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STATEMENT OF J. DEXTER PEACH
DIRECTOR, ENERGY AND MINERALS DIVISION
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U.S. SENATE

Mr. Chairman:

We appreciate your invitation to discuss some of our recent work at the Tennessee Valley Authority as it relates to the electric power rates paid by Valley ratepayers. As you know, in recent years, rate increases have been a subject of intense public interest. From 1960 to 1970, TVA's wholesale rates went up annually less than one percent in real terms, but from 1970 to 1980, rates rose annually about 9.2 percent in real terms. For 1980-1990, TVA presently forecasts real increases of up to 3.8 percent a year. TVA recently announced a rate increase of 9.3 percent beginning April 1, 1981, and will jump to 12.8 percent effective October 1, 1981.

In our view, the rate increases foreseen by TVA basically will be unavoidable. Fundamentally, TVA's rates are governed by production costs and the interest charges on money borrowed to construct new facilities or to make additions and improvements to existing facilities. In fiscal year 1980, production costs and interest charges accounted for about 86 percent of costs paid by ratepayers. As these costs rise, so must rates.

However, based on some of our recent work at TVA, we believe there is potential for moderating future rate increases to some extent. This potential relates to TVA's nuclear construction program, coal procurement program, and inventory management.

NUCLEAR CONSTRUCTION PROGRAM

As a producer of electric power, TVA today depends on coal-fired generating capacity more heavily than on nuclear powered capacity. But TVA's nuclear construction program schedule calls for 17 nuclear units to be in operation by 1996.

In recent years, much public attention has been focused on the construction program. The past 2 years have seen a 166 percent increase in estimated construction costs, deferrals of the completion dates of 4 nuclear units in response to steadily declining demand forecasts, unintended delays of other nuclear units, and much public scrutiny of the TVA's decision to complete all 17 nuclear units in the face of potential excess capacity.

In looking at the nuclear construction program, I would like to touch on three topics: demand forecasting, potential excess capacity, and the effects of construction program options on rates.

Demand forecasting

The relationship between demand forecasting and electric rates is direct. Demand forecasting is the foundational tool a power system uses to determine the additional capacity needed

to meet future consumption requirements. For TVA, adding more capacity means higher interest charges.

At best, however, forecasting demand beyond a few years into the future involves great uncertainty. Using a sophisticated set of models, TVA deals with uncertainty by producing a range of forecasts based on alternative levels of five explicitly identified factors believed by TVA to influence demand growth. The more important factors are economic growth and price of electricity, and the other three are the price of substitutes, TVA's conservation programs, and the Department of Energy's uranium enrichment power demand.

In 1978, we reported 1/ a number of weaknesses in TVA's approach to demand forecasting. Since that time, TVA has made significant improvements. Until recently, in line with our recommendations, TVA prepared three official planning forecasts--low, medium, and high. But recently, the medium forecast has been eliminated. Only the range between the low and high forecasts is used for planning purposes. At present, TVA is basing the nuclear construction program on the high forecast. Our concerns today about TVA's demand forecasting lie in the assumptions made about the factors that influence demand growth.

Economic growth

Before 1973, the TVA region grew significantly faster than the Nation, but during 1973-1979, the region's growth

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1/Electric Energy Options Hold Great Promise For the Tennessee Valley Authority, Nov. 29, 1978.

rate fell behind the Nation's. In its current high demand forecast, TVA assumes the region's economy will rebound and grow annually at a 3.5 percent rate during 1980-1990 versus only 2.8 percent for the Nation. Should this assumption prove optimistic, the high demand forecast would tend to be overstated.

Price of electricity

Price influences demand because consumers tend to use less as price increases. Therefore, reliable estimates of future price increases and of how much consumers will cut consumption as price rises (price elasticity of demand) are important. If price increases and the elasticity of demand are understated, the demand forecast would tend to be overstated. We believe there is a significant risk that the estimates of price increases and elasticity of demand used by TVA in its most recent forecast may have been understated.

TVA's estimates of future prices are sensitive to several factors, including interest rates paid on long term debt and the cost of the nuclear construction program. We believe there is a significant risk that interest rates and construction costs may turn out to be higher than currently estimated.

At the time TVA prepared its 1981 demand forecasts, TVA assumed that the interest rate would be 11 percent on long term debt issued in FY 1981 and 10 percent on debt issued during 1982-1987. However, TVA's most recent issues of long

term debt to the Federal Financing Bank in November 1980 and February 1981 were issued at about 12.4 and 12.7 percent, respectively.

In our view, the risk of higher construction costs is also significant. The most current estimate of nuclear program construction costs is $31.6 billion, including the four deferred units. That estimate is 166 percent higher than the estimate reported in TVA's FY 1980 Budget Program and 89 percent higher than the FY 1981 estimate. According to TVA's FY 1982 Budget Program, these increases have been due in large part to scope additions, design changes, and delays in project completion. In our view the risk of more additions, changes, and delays is significant.

For example, according to TVA, delays in project completion add to construction costs, and delays in two nuclear units have already occurred since the cost estimates appearing in the FY 1982 Budget Program were prepared. In February 1981, we learned that the commercial operating dates for units 1 and 2 at Watts Bar had been slipped 13 months due to design problems. Such unplanned delays in the non-deferred nuclear units have been commonplace. From about May 1979 to about May 1980, the estimated commercial operating dates of every non-deferred unit had slipped from at least 23 to as much as 43 months.

Combining these factors--potentially higher interest rates and construction costs--points toward higher prices for

electricity than now estimated, which would mean the current demand forecast would tend to be overstated.

But we're also concerned about TVA's estimates of how much consumers will reduce electricity consumption in response to price increases. The TVA demand forecasting staff itself holds the opinion that current estimates of price elasticity of demand may be too low. They believe that since the Arab oil embargo, consumers reduce consumption more as price rises than they did before the embargo. However, existing historical data on new consumption behavior is insufficient to reliably reestimate long term elasticity. If the elasticity estimates are too low, the demand forecast would tend to be overstated.

Potential excess capacity

TVA is basing its nuclear construction program on its high demand forecast. Under the current construction schedule and the high forecast, TVA would have relatively little or no surplus capacity during 1981-2000 based on annual peak loads. In other words, TVA's dependable capacity would about equal the total of the Valley's peak demand plus the desired reserves needed to provide for scheduled maintenance, emergency outages, and deviations from average weather conditions. However, under the low forecast, excess capacity over and above desired reserves would range from about 4 to 34 percent during 1981-2000, with excesses consistently exceeding 20 percent after 1990.

Excess capacity is not desirable because it means ratepayers would have unnecessarily paid interest charges on money

borrowed during construction, and, after construction completion, rates would include the fixed cost associated with underutilized capacity. In response to potential excess capacity, TVA is investigating the potential for transferring excess power through interchange agreements to oil-dependent utilities in Arkansas, Louisiana, Oklahoma, Florida, Virginia, New York, and New Jersey.

The attractiveness of such interchanges is the potential to relieve TVA ratepayers of the financial burden of surplus capacity after the plants are built. But until the plants are completed and the transfer of power begun, TVA ratepayers would continue to bear the financing costs associated with construction of the surplus capacity.

Construction program options

As mentioned earlier, TVA is now proceeding with a construction schedule that defers further construction of four nuclear units until 1984, when construction of the units may be resumed. The last unit would be completed in 1996. This schedule is designed to meet the requirements of TVA's current high demand forecast.

The decision to proceed with the current schedule was based on two major considerations. First, TVA analyzed future wholesale rates in terms of the current construction schedule versus the option of deferring two additional units in anticipation of possibly cancelling six units in 1984. TVA's analysis showed that, under the high demand forecast, the

optional schedule would yield rates that would be an average of 3.5 percent lower than rates under the current schedule for about the next 12 years. In absolute dollars, the savings would be about $3.8 billion. Under the low forecast, the optional schedule would yield rates that would be an average of 5.7 percent lower than rates under the current schedule for about the next 18 years. In absolute dollars, these savings would amount to about $13.6 billion.

However, TVA's analysis also showed that if the optional schedule were chosen over the current schedule, rates might be 10 percent higher in the year 2000 if high demand growth occurred and 20 percent higher in the year 2007 if low demand growth occurred. This is based on the assumption that when it becomes necessary to build additional new capacity or replacement capacity, the costs of construction will be higher than they would have been if the current construction schedule had been maintained.

The second major consideration in TVA's decision to continue the current construction schedule was its concern over what it calls the Valley's "energy advantage." In TVA's words, " * * * the availability of adequate supplies of electric power at competitive prices is an increasingly valuable regional asset in a world of increasing energy scarcity," and, "The most important contribution to the Valley's economy that TVA can make is to ensure that this energy advantage is maintained." With this goal in mind, TVA concluded that the poten-

tial savings available through deferring two more nuclear units in anticipation of possibly cancelling six units in 1984 were outweighed by the risk of losing the "energy advantage."

Taking TVA's data at face value, we would agree that one could subjectively conclude that the benefits of deferring two additional units and possibly cancelling six units in 1984 do not offer great incentive to follow that course. But we believe there are some risks that have not been directly considered in this analysis that could make the potential savings of additional deferrals and cancellation much greater.

For example, we mentioned earlier that we believe the risks of higher than anticipated interest rates and higher than estimated construction costs are substantial. These factors could increase the potential savings of additional deferrals and cancellation so that the risk of losing the "energy advantage" might no longer outweigh the savings of the optional construction schedule.

For instance, we estimate that if interest rates were 1 percentage point higher than anticipated and construction costs of the last six units were 40 percent higher than now estimated, the optional schedule could save ratepayers an additional $1.9 billion in the next 10 years. If interest rates were 2 percentage points higher and construction costs 40 percent higher, the optional schedule would save about $2.3 billion more in the next 10 years.

