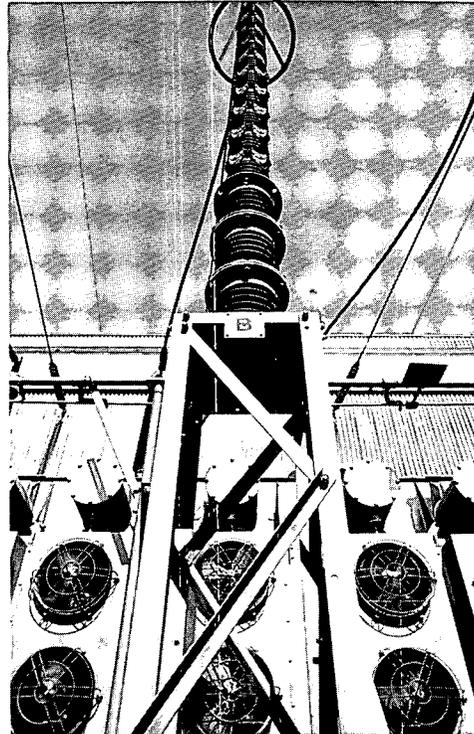
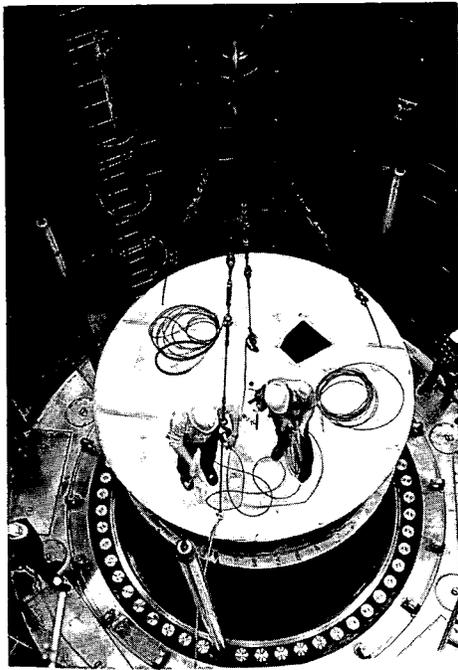
bustion turbine and purchased power.

With three units operating and 14 units under construction, TVA continues to have the most aggressive nuclear construction program in the country.

Originally, construction was to be completed as rapidly as possible, with all units on line by the end of 1986. However, the slowed economy, combined with the effects of TVA conservation programs, has enabled a more moderate pace. The construction schedule was modified in 1979 to stretch the completion of the units to

mid-1990.

As a result of the Three Mile Island accident and the subsequent pause in licensing by the Nuclear Regulatory Commission, fuel loading of Unit one at Sequoyah, near Chattanooga, scheduled for mid-November 1979, has been delayed. While this had no real impact on power supply for 1979, if fuel cannot be loaded in early 1980, there will be an adverse impact on TVA power supply by the end of the year. The unavailability of this lower cost power source will be costly to the system.



*Left, workers prepare for the early 1980 loading at Sequoyah. Center, transformers stand ready to carry 1100 megawatts from Sequoyah's Unit One to the consumer. Right, tranquil beauty of the area remains unaffected.*

# Fuel and Power Supply Continued

TVA's coal reserve policy is to work to ensure an adequate supply of coal at the most economical cost. While practically all of the coal burned is acquired through purchase contracts, the agency has initiated mining of its own reserves from time to time to meet specific needs.

Coal is currently being mined at TVA's Camp Breckenridge property in western Kentucky to supply Cumberland Steam Plant.

Three mining properties were shut down in 1979. The Long Pit Operation on the Koppers Property was closed due to the high cost of mining the coal. Eads Mine in southern Illinois was closed because its coal exceeded the allowable standards for sulfur content. The Fabius Mine in northern Alabama was closed because the coal reserves which could be mined using large stripping equipment were exhausted.

During 1979, TVA acquired the coal rights to 7,300 acres of properties located in southern Illinois from the Ewing-Northern Coal Association (ENCA) at a cost of \$6.2 million. This brings the total acquisitions of those properties, which were initiated by TVA in 1974, to 40,159 acres, or about 87-percent complete. Current plans are to acquire 46,000 acres by 1983.

Including the estimated 370 million tons of coal at the ENCA properties, TVA currently owns or controls reserve totalling 630 million tons.

To provide fuel for nuclear power plants, TVA has been buying uranium concentrates and has also been acquiring uranium property

interests. In 1979, long-term procurement contracts were signed with International Minerals and Chemical Company, Inc., for a minimum delivery of 8.6 million pounds, and with Pathfinder Mines Corporation for the delivery of a minimum of 2.4 million pounds of uranium concentrates. The IMC contracts extend over fiscal years 1980 through 1993. Also, as part of an amended procurement contract, TVA is now obtaining an additional 1.25 million pounds from United Nuclear Corporation Resources (UNC) through the year 1983.

Under its mineral rights program, TVA expanded its interest in the Morton Ranch property (Wyoming) to 100 percent through the purchase of UNC's 50 percent interest in the property. UNC has been retained as the operator until a permanent operator can be obtained through competitive bids. Mine development is already underway with production of uranium concentrates scheduled for the mid-1980's.

TVA also entered into a joint exploration and production agreement with Kerr-McGee Nuclear Corporation on the Marquez property in New Mexico. Federal-American Partners has commenced operations on properties TVA has leased in the Gas Hills area of Wyoming. Production of uranium concentrates from this area began in October 1978 at the rate of approximately 500,000 pounds per year. In total, TVA invested \$106 million in acquiring and developing property interests in 1979, bringing the net total for the past eight years to \$229 million.

## Nuclear Safety

TVA's commitment to nuclear safety is unqualified. Well before the Three Mile Island incident, TVA representatives were working to see that nuclear energy could be produced with the maximum degree of safety. Since that event, TVA has moved ahead rapidly to implement pace-setting improvements to the nuclear safety program.

**T**VA established an independent nuclear safety review staff to monitor design, construction and operation of nuclear power plants and to make safety recommendations.

**T**VA set even more stringent requirements for operator training and extended the training program from 22 to 26 months.

**T**he standard of allowable radiation for TVA employees was lowered to one-third the maximum accepted by the Nuclear Regulatory Commission.

**E**vacuation plans were extended to a 10-mile radius of the plants instead of the former 3-mile radius.

**D**esign changes provide operators with more accurate information and better control.

As nuclear technology advances, the Safety Review Staff will continue to work to pace each development with like safety improvements.