It should also be noted that simply deferring two more units until 1984 would not risk the loss of the Valley's

"energy advantage." If the units were deferred now and in 1984 TVA still believed that today's high forecast would occur, TVA could resume construction. If two more units were deferred, the resultant changes in reserve margins would not jeopardize TVA's ability to meet demand, even under the high forecast.

Conclusions

In our minds, TVA should not cancel any nuclear units now. However, we believe TVA should reassess the potential risks and benefits of deferring two more units. The data we have seen and the uncertainties surrounding future demand for electricity suggest to us that TVA should consider deferring six units, rather than four. By 1984, TVA should have a better grasp on factors such as economic growth, estimated construction costs, interest rates, price increases, and price elasticity of demand which will influence the demand forecast. By that time, TVA should be able to determine how many, if any, units to cancel.

COAL PROCUREMENT

Let me move to a discussion of our tentative findings and observations from a review just now concluding on TVA's coal procurement program. We will be providing TVA a draft of this report for comment and our tentative views are subject to modification as we consider their comments. Nevertheless, our work indicates a number of practices which have detracted from the economy and efficiency of TVA's coal purchasing program. For example, TVA has

--throughout the 1970s entered long term contracts for much of its coal supplies when market conditions were least favorable, resulting in what we believe are higher than necessary coal costs and severe hindrances to its small coal operator assistance program;

--purchased coal, in some instances, at higher than necessary prices in order to support economic development east of the Mississippi River and in the Valley;

--acquired coal reserves, some of which TVA is now mining and getting poor quality, high cost coal and some of which TVA is considering developing but which appear to also have low quality, costly-to-produce coal;

--failed to assure that it gets the quality of coal for which it contracted at one plant;

--employed an obsolete price adjustment formula that may not adequately compensate TVA for lower quality coal delivered by some contractors; and

--accumulated coal inventories that are in excess of target levels.

Long term contracts

During fiscal years 1970-1979, TVA contracted for nearly 383 million tons of coal. About 31 million tons, or 8 percent, were spot purchases, that is, contracts lasting 6 months or less. About 225 million tons, or 59 perent, were bought under contracts lasting 10 years or more. Another 49 million

tons, or 13 percent, were bought under contracts lasting 5 to 10 years. Thus, about 72 percent of TVA's coal purchases were made under contracts of 5 to 10 years or more in length. In addition, during this period TVA renegotiated contracts for an additional 75 million tons.

The fact that TVA has entered many long term coal supply contracts, would not support a conclusion that it may be paying more than it should for coal. However, that fact coupled with market conditions that existed at the time, and the terms agreed to, suggest that these contracts involved higher than necessary prices.

During 1974-1975 and 1977-1978, the two periods in the 1970s that were least favorable for buying coal, TVA committed itself to contracts with durations of up to 17 years for about 284 million tons of coal, or about 74 percent of all the coal contracted for in the 1970s. Because a sellers' market existed at those times, TVA had to pay premium prices for the coal. Naturally, in a sellers' market, one must expect to pay a premium price. But, it also seems natural that one would try to limit the length of time the premium price has to be paid.

For example, due to an impending coal miners strike, which eventually occurred in late 1974, TVA declared an emergency condition in late 1973 and began negotiating new coal contracts. By March 1975, TVA had contracted for 47 million tons of coal at an average price of $22.47 per ton. However, by the summer of 1975, prices had fallen from their peak levels and TVA awarded

a 3 1/2-year contract for about $17 a ton. TVA noted at that time that, "After market conditions eased, prices began falling from the earlier peaks," and TVA was able to replenish stockpiles. TVA could not, however, take full advantage of the more favorable market conditions because many contracts entered during the sellers' market were for 10 years or more.

During the 1977-1978 timeframe, TVA again contracted for large amounts of coal during a sellers' market. Tight market conditions existed primarily because TVA was buying large amounts of low sulfur coal to comply with its proposed Consent Decree concerning air pollution. According to TVA, the coal industry was aware of TVA's requirements, and many suppliers would offer coal only on their own terms. Compounding the supply problem was a coal miners' strike from January-March 1978. Under one requisition during this sellers' market, TVA entered 71 contracts, many of them for 10 years or more and one for 17 years, for delivery of 192 million tons of coal.

But the problem is not simply that TVA entered contracts at a time that would require premium prices. The escalation clauses TVA agreed to in most of these contracts have turned out to be costly. The escalation rates are being applied to already high base prices. For some of the long term contracts entered in 1977-1978, the average price has risen from $30 to $40 per ton, or about a 15 percent a year increase.

We recognize that some mechanism, such as an escalation clause, is necessary in term contracts during inflationary

periods. But we believe that TVA should minimize long-term contracting during periods of tight supply so that the base prices that are to be escalated will be minimized. Contracts entered during a sellers' market should be of the shortest length practicable so that when market conditions soften TVA can take better advantage of the lower prices that may be available.

We also noted during our review that TVA bought most of its coal under negotiated contracts. The TVA Act stipulates that TVA will make all purchases only after advertising for bids, unless an emergency requires immediate delivery of the supplies or certain conditions apply. The TVA Code also allows negotiation if advertising procedures fail to produce acceptable bids.

We found that about 76 percent of all the coal placed under contract in the 1970s was through negotiated contracts. TVA usually negotiated these contracts on an emergency basis. We believe that coal bought through advertised bids would tend to be lower priced than coal obtained through negotiations.

Another problem also attributable to TVA's tendency to award long term contracts is the inability to effectively implement its small coal operators assistance program. Small operators are defined by TVA as those who supply 200,000 tons or less per year and employ no more than 50 people. TVA procures coal from them primarily on a spot

purchase basis, but spot coal purchases have been used little in the 1970s because TVA generally has enough coal under long term contracts to meet the full needs of its steamplants. During the 1970s, about 8 percent of total receipts were from spot purchases, and as of September 30, 1980, less than 1 percent of coal under term contract was with small suppliers.

A concern we have at this stage in our review is how much flexibility TVA has to reduce the impact of the long term contracts either through contract expirations or periods of renegotiation. Our work is continuing to address this question.

Eastern coal buying policy

TVA policy allows coal to be purchased only from suppliers located east of the Mississippi River. TVA adopted this policy because it believes this meets the intent of the TVA Act which charges TVA with regional economic development. But this policy also restricts TVA's ability to obtain coal at the lowest possible price. Opening up to the western market could be especially benenficial during periods of tight supply when TVA's bargaining position is weakest.

For example, in the 1977-1978 sellers' market, TVA contracted for coal for the Shawnee steamplant. Although TVA had received several offers from western suppliers, TVA awarded 10-year contracts to eastern producers. The western producers offered coal at least equal in quality to the eastern coal

actually purchased and at a lower price. An internal TVA study showed that the eastern coal would cost $31 million to $36 million a year more than the western coal, but TVA still contracted with eastern producers.

Coal reserves owned by TVA

TVA has acquired a number of coal reserves to help assure the availability of coal supply. While this is a worthwhile objective, we believe TVA's experience in developing the Camp Breckinridge reserves in western Kentucky suggests a need for caution in developing other reserves.

From 1973 through 1980, TVA had obtained about 31 million tons of coal from Breckinridge. This coal has turned out to be some of TVA's lowest quality coal. Based on the average price of coal purchased from 1972-1980, we estimate that if TVA had bought Breckinridge quality coal on the open market it could have saved about $53 million.

We realize the money spent at Breckinridge is gone and cannot be recouped, but TVA should use the Breckinridge experience to determine whether it should develop other reserves, in particular its largest reserve, the Ewing-Northern Coal Association properties acquired in 1977. The coal in this reserve appears to be of about the same low quality as the Breckinridge coal and appears to be expensive--about $44 per ton.

Quality assurance practices

TVA's quality assurance practices do not always ensure that TVA receives the quality of coal for which it has con-

tracted. For example, at one steamplant, TVA has not installed effective sampling methods even though it is believed that the supplier may be delivering inferior quality coal. TVA personnel have estimated that effective sampling facilities could save TVA up to $7 million a year at this site. Also, TVA's actual sampling methods for coal used at the Cumberland steamplant are not consistent with recognized standards. The contractor is supposed to collect samples at the mine before loading and shipping the coal, but TVA personnel have noted that the sampling at the mine has been and remains inadequate. Problems detected included poor handling of samples, holes in sample bags, samples not collected after belt shutdown, and instrumentation either out of service or missing.

Price adjustment formula

In addition to implementing adequate quality assurance controls, TVA needs to adopt a more accurate coal quality price adjustment formula. The current formula does not adjust coal prices commensurate with actual costs incurred for delivery of coal lower in quality than contractually guaranteed. Data gathered by TVA's Fuels Group indicates that costs incurred due to low quality coal are substantially greater than the penalties assessed under its price adjustment formula. For example, on one contract, TVA assessed penalties of $2.6 million, but actual costs incurred due to low quality coal were about $13.3 million.

TVA implemented its current price adjustment formula in 1957 when steam coal prices were comparatively low--about 18

cents per million Btu. Since then prices on some contracts have increased to over $2.00 per million Btu. TVA has acknowledged that the formula was biased for the supplier--that is, power plant costs exceeded the penalty adjustment. Even so, TVA has not adopted an alternative formula proposed by us last year, nor has it revised its formula.

Excessive coal inventories

As of September 30, 1980, coal inventories at nine TVA steam plants totaled 14.1 million tons, or 5.9 million tons (71 percent) more than target inventories. Value of the excess coal was $182.8 million. This surplus was due largely to TVA's use of long-term, inflexible contracts which do not allow changes in the quantities of coal delivered. If a steam plant needs less coal than forecast because of forced outages or lower-than-projected demand, TVA often cannot reduce coal deliveries by contractors. During fiscal year 1980, carrying charges on the average excess inventory were about $16.8 million.

Conclusion

Based on our observations to date, we believe TVA needs to improve management of its coal purchasing program. More attention is needed to ensure coal is bought and used in the most economical manner.

INVENTORY MANAGEMENT

Last week we issued a report to the TVA Board Chairman on the need to improve security and inventory controls at power

sites. In that report, we noted that TVA needed better inventory controls, lacked adequate and consistent procedures for issuing and controlling tools, theft reporting practices varied widely among construction projects and power plants, and security policies had not been fully implemented because responsibilities had not been defined. As a result, we found that thefts had continued to rise and losses of equipment at TVA's construction projects and power plants were excessive.

We recommended a number of positive steps for dealing with these problems and TVA responded they are beginning to initiate a broad range of actions to address the shortcomings. Although the savings to be gained are relatively small in relation to TVA's total revenues, they, nonetheless, represent potential reductions to future rate increases. Some examples of losses are:

--Reported thefts have increased from a monthly average of $10,470 in 1977 to a monthly average of $40,035 during the first 5 months of 1980.

--At the completion of Browns Ferry nuclear plant, tagged equipment items valued at $560,000 could not be located.

--The Computing Operations Branch was unable to locate about $1.1 million of the approximately $10.6 million of ADP tagged equipment for which it was accountable as of April 30, 1979.

--The latest inventory data available from TVA's 12 fossil plants showed that 2,300 equipment items or

about 17 percent of the 13,700 items inventoried were not located.

In concluding my statement Mr. Chairman, let me emphasize that we foresee rate increases for TVA as unavoidable. We also believe, based on recent work at TVA, that greater management scrutiny could dampen the rate increases somewhat. Many tough decisions face TVA and the Congress. Decisions that will be long lasting for the agency and the consumers in the Valley. Decisions on load growth and capacity expansion plans will become more and more critical as the cost of adding capacity continues to escalate. Decisions will be facing the Congress as to how much and how often TVA's debt ceiling should be raised. Although the Congress doubled the debt ceiling from $15 to $30 billion just a short time ago, as seen in exhibit 9, this issue will soon be surfacing again. Because TVA's power program is, in effect, a utility without any regulatory oversight, we believe the Congressional Legislative and Appropriation Committees may want to take a more active role in providing oversight over TVA. As an independent agency in the Legislative Branch, we at GAO will continue to assist the Congress if such oversight is pursued.

We appreciate this opportunity to contribute to this Committees review of TVA's activities and will attempt to answer any questions you may have.

EXHIBIT 1

## TVA ELECTRICITY PRICE GROWTH ASSUMPTIONS USED IN 1981 FORECASTS (Constant 1972 Dollars)

| Year | Residential price | | | Commercial and industrial price | | | Wholesale price | | |
|---|---|---|---|---|---|---|---|---|---|
| | High | Medium | Low | High | Medium | Low | High | Medium | Low |
| | Annual percentage growth rate | | | | | | | | |
| **Actual** | | | | | | | | | |
| 1960–1970 | -1.6 | -1.6 | -1.6 | 0.3 | 0.3 | 0.3 | 0.8 | 0.8 | 0.8 |
| 1970–1980 | 4.5 | 4.5 | 4.5 | 7.5 | 7.5 | 7.5 | 9.2 | 9.2 | 9.2 |
| **Forecast** | | | | | | | | | |
| 1981 | 10.0 | 8.4 | 6.3 | 9.0 | 7.4 | 5.3 | 10.7 | 9.0 | 6.7 |
| 1982 | 7.2 | 5.8 | 4.0 | 7.3 | 5.9 | 4.0 | 8.8 | 7.1 | 4.8 |
| 1983 | 2.2 | 0.9 | -1.0 | 2.3 | 0.5 | -1.0 | 2.8 | 1.1 | -1.2 |
| 1984 | 3.1 | 1.4 | -0.5 | 3.1 | 1.4 | -0.5 | 3.3 | 1.6 | -0.7 |
| 1985 | 3.4 | 2.2 | 0.5 | 3.4 | 2.8 | 0.5 | 4.4 | 2.7 | 0.4 |
| 1986 | 1.6 | 0.0 | -1.9 | 1.7 | 0.0 | -2.0 | 1.7 | 0.0 | -2.3 |
| 1987 | 2.0 | 0.4 | -1.5 | 2.0 | 0.0 | -1.5 | 2.2 | 0.5 | -1.8 |
| 1988 | 4.7 | 3.5 | 1.5 | 4.8 | 4.0 | 1.5 | 5.8 | 4.1 | 1.8 |
| 1980–1990 | 3.8 | 2.3 | 0.4 | 3.8 | 2.3 | 0.4 | 4.4 | 2.7 | 0.4 |
| 1990–2000 | 3.1 | 1.6 | -0.4 | 3.2 | 1.6 | -0.4 | 3.5 | 1.8 | -0.5 |
| 1980–2000 | 3.5 | 1.9 | 0.03 | 3.5 | 1.9 | -0.03 | 4.0 | 2.3 | -0.3 |

EXHIBIT 2

## TVA FY 1980 POWER OPERATING EXPENSES AND INTEREST CHARGES

| | Amount (millions) | Percent |
|---|---|---|
| OPERATING EXPENSES | | |
| Fuel and Imports | | |
| Fossil | $1,237 | 39.1 |
| Nuclear | 57 | 1.8 |
| Combustion turbine | 8 | 0.3 |
| Imports | 65 | 2.1 |
| Operation and Maintenance | 482 | 15.2 |
| Depreciation | 169 | 5.3 |
| Demonstration of Power Use | 14 | 0.4 |
| Administrative and General | 117 | 3.7 |
| Payments in Lieu of Taxes | 114 | 3.6 |
| Social Security | 17 | 0.6 |
| Total operating expenses | $2,280 | 72.1 |
| INTEREST CHARGES | 881 | 27.9 |
| Total | $3,161 | 100.0 |

EXHIBIT 3

## CHANGES IN TVA'S NUCLEAR PROGRAM CONSTRUCTION SCHEDULE IN RESPONSE TO CHANGES IN DEMAND FORECASTS

| Unit | Commercial operating date: Before May 1979 deferral | After May 1979 deferral (note a) | After May 1980 deferral (note a) |
|---|---|---|---|
| Sequoyah 1 | 01/80 | 06/80 | 11/80 |
| Sequoyah 2 | 09/80 | 06/81 | 07/82 |
| Watts Bar 1 | 12/80 | 09/81 | b/11/82 |
| Watts Bar 2 | 09/81 | 06/82 | b/08/83 |
| Bellefonte 1 | 03/83 | 09/83 | 12/85 |
| Bellefonte 2 | 12/83 | 06/84 | 09/86 |
| Hartsville A1 | 12/84 | 07/86 | 07/88 |
| Hartsville A2 | 12/85 | 07/87 | 04/89 |
| Hartsville B1 | 06/85 | 06/89 | 04/95 |
| Hartsville B2 | 06/86 | 06/90 | 04/96 |
| Yellow Creek 1 | 11/85 | 11/85 | 04/88 |
| Yellow Creek 2 | 11/86 | 04/88 | 04/93 |
| Phipps Bend 1 | 09/85 | 03/87 | 02/89 |
| Phipps Bend 2 | 09/86 | 08/89 | 04/94 |

a/The only units that TVA specifically deferred were the two Hartsville-B units, Yellow Creek 2, and Phipps Bend 2. According to TVA, changes in the schedule for other plants were due to unplanned delays.

b/In February 1981, the commercial operating dates for Watts Bar 1 and 2 were slipped another 13 months.

EXHIBIT 4

## TVA ESTIMATES OF NUCLEAR PLANT CONSTRUCTION COSTS

| Nuclear plant | Amount reported in Budget Program FY 1980 | FY 1981 | FY 1982 (note a) | Uncapitalized interest charges (note a) |
|---|---|---|---|---|
| | billions | | | |
| Sequoyah 1-2 | $ 1.300 | $ 1.460 | $ 2.110 | $0.210 |
| Watts Bar 1-2 | 1.270 | 1.475 | 2.220 | 0.360 |
| Bellefonte 1-2 | 1.625 | 2.050 | 3.360 | 0.680 |
| Hartsville A | (3.500 | 2.616 | 4.185 | 0.825 |
| Hartsville B | ( | 3.184 | b/7.915 | 0.415 |
| Phipps Bend 1 | (1.800 | 1.536 | 2.960 | 0.445 |
| Phipps Bend 2 | ( | 1.414 | b/3.135 | 0.170 |
| Yellow Creek 1 | (2.400 | 1.540 | 2.815 | 0.475 |
| Yellow Creek 2 | ( | 1.435 | b/2.915 | 0.140 |
| Totals | $11.895 | $16.710 | $31.615 | $3.720 |

a/Estimates reported in the FY 1982 Budget Program include some capitalized interest charges, but a significant amount of interest charges associated with the nuclear construction program is expensed each year. Therefore, the estimates in the Budget Program are not the total costs of the construction program. TVA's Office of Engineering, Design, and Construction provided estimates of uncapitalized interest.

b/The four deferred nuclear units were not included in the FY 1982 Budget Program. These estimates were provided by TVA's Office of Engineering, Design, and Construction.