# Generating Capacity on September 30, 1979

TVA Hydro Plants	No. Units	Installed Capacity-kW	TVA Coal-Fired Plants	No. Units	Installed Capacity-kW	TVA Combustion Turbine Plants		
Apalachia	2	82,800	Allen	3	990,000			
Blue Ridge	1	20,000	Bull Run	1	950,000	Allen	20	620,800
Boone	3	75,000	Colbert	5	1,419,750	Colbert	8	476,000
Chatuge	1	10,000	Cumberland	2	2,600,000	Gallatin	4	325,200
Cherokee	4	135,180	Gallatin	4	1,255,200	Johnsonville	16	1,088,000
Chickamauga	4	117,000	John Sevier	4	846,500	Total	48	2,510,000
Douglas	4	120,600	Johnsonville	10	1,485,200	<b>Alcoa Dams</b>		
Fontana	3	238,500	Kingston	9	1,723,250	(12)		423,715
Fort Loudoun	4	139,140	Paradise	3	2,558,200	<b>Corps of Engineers</b>		
Fort Patrick			Shawnee	10	1,750,000	<b>Dams (8)</b>		853,000
Henry	2	36,000	Watts Bar	4	240,000	Total		
Great Falls	2	31,860	Widows Creek	8	1,977,985	System in		
Guntersville	4	115,200	Total	63	17,796,085	Service		29,858,110
Hiwassee	2	117,100						
Kentucky	5	175,000	<b>TVA Nuclear Plants</b>					
Melton Hill	2	72,000						
Nickajack	4	100,350	Browns Ferry	3	3,456,000			
Norris	2	100,800						
Nottely	1	15,000	<b>TVA Pumped Storage</b>					
Ocoee #1	5	18,000						
Ocoee #2	2	21,000	Raccoon Mountain	4	1,530,000			
Ocoee #3	1	28,800						
Pickwick	6	220,040						
South								
Holston	1	35,000						
Tims Ford	1	45,000						
Watauga	2	53,800						
Watts Bar	5	166,500						
Wheeler	11	359,100						
Wilbur	4	10,700						
Wilson	21	629,840						
Total	109	3,289,310						

# Financial Statements

TENNESSEE VALLEY AUTHORITY:

A corporation wholly owned by the United States of America

**COOPERS & LYBRAND  
CERTIFIED PUBLIC ACCOUNTANTS**

**IN PRINCIPAL AREAS  
OF THE WORLD**

To the Board of Directors of  
Tennessee Valley Authority:

We have examined the financial statements of *Tennessee Valley Authority* at September 30, 1979 and 1978 and for the years then ended which appear on pages 22 through 33 herein. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the aforementioned financial statements present fairly:

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

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

**COOPERS & LYBRAND**

New York, November 21, 1979.

# Balance Sheets

September 30, 1979 and 1978

## Assets

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

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

\*Deduct

# Liabilities and Capitalization

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

# Net Income and Retained Earnings Power Program

For the years ended September 30, 1979 and 1978

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

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

\*Deduct

# Net Expense and Accumulated Net Expense Nonpower Program

For the years ended September 30, 1979 and 1978

	1979	1978
	(Thousands)	
<b>Regional Resources Development</b>		
Navigation operations	\$ 7,709	\$ 7,306
System flood control operations	6,016	5,670
Recreation development	4,747	4,531
Tributary area development	3,209	2,925
Regional water quality management	1,472	1,290
Fisheries and wildlife resources development	1,459	1,136
Preliminary surveys and engineering	343	306
Environmental education	493	374
Valley agricultural development	2,720	2,014
Forest resources development	2,247	2,334
Strip mine reclamation demonstrations	2,041	3,677
Interagency health services demonstrations	606	324
Regional economic studies	775	726
Townlift community improvement	750	793
Human resources development	764	679
Minerals resources projects	319	327
Special opportunities counties program	484	1,250
Minority economic development	677	111
Local flood damage prevention operations	8,869	7,014
Environmental quality projects	506	480
Net expense of regional resources development	<u>46,206</u>	<u>43,267</u>
<b>Fertilizer Development; note 2</b>		
Research and development	11,065	10,893
Fertilizer introduction		
Fertilizer industry demonstrations	2,737	2,845
Farm test demonstrations outside the Valley	1,126	1,155
Net expense of fertilizer introduction	<u>3,863</u>	<u>4,000</u>
Developmental production		
Cost of products distributed	28,716	26,663
General expenses		
Loss on retirements of manufacturing plant and equipment, net	417	139
Gain on sale of phosphate reserves, net	71*	107*
Administrative and general	226	582
Other	890	430
Total general expenses	<u>1,462</u>	<u>1,044</u>
Total production expense	<u>30,178</u>	<u>27,707</u>
Less transfers and sales of products		
Transfers to other TVA programs, at market prices	21,687	20,978
Direct sales	151	335
Total transfers and sales	<u>21,838</u>	<u>21,313</u>
Net expense of developmental production	<u>8,340</u>	<u>6,394</u>
Net expense of fertilizer development	<u>23,268</u>	<u>21,287</u>
<b>National Energy Demonstrations</b>	4,698	609
<b>Land Between The Lakes Operations</b>	5,547	5,509
<b>Valley Mapping and Remote Sensing</b>	1,012	771
<b>Other Expense, Net</b>	<u>1,188</u>	<u>972</u>
Net Expense; schedule D	81,919	72,415
Accumulated net expense at beginning of period	867,375	794,960
Accumulated net expense at end of period	<u>\$949,294</u>	<u>\$867,375</u>

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

\*Deduct

# Changes in Financial Position

For the years ended September 30, 1979 and 1978

Source of Funds	Power program		All programs	
	1979	1978	1979	1978
	(Thousands)			
<b>Program sources</b>				
Net power income; exhibit II	\$ 136,737	\$ 216,568	\$ 136,737	\$ 216,568
Items not requiring funds; note a	67,707	58,821*	67,707	58,821*
Funds from power operations	204,444	157,747	204,444	157,747
Sale of power facilities	2,669	2,171	2,669	2,171
Funds from power program; note b	207,113	159,918	207,113	159,918
Net expense of nonpower programs; exhibit III			81,919*	72,415*
Add items not requiring funds; note a			9,106	8,232
Funds used in nonpower operations			72,813*	64,183*
Sale of nonpower facilities			362	342
Funds used in nonpower programs			72,451*	63,841*
<b>Debt sources</b>				
Long-term bonds				
Issues	1,500,000	800,000	1,500,000	800,000
Redemptions	100,000*	—	100,000*	—
Short-term notes				
Issues	7,795,000	4,280,000	7,795,000	4,280,000
Redemptions	7,390,000*	3,740,000*	7,390,000*	3,740,000*
Total debt sources	1,805,000	1,340,000	1,805,000	1,340,000
<b>Other sources</b>				
Congressional appropriations	500	320	154,531	138,510
Property transfers	174	261	765	528
Total other sources	674	581	155,296	139,038
Total source of funds	\$2,012,787	\$1,500,499	\$2,094,958	\$1,575,115
<b>Disposition of Funds</b>				
Expended for plant and equipment, excluding allowance for borrowed funds used	\$1,797,320	\$1,460,951	\$1,860,624	\$1,527,033
Less:				
Depreciation charged to construction and clearing accounts	4,456	3,620	6,874	5,766
Cost of removing retired facilities and salvage from retained materials	2,487	329	2,321	302
	1,790,377	1,457,002	1,851,429	1,520,965
Payments to U.S. Treasury; note 5				
Return on appropriation investment	68,868	61,716	68,868	61,716
Repayment of appropriation investment	20,000	20,000	20,000	20,014
	88,868	81,716	88,868	81,730
Unamortized debt discount and expense and other deferred charges				
Mine and mill development cost	119,627	39,395	119,627	39,395
Debt issue expense	30	16	30	16
	119,657	39,411	119,657	39,411