EXHIBIT 5

## TVA DEPENDABLE CAPACITY
(note a)

| | 1981 | | 1985 | | 1990 | | 1995 | | 2000 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mega-watts | Percent of total | Mega-watts | Percent of total | Mega-watts | Percent of total | Mega-watts | Percent of total | Mega-watts | Percent of total |
| Hydro | 5603 | 19.7 | 5603 | 17.5 | 5603 | 14.2 | 5603 | 13.1 | 5603 | 12.7 |
| Baseload | 792 | | 792 | | 792 | | 792 | | 792 | |
| Intermediate | 3441 | | 3441 | | 3441 | | 3441 | | 3441 | |
| Peak | 1370 | | 1370 | | 1370 | | 1370 | | 1370 | |
| Coal | 16249 | 57.2 | 16249 | 50.9 | 16249 | 41.3 | 16025 | 37.4 | 16025 | 36.4 |
| Baseload | 9286 | | 9286 | | 9286 | | 9138 | | 9138 | |
| Intermediate | 6349 | | 6349 | | 6349 | | 6273 | | 6273 | |
| Peak | 614 | | 614 | | 614 | | 614 | | 614 | |
| Nuclear | 4349 | 15.3 | 7851 | 24.6 | 15261 | 38.8 | 19012 | 44.4 | 20245 | 45.9 |
| Baseload | 4349 | | 7851 | | 15261 | | 19012 | | 20245 | |
| Intermediate | | | | | | | | | | |
| Peak | | | | | | | | | | |
| Combustion turbines | 2224 | 7.8 | 2224 | 7.0 | 2224 | 5.7 | 2224 | 5.1 | 2224 | 5.0 |
| Baseload | | | | | | | | | | |
| Intermediate | | | | | | | | | | |
| Peak | 2224 | | 2224 | | 2224 | | 2224 | | 2224 | |
| TVA system totals | 28425 | 100.0 | 31927 | 100.0 | 39337 | 100.0 | 42864 | 100.0 | 44097 | 100.0 |
| Baseload | 14427 | | 17929 | | 25339 | | 28942 | | 30175 | |
| Intermediate | 9790 | | 9790 | | 9790 | | 9714 | | 9714 | |
| Peak | 4208 | | 4208 | | 4208 | | 4208 | | 4208 | |

a/Assumes current construction schedule, 1981 medium forecast, and retirement of coal-fired plants after 50-year service life.

EXHIBIT 6

## COMPARISON OF TVA LOAD FORECASTS

| Year | Alternate forecasts | Assumptions about five major driving factors in the load forecast (note a): Economic growth | Substi-tution | Electricity price | Conservation programs | DOE load | Electricity consumption growth rates (note b): 1980-1990 | 1990-2000 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | -------Percent------- | |
| 1978 | 1 | H | M | L | H | - | 4.60 | 3.80 |
| (note c) | 2 | H | M | M | H | - | 4.10 | 3.00 |
| | 3 | M | M | L | H | - | 3.90 | 3.20 |
| | 4 | L | M | L | L | - | 3.70 | 2.80 |
| | 5 | L | M | M | L | - | 3.20 | 2.00 |
| 1979 | 1 | H | M | L | H | - | 4.60 | 3.50 |
| | 2 | M | H | L | L | - | 4.30 | 3.20 |
| | 3 | M | M | M | L | - | 3.60 | 2.10 |
| | 4 | M | M | H | H | - | 2.80 | 1.20 |
| | 5 | L | M | H | H | - | 2.40 | 0.70 |
| 1980 | High | H | H | L | M | E | 4.52 | 3.71 |
| (prepared | Medium | M | M | M | M | E | 3.33 | 2.12 |
| April 1980) | Low | L | L | H | M | E | 2.31 | -0.03 |
| 1981 | High | H | M | M | M | E | 3.26 | 2.30 |
| (prepared | d/Medium | M | M | M | M | E | 2.45 | 1.54 |
| August 1980) | Low | L | M | H | M | E | 1.41 | 0.51 |

a/H = High
M = Medium
L = Low
E = Expected

b/The "1980-1990" growth rates column for the 1978 and 1979 forecasts represents growth rates for 1978-1990.

c/This is the forecast presented by TVA before the Senate Committee on the Budget in February 1979 hearing.

d/As of January 1981, TVA had eliminated the mid-range forecast.

EXHIBIT 7

## TVA ECONOMIC GROWTH ASSUMPTIONS USED IN 1981 FORECASTS (Constant 1972 Dollars)

| Year | Gross national product (note a) | Gross regional product | | |
|---|---|---|---|---|
| | | High | Medium | Low |
| | ----------Percentage growth rates-------- | | | |
| **Actual** | | | | |
| 1970-1973 | 4.7 | 7.1 | 7.1 | 7.1 |
| 1970-1980 | 2.8 | 3.3 | 3.3 | 3.3 |
| 1973-1979 | 2.5 | 2.0 | 2.0 | 2.0 |
| **Forecast** | | | | |
| 1980 | -1.2 | -0.1 | -0.1 | -0.1 |
| 1981 | 0.8 | 1.6 | 0.3 | 0.3 |
| 1982 | 4.2 | 4.0 | 3.6 | 2.1 |
| 1983 | 3.2 | 4.0 | 3.7 | 1.9 |
| 1984 | 3.2 | 3.9 | 3.2 | 1.5 |
| 1985 | 1.8 | 3.3 | 2.5 | 1.2 |
| 1980-1990 | 2.8 | 3.5 | 2.5 | 1.7 |
| 1990-2000 | 2.8 | 3.5 | 2.9 | 2.7 |
| 1980-2000 | 2.8 | 3.5 | 2.7 | 2.2 |

a/TVA's source for this data is the Wharton Economic Forecasting Associates.

EXHIBIT 8

## ADDITIONAL REVENUE REQUIREMENTS DUE TO HIGHER THAN PROJECTED INTEREST RATES
(Millions of Dollars)

| Fiscal year | Percentage points higher than projected | | | | | |
|---|---|---|---|---|---|---|
| | 1 point | | 2 points | | 3 points | |
| | Annual | Cumulative | Annual | Cumulative | Annual | Cumulative |
| 1981 | $ 20 | $ 20 | $ 50 | $ 50 | $ 70 | $ 70 |
| 82 | 40 | 60 | 100 | 150 | 140 | 210 |
| 83 | 60 | 120 | 140 | 290 | 210 | 420 |
| 84 | 80 | 200 | 180 | 470 | 270 | 690 |
| 85 | 100 | 300 | 220 | 690 | 320 | 1,010 |
| 86 | 120 | 420 | 260 | 950 | 380 | 1,390 |
| 87 | 150 | 570 | 310 | 1,260 | 450 | 1,840 |
| 88 | 170 | 740 | 360 | 1,620 | 520 | 2,360 |
| 89 | 200 | 940 | 410 | 2,030 | 600 | 2,960 |
| 90 | 220 | 1,160 | 460 | 2,490 | 670 | 3,630 |
| 91 | 240 | 1,400 | 500 | 2,990 | 730 | 4,360 |
| 92 | 270 | 1,670 | 560 | 3,550 | 820 | 5,180 |
| 93 | 310 | 1,980 | 630 | 4,180 | 920 | 6,100 |
| 94 | 350 | 2,330 | 720 | 4,900 | 1,060 | 7,160 |
| 95 | 410 | 2,740 | 850 | 5,750 | 1,260 | 8,420 |

EXHIBIT 9

TVA ESTIMATES OF TOTAL OUTSTANDING DEBT UNDER THE CURRENT CONSTRUCTION SCHEDULE AND THE 1981 DEMAND FORECASTS (note a)

| Fiscal year | Low forecast | Medium forecast | High forecast |
|---|---|---|---|
| | ----------billions---------- | | |
| 1981 | $ 12.9 | $ 12.9 | $ 12.9 |
| 1982 | 15.3 | 15.3 | 15.3 |
| 1983 | 17.5 | 17.5 | 17.5 |
| 1984 | 19.4 | 19.4 | 19.4 |
| 1985 | 21.2 | 21.2 | 21.2 |
| 1986 | 23.1 | 23.1 | 23.1 |
| 1987 | 24.9 | 24.9 | 24.9 |
| 1988 | 26.9 | 26.9 | 26.9 |
| 1989 | 28.8 | 28.8 | 28.8 |
| 1990 | 30.6 | 30.6 | 30.7 |
| 1991 | 32.5 | 32.5 | 32.8 |
| 1992 | 34.5 | 34.5 | 35.8 |
| 1993 | 36.6 | 36.6 | 39.0 |
| 1994 | 38.7 | 38.8 | 43.7 |
| 1995 | 40.8 | 41.4 | 50.3 |
| 1996 | 43.0 | 45.1 | 58.7 |
| 1997 | 45.6 | 50.3 | 70.0 |
| 1998 | 48.5 | 56.7 | 82.5 |
| 1999 | 51.7 | 64.8 | 97.2 |
| 2000 | 55.2 | 74.8 | 113.6 |
| 2001 | 59.1 | 86.5 | 131.2 |
| 2002 | 63.7 | 99.6 | 150.0 |
| 2003 | 69.0 | 116.0 | 168.5 |
| 2004 | 75.6 | 133.2 | 185.7 |
| 2005 | 83.5 | 149.5 | 202.8 |
| 2006 | 93.9 | 166.6 | 221.9 |
| 2007 | 105.9 | 185.7 | 242.1 |
| 2008 | 121.3 | 202.4 | 264.1 |
| 2009 | 136.6 | 219.8 | 287.9 |
| 2010 | 153.5 | 238.8 | 314.7 |

a/The debt level for each year assumes that 20 percent of construction costs will be financed from internal funds.