\*Deduct

# Changes in Financial Position Continued

For the years ended September 30, 1979 and 1978

Disposition of Funds Continued	Power program		All programs	
	1979	1978	1979	1978
	(Thousands)			
Changes in working capital (increase or decrease*)				
Cash	\$ 36,347*	\$ 26,921*	\$ 13,502*	\$ 15,481*
Accounts receivable	93,538	109,453	97,750	110,140
Inventories	251,489	13,495*	254,550	12,194*
	<u>308,680</u>	<u>69,037</u>	<u>338,798</u>	<u>82,465</u>
Less other current liabilities (excluding short-term debt)	294,795	146,667	303,794	149,456
	<u>13,885</u>	<u>77,630*</u>	<u>35,004</u>	<u>66,991*</u>
Total disposition of funds	<u>\$2,012,787</u>	<u>\$1,500,499</u>	<u>\$2,094,958</u>	<u>\$1,575,115</u>

## Notes:

### a. Items not requiring funds:

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

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

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

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

\*Deduct

# Notes to Financial Statements

1. **Allocation of cost of multipurpose projects**—Section 14 of the TVA Act requires TVA's Board of Directors to allocate the cost of completed multipurpose projects, subject to the approval of the

President of the United States. The cost of facilities installed exclusively for a single purpose is assigned directly to that purpose; the cost of multiple-use facilities is allocated among the various purposes served.

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

	Investment		Total
	Direct	Multiple-use (Thousands)	
Power	\$319,339	\$177,149	\$ 496,488
Navigation	153,088	137,281	290,369
Flood control	61,595	159,373	220,968
Recreation	1,324	66,073	67,397
Tributary area development	<u>19</u>	<u>45,509</u>	<u>45,528</u>
Total	<u>\$535,365</u>	<u>\$585,385</u>	<u>\$1,120,750</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 which is applicable to major generating facilities. The costs of generation during preliminary operations prior to commercial acceptance including amortization of nuclear fuel less credit for the fair value of energy generated are also included in the recorded costs of steam and nuclear generating plants. Except for chemical plant, plant retirements (including original cost and removal cost less salvage) are charged against appropriate accumulated depreciation accounts. Because of the experimental nature of fertilizer development, losses on early retirement of chemical plant are included in current year operations.

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

**Allowance for funds used**—The practice of capitalizing an allowance for funds used during construction and during the fabrication of nuclear fuels in the power program was modified in the fourth quarter of fiscal year 1979 (retroactive to October 1, 1978) in accordance with the TVA Board of Directors criteria for establishing wholesale power rates. The effect of this change was to make the allowance applicable only to the construction of major generating facilities and limit the amount to the sum of depreciation

and other current period noncash charges less the amount of the repayment of the appropriation investment as prescribed in Section 15d of the TVA Act. The method used provides for the calculation each month of the interest on the most recent debt issues that are equivalent to the average balance of construction work in progress for major generating facilities subject to the limitation described. The limitation reduced net income and the amount of allowance for funds used during construction that would have been otherwise determined for fiscal year 1979 by \$224,955,000 and reduced the equivalent average capitalization rate for fiscal year 1979 from 8.62 percent to 3.95 percent which compares with 7.57 percent for fiscal year 1978.

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

## Notes to Financial Statements Continued

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

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.

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

Borrowing expenses—Issue and reacquisition expenses and discounts on power borrowings from the public are amortized on a straight-line basis over the term of the related securities. Issue expenses on power borrowings from the Federal Financing Bank are amortized over a five-year period

except that amounts under \$6,000 are expensed as incurred.

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

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

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

The total rentals charged to power operating expenses and other operating clearing accounts for the years ending September 30, 1979 and 1978, amounted to approximately \$20,128,350 and \$20,484,000, re-

spectively. At September 30, 1979, the aggregate minimum gross rental commitments of TVA under all non-cancelable leases for the periods shown are as follows:

1980	\$18,246,000
1981	\$15,393,000
1982	\$13,955,000
1983	\$12,967,000
1984	\$12,554,000
thereafter	\$44,256,000

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

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

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

\*Deduct

## Notes to Financial Statements Continued

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

**5. Payments to the U.S. Treasury**—Section 15d of the TVA Act requires the payment from net power proceeds of a return on the net appropriation investment in power facilities plus repayments of

such investment, beginning with fiscal year 1961. The amount of return payable during each year is based on the appropriation investment as of the beginning of that year and the computed average interest rate payable by the U.S. Treasury on its total marketable public obligations as of the same date. The repayment schedule calls for payment of not less than \$10 million for each of the first five years

(1961-1965), \$15 million for each of the next five years (1966-1970), and \$20 million for each year thereafter until a total of \$1 billion shall have been repaid. The payments required by Section 15d may be deferred under certain circumstances for not more than two years.

Required payments have been made as follows:

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

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

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

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

ture and distribution of fertilizers.

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

# Notes to Financial Statements Continued

Issues outstanding on September 30, 1979, consist of the following:

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

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

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

**7. Retirement plan**—TVA has a contributory retirement plan which covers substantially all of its salaried employees. The cost of currently accruing benefits is funded currently. The cost of the

plan to TVA was \$48,823,000 in 1979 and \$38,060,000 in 1978, including amortization of unfunded prior service costs over the average future careers of active members. The actuarially computed pension fund assets as of September 30, 1978, the latest actuarial valuation date, exceeded the actuarially computed value of vested benefits of the plan.

## Notes to Financial Statements Continued

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8. **Litigation**—Six citizens' suits were filed in six different district courts under the Clean Air Act, alleging that the sulfur dioxide emissions from 10 of TVA's coal-fired steam plants and the particulate emissions from 7 coal-fired plants violate the emission standards set by the States. Plaintiffs include the States of Kentucky and Alabama and the United States of America at the request of the Environmental Protection Agency. Five of the cases were consolidated in the United States District Court for the Middle District of Tennessee; the other was filed in the United States District Court for the Northern District of Alabama. Plaintiffs asked that the courts order TVA to comply with the applicable emission standards as expeditiously as possible. In addition, the State of Alabama specifically asked the court to restrict operation of Widows Creek and Colbert Steam Plants until final compliance is achieved and assess a State penalty of \$10,000 per day per violation. A proposed settlement agreement was approved in December 1978 and presented to the courts for approval. This proposed agreement specifies compliance schedules to control both sulfur dioxide and particulate emissions at TVA steam plants and provides for stipulated daily penalties if TVA does not meet these schedules. The agreement waives any TVA liability

for penalties and fines for past violations. The reference in the agreement as originally drafted to a Cumberland Steam Plant scrubber project and activities in lieu of penalties has been deleted, based on new air quality information. The Alabama district court has approved the agreement. While the agreement as submitted to the courts is in full satisfaction of all State or Federal civil penalties, TVA is still subject by law to the mandatory noncompliance penalties under Section 120 of the Clean Air Act Amendments of 1977 which will be levied separate and apart from this action on all sources not in compliance after July 1, 1979. Several of TVA's steam plants were not in compliance on that date. The amount of these mandatory noncompliance penalties is based on the economic value of noncompliance to the owner, less any amounts actually expended by the source toward achieving compliance. The amount of these payments cannot be determined until EPA issues guidelines and regulations. It is TVA's position that under the act no penalties are due, based in part on the act's exemption from penalties for sources under consent decrees.