EXHIBIT 10

## ESTIMATED FUEL COSTS FOR TVA'S COAL AND NUCLEAR CAPACITY (note a)

| Fiscal year | Cost of coal per kwh (note b) | | | | | | Cost of nuclear fuel per kwh system average | |
|---|---|---|---|---|---|---|---|---|
| | Low cost unit | | Mid cost unit | | High cost unit | | | |
| | Mills | Increase(%) | Mills | Increase(%) | Mills | Increase(%) | Mills | Increase(%) |
| 1981 | 15.1 | - | 18.4 | - | 22.6 | - | 3.2 | - |
| 82 | 16.6 | 9.9 | 19.5 | 6.0 | 24.7 | 9.3 | 4.6 | 43.8 |
| 83 | 18.5 | 11.4 | 21.1 | 8.2 | 27.6 | 11.7 | 5.4 | 17.4 |
| 84 | 19.2 | 3.8 | 23.8 | 12.8 | 31.6 | 14.5 | 6.6 | 22.2 |
| 85 | 19.9 | 3.6 | 27.4 | 15.1 | 35.7 | 13.0 | 7.9 | 19.7 |
| 86 | 21.3 | 7.0 | 29.6 | 8.0 | 39.3 | 10.1 | 9.2 | 16.5 |
| 87 | 22.8 | 7.0 | 32.6 | 10.1 | 43.2 | 9.9 | 10.3 | 12.0 |
| 88 | 25.6 | 12.3 | 35.3 | 8.3 | 46.9 | 8.6 | 11.7 | 13.6 |
| 89 | 28.3 | 10.5 | 37.1 | 5.1 | 50.3 | 7.2 | 12.8 | 9.4 |
| 1990 | 29.9 | 5.7 | 39.0 | 5.1 | 53.7 | 6.8 | 13.5 | 5.5 |
| 91 | 31.7 | 6.0 | 41.0 | 5.1 | 59.0 | 9.9 | 14.6 | 8.1 |
| 92 | 33.6 | 6.0 | 43.1 | 5.1 | 62.9 | 6.6 | 15.7 | 7.5 |
| 93 | 39.3 | 17.0 | 45.4 | 5.3 | 66.5 | 5.7 | 17.1 | 8.9 |
| 94 | 43.6 | 10.9 | 47.7 | 5.1 | 70.4 | 5.9 | 18.6 | 8.8 |
| 95 | 46.3 | 6.2 | 50.5 | 5.9 | 74.6 | 6.0 | 20.3 | 9.1 |
| 96 | 49.5 | 6.9 | 53.5 | 5.9 | 80.3 | 7.6 | 21.9 | 7.9 |
| 97 | 52.8 | 6.7 | 58.2 | 8.8 | 85.8 | 6.8 | 23.7 | 8.2 |
| 98 | 56.2 | 6.4 | 62.8 | 7.9 | 92.5 | 7.8 | 25.5 | 7.6 |
| 99 | 59.8 | 6.4 | 67.5 | 7.5 | 99.5 | 7.6 | 27.6 | 8.2 |
| 2000 | 63.7 | 6.5 | 71.6 | 6.1 | 105.9 | 6.4 | 30.0 | 8.7 |
| 01 | 68.0 | 6.8 | 77.5 | 8.2 | 108.2 | 2.2 | 32.6 | 8.7 |
| 02 | 72.5 | 6.6 | 81.0 | 4.5 | 110.6 | 2.2 | 35.5 | 8.9 |
| 03 | 77.4 | 6.8 | 87.3 | 7.8 | 113.0 | 2.2 | 38.7 | 9.0 |
| 04 | 82.5 | 6.6 | 94.1 | 7.8 | 115.4 | 2.1 | 41.7 | 7.8 |
| 05 | 88.1 | 6.8 | 101.4 | 7.8 | 117.9 | 2.2 | 44.8 | 7.4 |
| 06 | 94.0 | 6.7 | 109.3 | 7.8 | 120.5 | 2.2 | 48.0 | 7.1 |
| 07 | 100.2 | 6.6 | 110.8 | 1.4 | 129.8 | 7.7 | 51.7 | 7.7 |
| 08 | 107.0 | 6.8 | 115.0 | 3.8 | 139.7 | 7.6 | 55.8 | 7.9 |
| 09 | 114.1 | 6.6 | 123.6 | 7.5 | 150.5 | 7.7 | 59.9 | 7.3 |
| 10 | 121.8 | 6.7 | 132.8 | 7.4 | 162.1 | 7.7 | 65.1 | 8.7 |

a/Costs are not adjusted for inflation and are based on unaudited data provided by TVA.

b/Most coal units fall into the low to mid-cost range. The high cost coal units require low sulfur coal.

EXHIBIT 11

PEAK LOAD CAPACITY REQUIREMENTS VS ACTUAL DEPENDABLE CAPACITY

(Medium forecast and Current Construction Schedule)