A residential electric consumer of the Memphis Light, Gas, and Water Division (Memphis) filed a class action suit against it and its governing Board in the Chancery

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

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

## Notes to Financial Statements Continued

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

On November 18, 1977, TVA filed antitrust suits against 10 foreign uranium producers and 3 domestic firms. The complaints were filed in U.S. District Courts in Chattanooga, Denver, and New York City,

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

In a suit brought by the Attorney General of Alabama, the United States District Court for the Northern District of Alabama has ruled that Section 8(a) of the TVA

Act requires TVA to maintain its "headquarters" in the immediate vicinity of Muscle Shoals, Alabama. TVA has appealed the decision, and the court has stayed, pending the appeal, an injunction which requires TVA to relocate its "headquarters" from Knoxville, Tennessee, to Muscle Shoals. TVA expects the United States Court of Appeals for the Fifth Circuit to reverse the district court's order.

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

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

# Operating Statistics

Tennessee Valley Authority  
A corporation wholly owned by the United States of America

## Power Earnings (Millions)

	<u>1979</u>	<u>1978</u>	<u>1977</u>	<u>1976</u>	<u>1975</u>
<b>Operating Revenues</b>					
Sales of electric energy					
Municipalities and cooperatives	\$ 1,810.9	\$1,540.1	\$1,238.3	\$1,057.4	\$ 737.2
Federal agencies	368.7	305.8	322.6	300.1	182.5
Industries	598.2	456.0	355.7	303.6	227.6
Electric utilities	4.7	3.9	2.9	1.9	1.6
Interdivisional	12.8	6.5	5.6	8.0	6.7
Revenue credit due customers; note nine	<u>163.0*</u>				
Total sales of electric energy	<u>2,632.3</u>	<u>2,312.3</u>	<u>1,925.1</u>	<u>1,671.0</u>	<u>1,155.6</u>
Rents and other miscellaneous revenues	<u>24.6</u>	<u>37.8</u>	<u>41.6</u>	<u>21.5</u>	<u>20.7</u>
Total operating revenues	<u>2,656.9</u>	<u>2,350.1</u>	<u>1,966.7</u>	<u>1,692.5</u>	<u>1,176.3</u>
<b>Operating Expenses</b>					
Production	1,594.0	1,539.9	1,309.2	1,161.5	750.8
Transmission	31.9	27.5	27.6	24.6	22.2
Customer accounts	.8	.7	.7	.6	.5
Demonstration of power use	12.1	4.3	2.1	1.4	1.3
Administrative and general	93.6	81.6	60.0	48.6	34.0
Payments in lieu of taxes	100.0	79.9	68.2	48.4	36.8
Social security taxes	14.6	11.7	8.7	6.7	5.2
Depreciation	160.6	150.4	138.4	122.0	110.3
Other	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
Total operating expenses	<u>2,007.5</u>	<u>1,896.0</u>	<u>1,614.9</u>	<u>1,413.8</u>	<u>961.1</u>
Operating income	<u>649.3</u>	<u>454.1</u>	<u>351.8</u>	<u>278.7</u>	<u>215.2</u>
<b>Other Income and Deductions</b>	<u>7.2*</u>	<u>.3</u>	<u>1.4*</u>	<u>.3*</u>	<u>.2*</u>
Income before interest charges and extraordinary item	642.1	454.4	350.4	278.4	215.0
<b>Interest Charges</b>	<u>505.4</u>	<u>237.8</u>	<u>200.6</u>	<u>152.4</u>	<u>111.6</u>
Income before extraordinary item	136.7	216.6	149.8	126.0	103.4
<b>Extraordinary Item</b>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
Net income	<u>\$ 136.7</u>	<u>\$ 216.6</u>	<u>\$ 149.8</u>	<u>\$ 126.0</u>	<u>\$ 103.4</u>
<b>Net Power Proceeds From Operations</b>					
Income before interest charges and extraordinary item	\$ 642.1	\$ 454.4	\$ 350.4	\$ 278.4	\$ 215.0
Add back noncash items	220.5	189.1	172.2	123.1	117.9
Total	<u>\$ 862.6</u>	<u>\$ 643.5</u>	<u>\$ 522.6</u>	<u>\$ 401.5</u>	<u>\$ 332.9</u>

\*Deduct

Fiscal Years

<u>1974</u>	<u>1973</u>	<u>1972</u>	<u>1971</u>	<u>1970</u>	<u>1969</u>	<u>1968</u>	<u>1967</u>	<u>1966</u>	<u>1965</u>
\$556.1	\$476.3	\$415.3	\$379.2	\$285.5	\$222.2	\$197.2	\$172.0	\$158.2	\$136.8
121.5	103.2	73.3	61.9	59.4	63.6	78.9	83.9	84.0	82.4
179.8	144.7	124.3	125.0	106.0	92.2	84.2	79.6	71.5	67.1
1.2	.8	6.3	10.1	7.6	7.3	8.6	10.1	7.9	4.8
<u>5.0</u>	<u>4.0</u>	<u>3.4</u>	<u>3.1</u>	<u>3.0</u>	<u>2.8</u>	<u>2.7</u>	<u>3.1</u>	<u>3.0</u>	<u>3.0</u>
863.6	729.0	622.6	579.3	461.5	388.1	371.6	348.7	324.6	294.1
<u>20.0</u>	<u>20.3</u>	<u>19.2</u>	<u>18.7</u>	<u>18.1</u>	<u>15.2</u>	<u>12.1</u>	<u>2.4</u>	<u>2.2</u>	<u>1.9</u>
<u>883.6</u>	<u>749.3</u>	<u>641.8</u>	<u>598.0</u>	<u>479.6</u>	<u>403.3</u>	<u>383.7</u>	<u>351.1</u>	<u>326.8</u>	<u>296.0</u>
494.2	408.7	325.6	306.1	246.1	210.3	191.1	187.8	170.4	139.9
20.8	18.9	17.8	16.9	15.1	14.3	13.9	12.9	12.4	12.2
.5	.5	.4	.4	.3	.3	.2	.2	.2	.2
1.3	1.3	1.2	1.2	1.1	1.0	1.0	.9	.8	.8
29.9	27.4	24.0	22.0	18.0	15.6	14.4	13.3	12.1	11.5
31.1	27.3	25.7	20.0	16.1	14.5	13.1	11.9	10.5	9.1
4.6	3.8	3.2	2.9	2.4	2.2	1.8	1.7	1.2	1.0
97.1	89.5	83.4	80.0	75.1	71.6	70.7	65.7	62.6	59.1
—	—	—	—	—	—	—	—	—	—
<u>679.5</u>	<u>577.4</u>	<u>481.3</u>	<u>449.5</u>	<u>374.2</u>	<u>329.8</u>	<u>306.2</u>	<u>294.4</u>	<u>270.2</u>	<u>233.8</u>
204.1	171.9	160.5	148.5	105.4	73.5	77.5	56.7	56.6	62.2
.4	.4	.1*	.1	—	—	—	—	—	—
204.5	172.3	160.4	148.6	105.4	73.5	77.5	56.7	56.6	62.2
98.4	65.9	48.3	29.6	30.8	22.8	18.4	16.0	8.7	7.2
<u>106.1</u>	<u>106.4</u>	<u>112.1</u>	<u>119.0</u>	<u>74.6</u>	<u>50.7</u>	<u>59.1</u>	<u>40.7</u>	<u>47.9</u>	<u>55.0</u>
—	—	—	—	—	—	10.3*	—	—	—
<u>\$106.1</u>	<u>\$106.4</u>	<u>\$112.1</u>	<u>\$119.0</u>	<u>\$ 74.6</u>	<u>\$ 50.7</u>	<u>\$ 48.8</u>	<u>\$ 40.7</u>	<u>\$ 47.9</u>	<u>\$ 55.0</u>
\$204.5	\$172.3	\$160.4	\$148.6	\$105.4	\$ 73.5	\$ 77.5	\$ 56.7	\$ 56.6	\$ 62.2
97.1	89.4	83.8	80.0	75.1	71.6	70.7	65.7	62.6	59.1
<u>\$301.6</u>	<u>\$261.7</u>	<u>\$244.2</u>	<u>\$228.6</u>	<u>\$180.5</u>	<u>\$145.1</u>	<u>\$148.2</u>	<u>\$122.4</u>	<u>\$119.2</u>	<u>\$121.3</u>

# Net Power Assets

	At September 30				
	1979	1978	1977	1976	1975
Net Assets					
Completed plant	\$ 6,436.6	\$5,865.2	\$5,614.3	\$5,017.0	\$4,778.6
Less accumulated depreciation	<u>1,897.5</u>	<u>1,746.1</u>	<u>1,609.3</u>	<u>1,458.9</u>	<u>1,344.4</u>
Net completed plant	4,539.1	4,119.1	4,005.0	3,558.1	3,434.2
Construction in progress	5,832.3	4,586.6	3,280.2	2,470.9	1,714.2
Nuclear fuel	448.1	393.0	299.6	227.3	169.0
Inventories	611.0	359.5	373.0	377.4	273.2
Other current assets less other current liabilities	433.2*	195.6*	131.5*	290.6*	47.6*
Deferred charges, net	<u>210.9</u>	<u>92.3</u>	<u>53.9</u>	<u>17.3</u>	<u>11.2</u>
Total	<u>\$11,208.2</u>	<u>\$9,354.9</u>	<u>\$7,880.2</u>	<u>\$6,360.4</u>	<u>\$5,554.2</u>
Derived From					
U.S. Treasury funds, gross	\$ 1,472.8	\$1,472.3	\$1,472.5	\$1,471.1	\$1,470.9
Less Treasury funds repaid	<u>560.2</u>	<u>540.2</u>	<u>520.2</u>	<u>475.1</u>	<u>475.1</u>
Net U.S. Treasury funds	912.6	932.1	952.3	996.0	995.8
Long-term debt	6,625.0	5,425.0	4,725.0	3,575.0	2,875.0
Short-term notes payable to U.S. Treasury	150.0	150.0	150.0	150.0	150.0
Short-term debt payable to others	2,225.0	1,620.0	980.0	680.0	635.0
Advances and contributions	—	—	—	—	—
Retained earnings	<u>1,295.6</u>	<u>1,227.8</u>	<u>1,072.9</u>	<u>959.4</u>	<u>898.4</u>
Total	<u>\$11,208.2</u>	<u>\$9,354.9</u>	<u>\$7,880.2</u>	<u>\$6,360.4</u>	<u>\$5,554.2</u>

Note: In all years, the amounts for "U.S. Treasury funds, gross" include the full \$65.1 million of bonds issued by TVA to the Treasury and to the RFC, and the amounts for "Less Treasury funds repaid" include the amounts redeemed. All of these bonds were redeemed by June 30, 1956.

\*Deduct

At June 30

1974	1973	1972	1971	1970	1969	1968	1967	1966	1965
\$4,061.9	\$3,820.5	\$3,404.4	\$3,317.9	\$3,202.9	\$2,977.3	\$2,900.7	\$2,792.5	\$2,602.6	\$2,466.8
<u>1,242.4</u>	<u>1,156.2</u>	<u>1,075.4</u>	<u>998.0</u>	<u>924.5</u>	<u>856.0</u>	<u>789.3</u>	<u>727.2</u>	<u>671.9</u>	<u>614.3</u>
2,819.5	2,664.3	2,329.0	2,319.9	2,278.4	2,121.3	2,111.4	2,065.3	1,930.7	1,852.5
1,552.0	1,318.6	1,294.3	822.4	481.9	386.4	216.3	150.0	203.5	220.6
129.9	93.1	63.9	41.5	24.8	13.2	—	—	—	—
128.7	140.8	109.3	83.1	37.5	44.2	51.5	44.9	32.4	39.1
22.6	17.4*	26.3*	34.9*	16.6	2.2	3.6	23.8	7.3	8.4
<u>23.9</u>	<u>15.0</u>	<u>11.5</u>	<u>10.0</u>	<u>6.8</u>	<u>6.9</u>	<u>5.1</u>	<u>3.3</u>	<u>2.5</u>	<u>1.4</u>
<u>\$4,676.6</u>	<u>\$4,214.4</u>	<u>\$3,781.7</u>	<u>\$3,242.0</u>	<u>\$2,846.0</u>	<u>\$2,574.2</u>	<u>\$2,387.9</u>	<u>\$2,287.3</u>	<u>\$2,176.4</u>	<u>\$2,122.0</u>
\$1,470.3	\$1,469.9	\$1,470.0	\$1,466.4	\$1,463.5	\$1,462.0	\$1,461.0	\$1,455.2	\$1,455.1	\$1,454.7
<u>455.1</u>	<u>435.1</u>	<u>415.2</u>	<u>395.2</u>	<u>375.2</u>	<u>360.1</u>	<u>345.1</u>	<u>330.1</u>	<u>315.1</u>	<u>300.1</u>
1,015.2	1,034.8	1,054.8	1,071.2	1,088.3	1,101.9	1,115.9	1,125.1	1,140.0	1,154.6
2,125.0	1,775.0	1,225.0	675.0	675.0	375.0	275.0	215.0	145.0	145.0
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0
570.0	480.0	630.0	680.3	321.0	352.7	250.0	202.2	140.0	80.0
—	.9	.9	.8	.8	.7	.7	.7	.7	.7
<u>866.4</u>	<u>823.7</u>	<u>771.0</u>	<u>714.7</u>	<u>660.9</u>	<u>643.9</u>	<u>646.3</u>	<u>644.3</u>	<u>650.7</u>	<u>646.7</u>
<u>\$4,676.6</u>	<u>\$4,214.4</u>	<u>\$3,781.7</u>	<u>\$3,242.0</u>	<u>\$2,846.0</u>	<u>\$2,574.2</u>	<u>\$2,387.9</u>	<u>\$2,287.3</u>	<u>\$2,176.4</u>	<u>\$2,122.0</u>