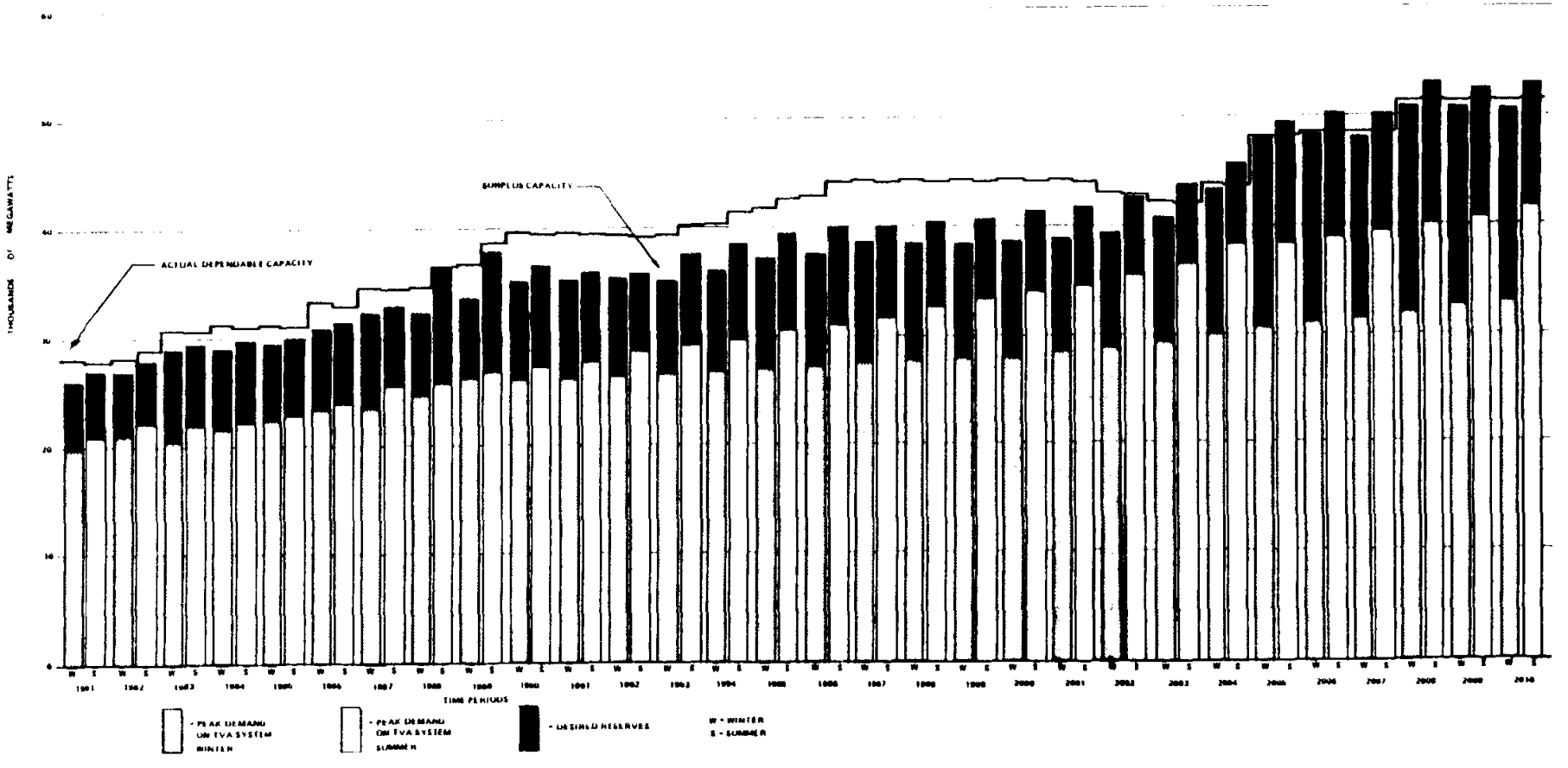


EXHIBIT 12

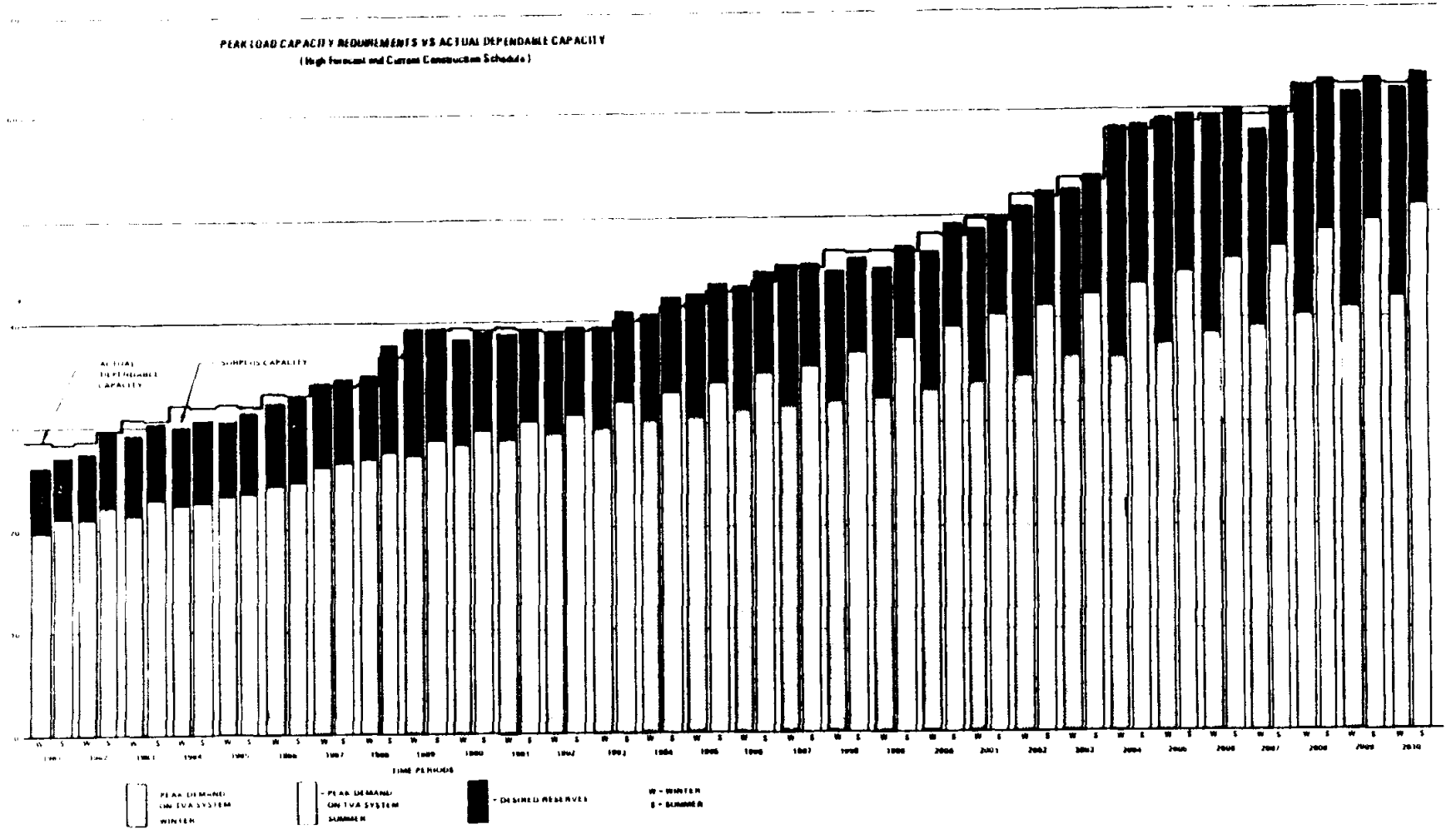

PEAK LOAD CAPACITY REQUIREMENTS VS ACTUAL DEPENDABLE CAPACITY
(High Forecast and Current Construction Schedule)
ACTUAL DEPENDABLE CAPACITY
SURPLUS CAPACITY
TIME PERIODS
PEAK DEMAND ON TVA SYSTEM WINTER
PEAK DEMAND ON TVA SYSTEM SUMMER
DESIRED RESERVES
W - WINTER
S - SUMMER

EXHIBIT 13

PEAK LOAD CAPACITY REQUIREMENTS VS ACTUAL DEPENDABLE CAPACITY

(Low forecast and Current Construction Schedule)

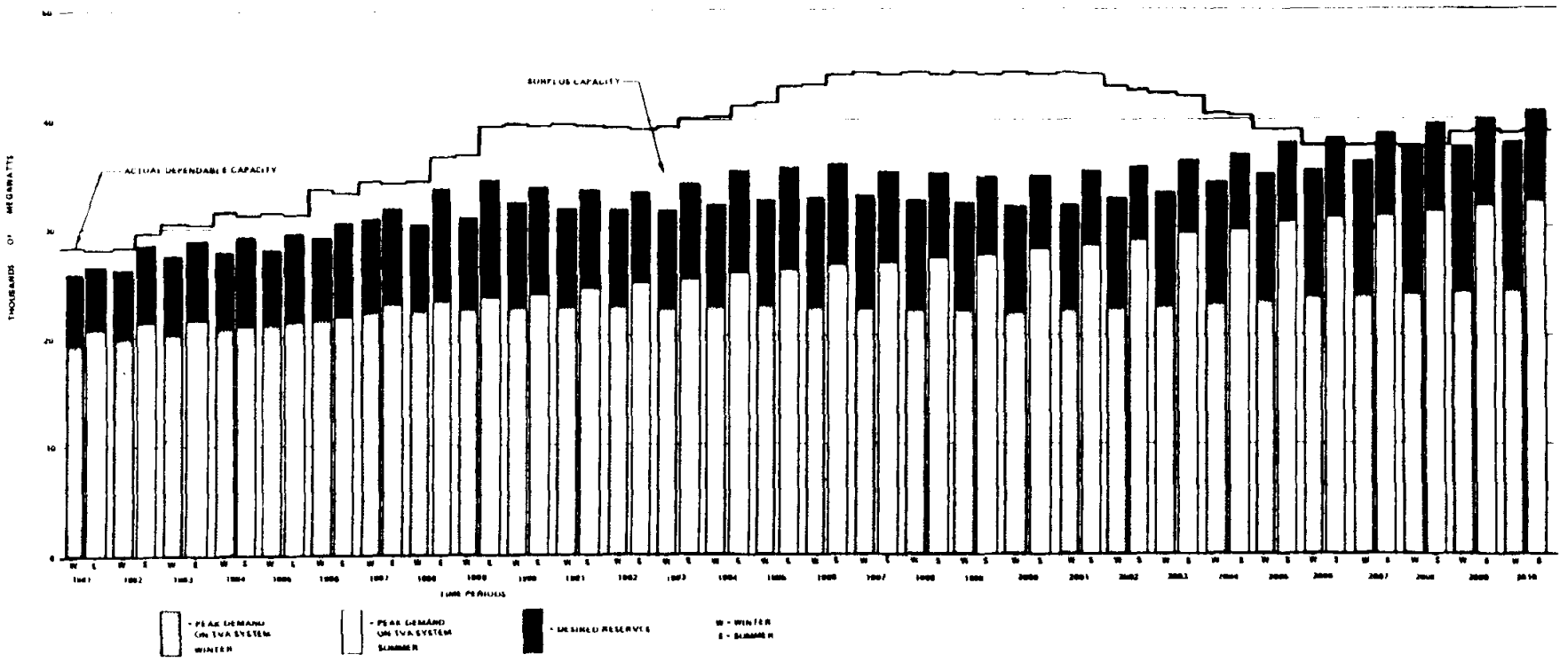


EXHIBIT 14

## TVA ESTIMATES OF SUMMER PEAK DEMAND RESERVE MARGINS
## LOW FORECAST AND CURRENT CONSTRUCTION SCHEDULE

| | Reserve margins | | | | | |
|---|---|---|---|---|---|---|
| | Desired | | Available | | Surplus | |
| Year | MW | Percent | MW | Percent | MW | Percent |
| 1981 | 6030 | 29.0 | 7626 | 36.7 | 1596 | 7.7 |
| 1982 | 7045 | 32.6 | 7950 | 36.8 | 905 | 4.2 |
| 1983 | 7283 | 33.4 | 8937 | 41.0 | 1654 | 7.6 |
| 1984 | 7980 | 37.3 | 10519 | 49.1 | 2539 | 11.8 |
| 1985 | 7966 | 36.8 | 10286 | 47.5 | 2320 | 10.7 |
| 1986 | 8210 | 36.8 | 10828 | 48.5 | 2618 | 11.7 |
| 1987 | 8486 | 36.3 | 10951 | 46.8 | 2465 | 10.5 |
| 1988 | 10104 | 42.6 | 13156 | 55.5 | 3052 | 12.9 |
| 1989 | 10676 | 44.5 | 15321 | 63.8 | 4645 | 19.3 |
| 1990 | 9515 | 39.1 | 14981 | 61.5 | 5466 | 22.4 |
| 1991 | 9064 | 36.7 | 14667 | 59.5 | 5603 | 22.8 |
| 1992 | 8379 | 33.4 | 14049 | 56.1 | 5670 | 22.7 |
| 1993 | 8866 | 34.8 | 14915 | 58.5 | 6049 | 23.7 |
| 1994 | 9168 | 35.3 | 15641 | 60.2 | 6473 | 24.9 |
| 1995 | 8943 | 33.7 | 16342 | 61.6 | 7399 | 27.9 |
| 1996 | 9017 | 33.7 | 17314 | 64.6 | 8297 | 30.9 |
| 1997 | 8042 | 29.7 | 17005 | 62.8 | 8963 | 33.1 |
| 1998 | 7640 | 27.9 | 16695 | 60.9 | 9055 | 33.0 |
| 1999 | 6941 | 25.0 | 16360 | 59.0 | 9419 | 34.0 |
| 2000 | 6759 | 24.1 | 16024 | 57.1 | 9265 | 33.0 |
| 2001 | 6665 | 23.4 | 15619 | 54.8 | 8954 | 31.4 |
| 2002 | 6686 | 23.1 | 14457 | 50.0 | 7771 | 26.9 |
| 2003 | 6768 | 23.0 | 13231 | 45.0 | 6463 | 22.0 |
| 2004 | 7034 | 23.6 | 10715 | 35.9 | 3681 | 12.3 |
| 2005 | 7352 | 24.3 | 8467 | 28.0 | 1115 | 3.7 |
| 2006 | 7438 | 24.2 | 7264 | 23.7 | -174 | -.5 |
| 2007 | 7440 | 23.9 | 6851 | 22.0 | -589 | -1.9 |
| 2008 | 8174 | 25.9 | 6043 | 19.2 | -2131 | -6.7 |
| 2009 | 8000 | 25.0 | 6614 | 20.7 | -1386 | -4.3 |
| 2010 | 7949 | 24.5 | 6170 | 19.0 | -1779 | -5.5 |

EXHIBIT 15

## TVA ESTIMATES OF SUMMER PEAK DEMAND RESERVE MARGINS
## HIGH FORECAST AND CURRENT CONSTRUCTION SCHEDULE

| | Reserve margins | | | | | |
|---|---|---|---|---|---|---|
| | Desired | | Available | | Surplus | |
| Year | MW | Percent | MW | Percent | MW | Percent |
| 1981 | 6076 | 28.8 | 7309 | 34.6 | 1233 | 5.8 |
| 1982 | 7156 | 32.1 | 7274 | 32.6 | 118 | .5 |
| 1983 | 7464 | 32.7 | 7894 | 34.5 | 430 | 1.8 |
| 1984 | 7945 | 34.8 | 9086 | 39.8 | 1141 | 5.0 |
| 1985 | 7985 | 34.0 | 8440 | 35.9 | 455 | 1.9 |
| 1986 | 8297 | 33.6 | 8416 | 34.0 | 119 | .4 |
| 1987 | 8604 | 32.6 | 7920 | 30.0 | -684 | -2.6 |
| 1988 | 10477 | 38.2 | 9477 | 34.6 | -1000 | -3.6 |
| 1989 | 11252 | 39.6 | 10953 | 38.6 | -299 | -1.0 |
| 1990 | 9606 | 32.6 | 9881 | 33.5 | 275 | .9 |
| 1991 | 9155 | 30.2 | 9036 | 29.8 | -119 | -.4 |
| 1992 | 8448 | 27.0 | 7869 | 25.2 | -579 | -1.8 |
| 1993 | 9110 | 28.3 | 8186 | 25.4 | -924 | -2.9 |
| 1994 | 9158 | 27.5 | 8376 | 25.2 | -782 | -2.3 |
| 1995 | 9521 | 27.7 | 8487 | 24.7 | -1034 | -3.0 |
| 1996 | 9795 | 27.8 | 8890 | 25.3 | -905 | -2.5 |
| 1997 | 9563 | 26.5 | 9266 | 25.6 | -297 | -.9 |
| 1998 | 9016 | 24.3 | 9263 | 24.9 | 247 | .6 |
| 1999 | 8757 | 22.9 | 8169 | 21.4 | -588 | -1.5 |
| 2000 | 9244 | 23.5 | 8240 | 20.9 | -1004 | -2.6 |
| 2001 | 9603 | 23.8 | 8419 | 20.9 | -1184 | -2.9 |
| 2002 | 10998 | 26.5 | 10305 | 24.8 | -693 | -1.7 |
| 2003 | 11754 | 27.6 | 10801 | 25.3 | -953 | -2.3 |
| 2004 | 14215 | 32.5 | 13593 | 31.1 | -622 | -1.4 |
| 2005 | 14913 | 33.2 | 14214 | 31.6 | -699 | -1.6 |
| 2006 | 14102 | 30.6 | 13498 | 29.3 | -604 | -1.3 |
| 2007 | 12997 | 27.5 | 12333 | 26.1 | -664 | -1.4 |
| 2008 | 14796 | 30.5 | 14244 | 29.4 | -552 | -1.1 |
| 2009 | 13661 | 27.5 | 13006 | 26.2 | -655 | -1.3 |
| 2010 | 12924 | 25.4 | 11721 | 23.0 | -1203 | -2.4 |

EXHIBIT 16

## COMPARISON OF WHOLESALE RATES UNDER ALTERNATE CONSTRUCTION SCENARIOS AND DEMAND FORECASTS (note a)

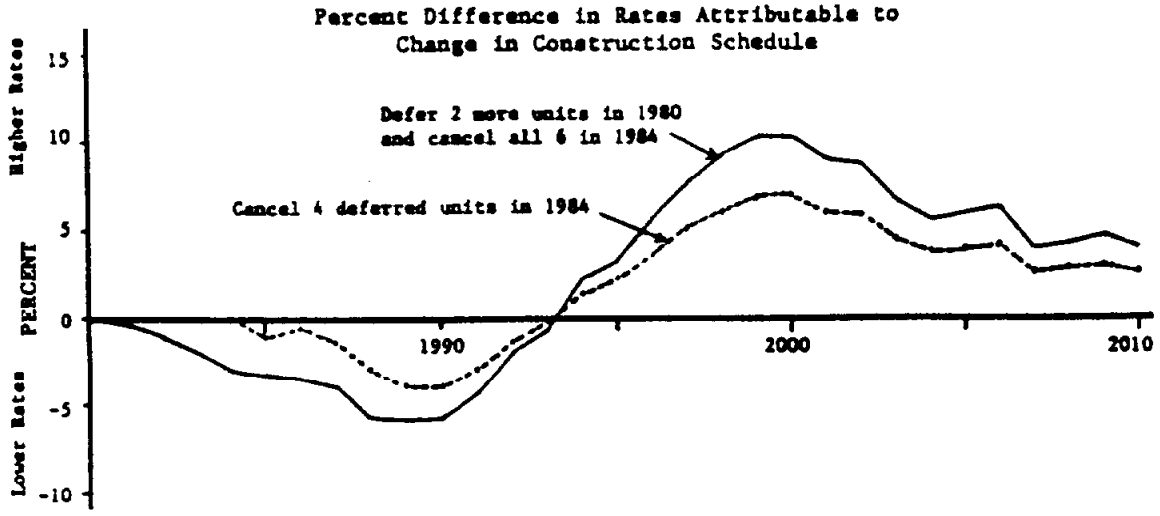
(Cents per kwh)

| Fiscal year | Option A: Current construction schedule (four units deferred until 1984) | | Option B: Four units deferred; cancel four in 1984 | | Option C: Six units deferred; cancel all six units in 1984 | |
|---|---|---|---|---|---|---|
| | Low forecast | High forecast | Low forecast | High forecast | Low forecast | High forecast |
| 1981 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| 82 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.8 |
| 83 | 4.3 | 4.2 | 4.3 | 4.2 | 4.2 | 4.1 |
| 84 | 4.7 | 4.6 | 4.7 | 4.6 | 4.6 | 4.5 |
| 85 | 5.3 | 5.1 | 5.2 | 5.1 | 5.2 | 4.9 |
| 86 | 5.7 | 5.4 | 5.6 | 5.4 | 5.5 | 5.3 |
| 87 | 5.9 | 5.7 | 5.8 | 5.6 | 5.7 | 5.5 |
| 88 | 6.8 | 6.4 | 6.5 | 6.2 | 6.3 | 6.0 |
| 89 | 7.3 | 6.8 | 7.0 | 6.5 | 6.8 | 6.4 |
| 1990 | 7.8 | 7.2 | 7.5 | 6.9 | 7.2 | 6.8 |
| 91 | 8.2 | 7.5 | 7.8 | 7.3 | 7.6 | 7.2 |
| 92 | 8.7 | 8.0 | 8.3 | 7.9 | 8.1 | 7.8 |
| 93 | 9.4 | 8.6 | 8.8 | 8.6 | 8.7 | 8.5 |
| 94 | 10.1 | 9.3 | 9.5 | 9.4 | 9.3 | 9.5 |
| 95 | 11.0 | 10.2 | 10.2 | 10.4 | 10.1 | 10.5 |
| 96 | 12.0 | 11.2 | 11.0 | 11.6 | 10.9 | 11.8 |
| 97 | 12.9 | 12.3 | 12.0 | 13.0 | 11.9 | 13.3 |
| 98 | 13.8 | 13.6 | 13.0 | 14.5 | 13.0 | 14.9 |
| 99 | 14.9 | 15.1 | 14.2 | 16.1 | 14.2 | 16.7 |
| 2000 | 16.1 | 16.7 | 15.6 | 17.9 | 15.7 | 18.4 |
| 01 | 17.4 | 18.6 | 17.1 | 19.8 | 17.4 | 20.3 |
| 02 | 18.6 | 20.7 | 18.7 | 21.9 | 19.0 | 22.5 |
| 03 | 19.8 | 23.0 | 20.5 | 24.0 | 20.9 | 24.5 |
| 04 | 20.6 | 24.6 | 22.7 | 25.5 | 23.7 | 26.0 |
| 05 | 21.9 | 26.2 | 24.8 | 27.2 | 25.9 | 27.7 |
| 06 | 23.8 | 27.9 | 26.6 | 29.0 | 28.2 | 29.6 |
| 07 | 25.9 | 30.5 | 29.6 | 31.3 | 31.1 | 31.7 |
| 08 | 28.4 | 32.4 | 31.8 | 33.3 | 33.2 | 33.7 |
| 09 | 31.4 | 34.4 | 34.2 | 35.5 | 35.5 | 36.0 |
| 2010 | 34.2 | 36.8 | 36.6 | 37.8 | 37.5 | 38.3 |