# System Input, System Output

(Millions of Kilowatthours)

System Input	1979	1978	1977	1976	1975
System generation					
Hydro					
TVA plants	15,730.9	15,500.7	14,318.0	14,606.8	17,176.0
ALCOA plants	2,243.3	2,015.2	1,949.4	2,048.3	2,393.4
Cumberland plants	3,376.1	3,178.2	1,929.7	2,541.7	3,380.7
Total hydro	<u>21,350.3</u>	<u>20,694.1</u>	<u>18,197.1</u>	<u>19,196.8</u>	<u>22,950.1</u>
Pumped-storage	(273.5)	(12.5)	—	—	—
TVA coal-fired plants	78,081.0	77,939.6	82,493.1	81,764.8	71,699.4
TVA nuclear plants	19,771.0	15,795.2	20,003.2	(100.1)	7,429.0
Combustion turbine plants	545.7	2,940.9	2,111.9	1,119.9	506.8
Total net generation	<u>119,474.5</u>	<u>117,357.3</u>	<u>122,805.3</u>	<u>101,981.4</u>	<u>102,585.3</u>
Purchased	86.9	901.1	601.8	4,952.3	5,276.4
Interchange received	12,779.0	12,140.1	10,949.8	11,373.7	8,150.0
Total input	<u>132,340.4</u>	<u>130,398.5</u>	<u>134,356.9</u>	<u>118,307.4</u>	<u>116,011.7</u>
System Output					
Sales					
Municipalities and cooperatives	75,936.4	77,875.3	76,505.0	66,536.9	64,468.1
Federal agencies	16,169.9	16,722.3	22,268.0	21,609.8	19,389.3
Industries	24,912.8	22,877.5	22,738.7	19,941.7	21,822.4
Electric utilities	171.6	175.5	161.7	97.1	115.8
Total outside sales	<u>117,190.7</u>	<u>117,650.6</u>	<u>121,673.4</u>	<u>108,185.5</u>	<u>105,795.6</u>
Interdivisional	497.5	295.3	313.6	532.9	637.6
Total sales	<u>117,688.2</u>	<u>117,945.9</u>	<u>121,987.0</u>	<u>108,718.4</u>	<u>106,433.2</u>
Returned to ALCOA*	1,856.2	1,825.2	1,709.0	1,844.8	1,718.8
Interchange delivered	9,720.6	7,134.3	7,228.8	4,666.1	4,738.0
Losses	3,075.4	3,493.1	3,432.1	3,078.1	3,121.7
Total output	<u>132,340.4</u>	<u>130,398.5</u>	<u>134,356.9</u>	<u>118,307.4</u>	<u>116,011.7</u>
Generating capacity, fiscal year end—					
kilowatts	29,858,110	28,308,710	28,294,960	27,071,480	26,726,630
Area peak load—kilowatts	21,540,000	21,992,000	21,803,000	20,381,000	18,633,000

\*In return for energy delivered to the TVA system from the ALCOA plants.

Fiscal Years

<u>1974</u>	<u>1973</u>	<u>1972</u>	<u>1971</u>	<u>1970</u>	<u>1969</u>	<u>1968</u>	<u>1967</u>	<u>1966</u>	<u>1965</u>
17,485.3	18,141.5	15,915.2	12,733.6	12,313.2	11,595.4	15,187.8	13,317.9	11,024.4	14,615.5
2,408.0	2,623.2	2,119.7	1,811.7	1,779.3	1,813.3	2,283.8	1,868.9	1,777.1	2,163.0
3,643.0	3,693.1	3,257.7	2,737.1	2,447.2	1,579.2	3,361.6	2,555.3	1,338.0	2,023.6
<u>23,536.3</u>	<u>24,457.8</u>	<u>21,292.6</u>	<u>17,282.4</u>	<u>16,539.7</u>	<u>14,987.9</u>	<u>20,833.2</u>	<u>17,742.1</u>	<u>14,139.5</u>	<u>18,802.1</u>
—	—	—	—	—	—	—	—	—	—
84,084.1	84,384.0	73,439.8	74,332.1	76,144.6	75,600.9	69,619.4	68,114.0	67,941.9	55,651.7
1,947.6	—	—	—	—	—	—	—	—	—
291.7	253.9	71.1	18.3	—	—	—	—	—	—
<u>109,859.7</u>	<u>109,095.7</u>	<u>94,803.5</u>	<u>91,632.8</u>	<u>92,684.3</u>	<u>90,588.8</u>	<u>90,452.6</u>	<u>85,856.1</u>	<u>82,081.4</u>	<u>74,453.8</u>
1,046.7	670.3	266.1	593.2	459.2	4.3	—	79.7	23.7	—
8,520.9	7,288.0	7,075.4	8,889.6	8,141.8	7,354.8	5,156.2	5,141.0	2,676.9	2,765.4
<u>119,427.3</u>	<u>117,054.0</u>	<u>102,145.0</u>	<u>101,115.6</u>	<u>101,285.3</u>	<u>97,947.9</u>	<u>95,608.8</u>	<u>91,076.8</u>	<u>84,782.0</u>	<u>77,219.2</u>
64,182.5	63,822.0	57,820.3	55,534.6	53,692.9	49,008.2	44,575.0	40,705.9	37,783.5	32,161.3
17,388.1	17,112.5	12,501.8	11,773.5	13,069.6	14,826.9	18,801.8	20,226.3	20,638.2	20,391.9
23,790.1	21,864.7	19,592.0	21,278.3	22,012.6	20,568.1	19,213.4	18,589.8	16,765.1	15,773.7
122.2	92.1	539.7	1,407.3	1,273.7	1,300.5	1,462.1	1,768.1	1,150.1	769.8
<u>105,482.9</u>	<u>102,891.3</u>	<u>90,453.8</u>	<u>89,993.7</u>	<u>90,048.8</u>	<u>85,703.7</u>	<u>84,052.3</u>	<u>81,290.1</u>	<u>76,336.9</u>	<u>69,096.7</u>
661.8	581.3	636.6	653.9	673.5	670.2	667.8	796.6	768.4	764.1
106,144.7	103,472.6	91,090.4	90,647.6	90,722.3	86,373.9	84,720.1	82,086.7	77,105.3	69,860.8
1,849.5	1,820.3	1,857.6	1,846.7	1,847.5	1,756.2	1,863.5	1,688.1	1,694.7	1,638.5
8,408.2	8,202.7	5,998.1	5,049.4	5,379.7	6,808.5	6,204.9	4,614.3	3,430.6	3,490.4
3,024.9	3,558.4	3,198.9	3,571.9	3,335.8	3,009.3	2,820.3	2,687.7	2,551.4	2,229.5
<u>119,427.3</u>	<u>117,054.0</u>	<u>102,145.0</u>	<u>101,115.6</u>	<u>101,285.3</u>	<u>97,947.9</u>	<u>95,608.8</u>	<u>91,076.8</u>	<u>84,782.0</u>	<u>77,219.2</u>
23,319,030	21,892,480	19,880,420	19,828,380	19,422,480	18,239,280	18,202,090	18,111,860	17,149,500	14,675,615
18,611,000	18,888,000	16,664,000	16,745,000	16,797,000	15,017,000	15,266,000	14,634,000	14,263,000	12,801,000