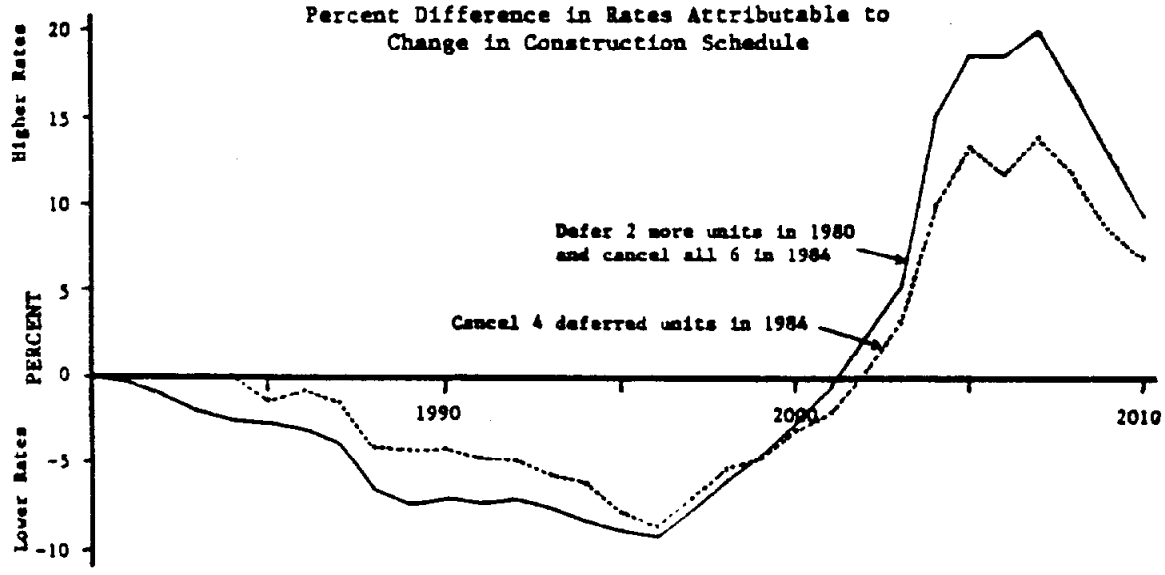
a/Wholesale rates are not adjusted for inflation and are based on unaudited data from TVA financial projections.

EXHIBIT 17

IMPACT ON WHOLESALE RATES OF CANCELLING NUCLEAR UNITS: HIGH LOAD GROWTH




IMPACT ON WHOLESALE RATES OF CANCELLING NUCLEAR UNITS: LOW LOAD GROWTH




SOURCE: TVA WHITE PAPER, IMPLICATIONS FOR TVA OF CHANGING LOAD FORECASTS

EXHIBIT 18

## PERCENT DIFFERENCES BETWEEN RATES UNDER THE CURRENT CONNSTRUCTION SCHEDULE AND RATES UNDER OTHER CONSTRUCTION OPTIONS (note a)

| Fiscal year | Low demand forecast | | High demand forecast | |
|---|---|---|---|---|
| | Defer six units in 1980, cancel six units in 1984 | Cancel four units in 1984 | Defer six units in 1980, cancel six units in 1984 | Cancel four units in 1984 |
| | Percent | | | |
| 1981 | 0.0 | 0.0 | 0.0 | 0.0 |
| 82 | 0.0 | 0.0 | -2.6 | 0.0 |
| 83 | -2.3 | 0.0 | -2.4 | 0.0 |
| 84 | -2.1 | 0.0 | -2.2 | 0.0 |
| 85 | -1.9 | -1.9 | -3.9 | 0.0 |
| 86 | -3.5 | -1.8 | -1.9 | 0.0 |
| 87 | -3.4 | -1.7 | -3.5 | -1.8 |
| 88 | -7.4 | -4.4 | -6.3 | -3.1 |
| 89 | -6.8 | -4.1 | -5.9 | -4.4 |
| 1990 | -7.7 | -3.8 | -5.6 | -4.2 |
| 91 | -7.3 | -4.9 | -4.0 | -2.7 |
| 92 | -6.9 | -4.6 | -2.5 | -1.3 |
| 93 | -7.4 | -6.4 | -1.2 | 0.0 |
| 94 | -7.9 | -5.9 | 2.2 | 1.1 |
| 95 | -8.2 | -7.3 | 2.9 | 1.9 |
| 96 | -9.2 | -8.3 | 5.4 | 3.6 |
| 97 | -7.8 | -7.0 | 8.1 | 5.7 |
| 98 | -5.8 | -5.1 | 9.6 | 6.6 |
| 99 | -4.7 | -4.7 | 10.6 | 6.6 |
| 2000 | -2.5 | -3.1 | 10.2 | 7.2 |
| 01 | 0.0 | -1.7 | 9.1 | 6.5 |
| 02 | 2.2 | .5 | 8.7 | 5.8 |
| 03 | 5.6 | 3.5 | 6.5 | 4.3 |
| 04 | 15.0 | 10.2 | 5.7 | 3.7 |
| 05 | 18.3 | 13.2 | 5.7 | 3.8 |
| 06 | 18.5 | 11.8 | 6.1 | 3.9 |
| 07 | 20.1 | 14.3 | 3.9 | 2.6 |
| 08 | 16.9 | 12.0 | 4.0 | 2.8 |
| 09 | 13.1 | 8.9 | 4.7 | 3.2 |
| 2010 | 9.6 | 7.0 | 4.1 | 2.7 |

a/Based on unaudited data from TVA financial projections.

EXHIBIT 19

## TOTAL COAL CONTRACTED FOR BY TVA
## FISCAL YEARS 1970-1979

| Type of contract | Contract amount | |
|---|---|---|
| | Tons in millions | Percent of total |
| Spot contracts | 31.29 | 8.2 |
| Term contracts | | |
| Less than 1 year | 2.20 | .6 |
| 1 to 5 years | 75.55 | 19.7 |
| 5 to 10 years | 48.93 | 12.8 |
| Over 10 years | 224.66 | 58.7 |
| | 382.63 | 100.0 |

EXHIBIT 20

## COMPARISON OF ANNUAL COAL PROCUREMENTS UNDER ADVERTISED, NEGOTIATED, AND SPOT CONTRACTS FISCAL YEAR 1970-1979

| Year | Advertised contracts | | | Negotiated contracts | | | Spot contracts | | Annual total tons (Millions) |
|---|---|---|---|---|---|---|---|---|---|
| | Tons (Millions) | Percent of annual total (%) | Contract length (Years) | Tons (Millions) | Percent of annual total (%) | Contract length (Years) | Tons (Millions) | Percent of annual total (%) | |
| 1970 | 1.50 | 3.1 | .5 - 1.75 | 45.88 | 95.6 | 3.5 - 17 | 0.59 | 1.2 | 47.97 |
| 1971 | 1.73 | 62.7 | .5 - 2.0 | - | - | - | 1.03 | 37.3 | 2.76 |
| 1972 | 2.77 | 61.1 | 1 - 3 | - | - | - | 1.76 | 38.9 | 4.53 |
| 1973 | 23.12 | 90.6 | .5 - 9.5 | 0.09 | 0.3 | .5 | 2.31 | 9.1 | 25.52 |
| 1974 | - | - | - | 16.52 | 96.9 | 1 - 3.5 | 0.52 | 3.1 | 17.04 |
| 1975 | 0.54 | 1.5 | 3.5 | 30.41 | 86.0 | 1 - 10 | 4.42 | 12.5 | 35.37 |
| 1976 | 5.16 | 63.3 | 2 | - | - | - | 2.99 | 36.7 | 8.15 |
| 1977 | 25.62 | 23.3 | 3 - 10 | 80.94 | - | 1 - 17.3 | 3.43a/ | 3.1 | 109.99 |
| 1978 | - | - | - | 110.76 | 91.2 | 1 - 11 | 10.70 | 8.2 | 121.46 |
| 1979 | 6.30 | 64.0 | .5 - 3 | - | - | - | 3.54 | 36.0 | 9.84 |
| Totals | 66.74 | 17.4 | .5 - 10.0 | 284.60 | 74.4 | .5 - 17 | 31.29 | 8.2 | 382.63 |

a/Includes transition quarter.

EXHIBIT 21

EXHIBIT 21

TVA OWNED OR CONTROLLED COAL RESERVES

APRIL 1980

| Property Name | Tons when acquired | Remaining tons recoverable at at current costs |
|---|---|---|
| Red Bird | 25,000,000 | 5,000,000 |
| Franklin County | 65,000,000 | 65,000,000 |
| Koppers | 67,000,000 | 25,000,000 |
| Camp Breckinridge | 225,000,000 (note a) | 150,000,000 |
| Waverly Coal Block | 65,000,000 | - |
| Fabius | 10,495,000 (note b) | 5,000,000 |
| Eads | 4,803,000 (note b) | 10,000,000 |
| ENCA | 370,000,000 | 370,000,000 |
| Total | 832,298,000 | 630,000,000 |

a/Leased coal

b/Additional reserves were purchased after property acquired.

EXHIBIT 22

EXHIBIT 22

TVA COAL INVENTORY DATA
AS OF SEPTEMBER 30, 1980

| Plant name | Inventory (tons) Target | Actual | Excess | Value of excess inventory |
|---|---|---|---|---|
| Bull Run | 668,000 | 792,043 | 124,043 | $ 3,812,089 |
| Colbert | 824,000 | 1,148,502 | 324,502 | 11,995,865 |
| Cumberland | 1,522,000 | 1,741,434 | 219,434 | 7,133,799 |
| Gallatin | 680,000 | 1,847,601 | 1,167,601 | 45,557,455 |
| John Sevier | 553,000 | 842,563 | 309,563 | 11,680,121 |
| Johnsonville | 918,000 | 1,150,179 | 232,179 | 8,780,081 |
| Kingston | 1,022,000 | 2,399,243 | 1,377,243 | 49,993,920 |
| Paradise | 1,389,000 | 3,327,338 | 1,938,338 | 36,735,381 |
| Widows Creek (Units 7&8) | 675,000 | 858,994 | 183,994 | 7,108,792 |
| Total | 8,231,000 | 14,107,897 | 5,876,897 | $182,797,503 |