## Customer Statistics

In the following tables, the sales and related statistics for TVA and for the local distributors have been combined to portray total sales to ultimate customers.

### Ultimate Customers

Month	Total	Residential	Commercial and Industrial	Federal Agencies	Outdoor Lighting
<b>Sept</b>					
1979	2,722,984	2,425,623	294,041	11	3,309
1978	2,664,412	2,371,064	290,132	11	3,205
1977	2,601,415	2,316,414	281,906	11	3,084
<b>June</b>					
1976	2,521,956	2,248,475	270,532	11	2,938
1975	2,458,822	2,192,972	263,056	11	2,783
1974	2,401,581	2,139,476	259,417	11	2,677
1973	2,325,134	2,068,150	254,423	11	2,550
1972	2,236,153	1,987,724	245,965	11	2,453
1971	2,158,423	1,919,208	236,687	11	2,517
1970	2,096,544	1,863,578	230,654	11	2,301
1969	2,047,338	1,817,982	227,179	11	2,166
1968	1,994,065	1,769,141	222,870	11	2,043
1967	1,946,594	1,726,382	218,257	11	1,944
1966	1,895,082	1,679,342	213,927	11	1,802
1965	1,840,791	1,630,547	208,533	10	1,701

### Electricity Sales - Millions of kilowatthours

Year Ending	Total	Residential	Commercial and Industrial	Federal Agencies	Outdoor Lighting
<b>Sept</b>					
1979	113,438	35,212	60,511	16,667	1,048
1978	113,418	37,874	57,522	17,018	1,004
1977	117,764	37,648	56,552	22,582	982
<b>June</b>					
1976	104,925	31,985	49,884	22,143	913
1975	102,778	31,785	50,117	20,027	849
1974	102,618	30,602	53,125	18,050	841
1973	99,670	30,637	50,557	17,694	782
1972	87,333	27,474	46,005	13,138	716
1971	85,930	27,291	45,553	12,427	659
1970	86,380	26,835	45,200	13,743	602
1969	82,111	24,449	41,610	15,497	555
1968	80,600	22,174	38,448	19,470	508
1967	77,708	19,945	36,276	21,023	464
1966	73,649	18,736	33,087	21,407	419
1965	67,050	16,501	29,043	21,156	350

# Customer Statistics Continued

## Revenue from Electric Sales - Thousands of dollars

Year Ending	Total	Residential	Commercial and Industrial	Federal Agencies	Outdoor Lighting
<b>Sept</b>					
1979	3,235,762	1,090,813	1,718,399	381,555	44,995
1978	2,747,716	1,015,406	1,379,852	312,328	40,130
1977	2,324,976	873,061	1,087,537	328,237	36,141
<b>June</b>					
1976	1,978,805	724,011	915,431	308,071	31,292
1975	1,448,320	559,439	672,806	189,187	26,888
1974	1,138,887	442,644	545,319	126,544	24,380
1973	992,421	398,253	465,323	107,154	21,691
1972	860,669	352,116	412,374	76,685	19,494
1971	796,426	332,544	381,299	65,010	17,573
1970	667,418	277,153	312,574	62,459	15,232
1969	576,589	231,391	265,294	66,323	13,581
1968	539,668	206,112	239,740	81,669	12,147
1967	492,374	177,055	217,543	87,026	10,750
1966	464,555	168,902	199,281	86,981	9,391
1965	418,705	151,007	174,808	85,344	7,546

## Residential Statistics

Fiscal Year	Average Annual Use	Average Annual Bill	Average Average Rate	US* Average Annual Use	US* Average Annual Rate c/kWh
1979	14,680	\$454.81	3.10¢	8,834	4.24
1978	16,190	434.03	2.68	8,828	3.98
1977	16,400	380.34	2.32	8,730	3.70
1976	14,370	325.35	2.26	8,209	3.33
1975	14,540	255.92	1.76	8,068	3.05
1974	14,480	209.37	1.45	8,019	2.54
1973	15,080	196.07	1.30	7,882	2.32
1972	14,040	179.92	1.28	7,496	2.25
1971	14,400	175.53	1.22	7,243	2.14
1970	14,560	150.39	1.03	6,810	2.09
1969	13,600	128.71	.95	6,259	2.11
1968	12,668	117.74	.93	5,788	2.14
1967	11,680	103.68	.89	5,434	2.18
1966	11,294	101.81	.90	5,072	2.22
1965	10,831	99.12	.92	4,814	2.28

\* Total United States

Notes: The City of Memphis ceased to be a regular distributor of TVA power in 1958 and its customer statistics are excluded beginning in fiscal year 1959. The City again became a regular distributor January 1, 1965, and its customers' statistics are included thereafter.

Federal agencies include only TVA's direct service and interdivisional sales.

To avoid overstating the number of customers in the region, the number of Outdoor Lighting customers excludes the customers who supplement regular service with the special outdoor lighting fixture. Only public street lighting and athletic field lighting customers are counted. However, the energy sales and revenue figures under Outdoor Lighting do include data for the special fixtures.

# Fuel Statistics

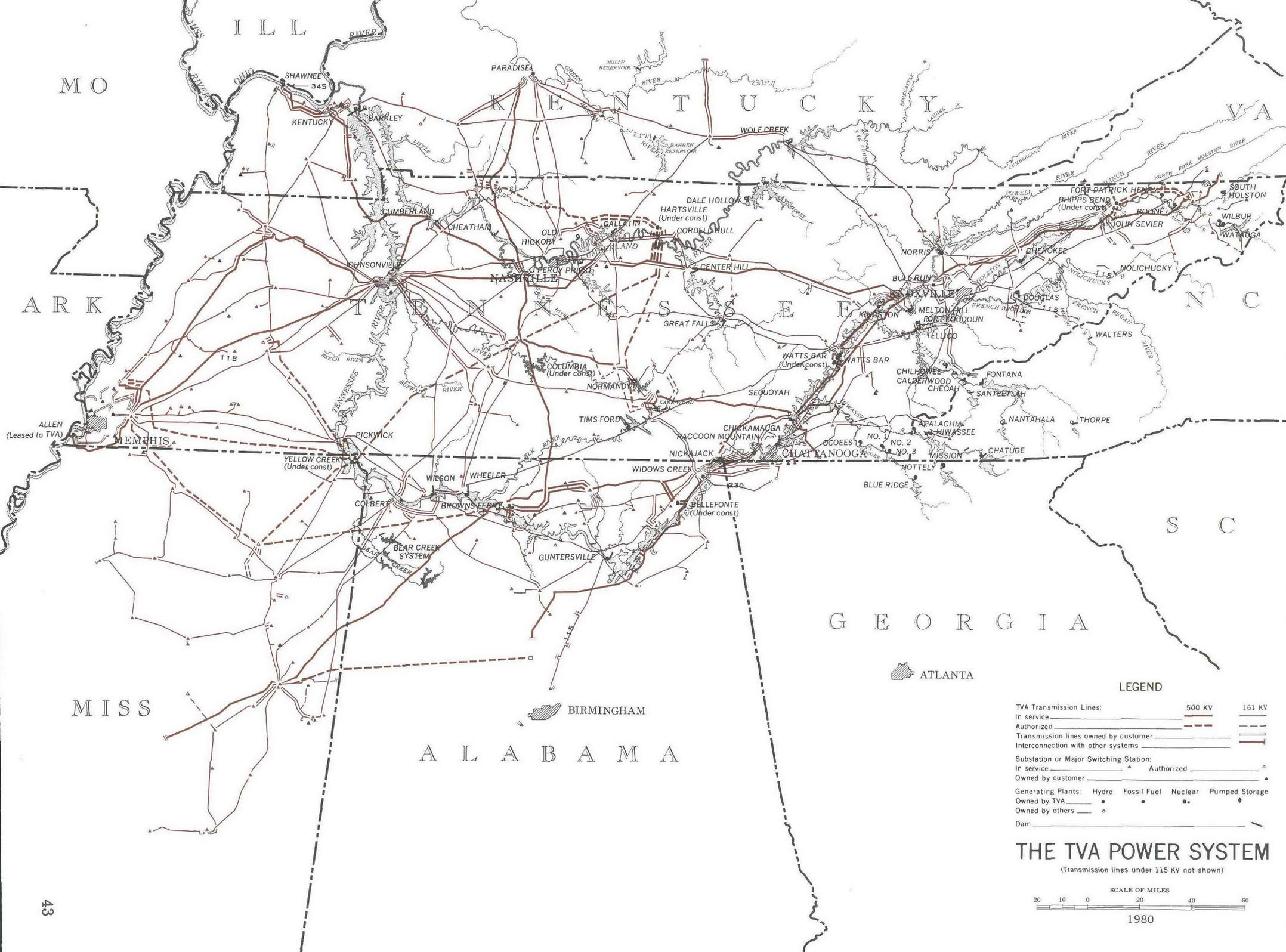
Fuel Burned	1979	1978	1977	1976	1975
<b>Steam plants</b>					
Coal - tons	34,734,280	36,061,379	37,946,797	37,158,293	33,139,949 <sup>1</sup>
Oil - gallons	17,884,415	18,961,477	13,887,791	13,762,479	14,447,738
Gas - MCF	—	—	—	—	—
Total fuel expense	\$1,041,116,668	\$897,590,341	\$809,284,973	\$699,978,978	\$435,157,927
Coal expense per ton	\$29.653	\$24.672	\$21.177	\$18.715	\$12.993
Oil expense per gallon	\$ .624	\$ .416	\$ .408	\$ .333	\$ .316
Gas expense per MCF	—	—	—	—	—
<b>Nuclear plants</b>					
Total fuel expense	\$ 47,978,968	\$ 38,355,587	\$ 32,023,437	\$ 118,052 <sup>4</sup>	\$ 7,109,516
<b>Combustion turbine plants</b>					
Oil - gallons	51,261,900	270,004,262	193,032,102	102,083,371	47,090,948
Gas - MCF	—	—	—	—	—
Total fuel expense	\$ 19,578,115	\$ 99,110,531	\$ 67,883,653	\$ 31,206,773	\$ 13,116,621 <sup>2</sup>
Oil expense per gallon	\$ .382	\$ .367	\$ .352	\$ .306	\$ .278
Gas expense per MCF	—	—	—	—	—
<b>Fuel Ratios</b>					
<b>Steam plants</b>					
Fuel expense per kWh generation - mills	13.334	11.516	9.810	8.561	6.069
Btu per kWh net generation	10,090	10,140	10,120	9,960	9,880
Cents per million Btu burned	132.16	113.57	96.96	85.91	61.41
Btu per pound of coal fired	11,300	10,920	10,970	10,940	10,660
<b>Combustion turbine plants</b>					
Fuel expense per kWh net generation - mills	35.88	33.70	32.145	27.864	25.879
Btu per kWh net generation	13,160	12,800	12,760	12,640	12,950
Cents per million Btu burned	272.68	263.28	251.80	220.39	199.86
<b>Nuclear plants</b>					
Fuel expense per kWh net generation - mills	2.427	2.428	1.856	—	1.525
Btu per kWh net generation	10,550	10,810	10,720	—	10,570
Cents per million Btu burned	23.00	22.46	17.32	241.02 <sup>4</sup>	14.42
<b>Coal Received</b>					
Tons	41,202,665	32,892,169	37,284,557	40,907,840	36,717,599 <sup>3</sup>
Mine cost plus transportation	\$1,217,524,119	\$842,033,551	\$781,474,331	\$767,163,347	\$539,980,917
Cents per million Btu	130.40	115.94	95.75	85.68	68.89

1. Includes 62,006 tons of petroleum coke costing \$673,924, which is estimated at 13,780 Btu per pound.

2. Includes \$47,054 amortization for Allen Gas Turbine Plant pipeline cost.

3. Includes 14,693 tons of petroleum coke costing \$197,689.

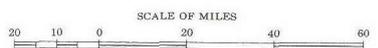
4. Cost of fuel oil fired for auxiliary steam and testing of emergency generators.



**LEGEND**

- TVA Transmission Lines: 500 KV (solid line), 161 KV (dashed line)
- In service (solid/dashed line)
- Authorized (dotted line)
- Transmission lines owned by customer (long-dashed line)
- Interconnection with other systems (line with cross-ticks)
- Substation or Major Switching Station:
  - In service (triangle)
  - Authorized (circle)
  - Owned by customer (square)
- Generating Plants: Hydro (square with 'H'), Fossil Fuel (square with 'F'), Nuclear (square with 'N'), Pumped Storage (square with 'P')
  - Owned by TVA (solid symbol)
  - Owned by others (dotted symbol)
- Dam (rectangle with vertical lines)

**THE TVA POWER SYSTEM**  
(Transmission lines under 115 KV not shown)



1980