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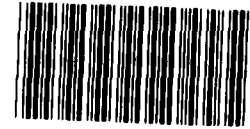
RESOURCES, COMMUNITY,
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DIVISION

B-207463

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RELEASED

The Honorable Gordon J. Humphrey
Chairman, Subcommittee on Regional
and Community Development
Committee on Environment and Public Works
United States Senate



121938

Dear Mr. Chairman:

Subject: Data on DOE's Uranium Enrichment Power Contracts
and the Cost of Power (GAO/RCED-83-196)

Your letter of February 28, 1983, asked us to respond to two sets of questions concerning the Department of Energy's (DOE's) uranium enrichment program and its potential effect on the Tennessee Valley Authority (TVA)¹ and its customers. In a report to you dated April 15, 1983,² we responded to the first set of questions pertaining to the research, development, and capital expenditure aspects of DOE's uranium enrichment program. This letter addresses your second set of questions concerning the (1) amount and cost of the TVA power which DOE has contracted for but does not plan to use, (2) differences in contract terms of DOE's power contracts, (3) cost of TVA's power as compared to the power DOE receives from other suppliers, (4) impact of lower power costs on DOE enrichment price, and (5) action taken by DOE to minimize the cost of TVA power not taken.

Your specific questions and summaries of our answers to them are on pages 5 and 6. More detailed answers to these questions are contained in enclosures I through V of this report. As discussed with your office, at the time this report was being prepared, TVA had not yet provided us with the information needed to answer your question concerning the debt service

¹TVA is an independent corporate agency of the Federal Government responsible for developing the Tennessee River, providing an adequate supply of electrical power to the Tennessee Valley Region at the lowest feasible cost, and other activities. TVA serves nearly 7 million residents, commercial and industrial customers, and several Federal agencies, including DOE.

²"Data on DOE's Uranium Enrichment Program" (GAO/RED-83-143).

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portion of its electric rates. TVA officials have, however, told us they are preparing this information and we will provide it to your office after we receive it from TVA.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objective of our work was to answer the specific questions you asked about the electric power contracts in DOE's uranium enrichment program. To answer the questions we interviewed DOE uranium enrichment program officials in Washington, D.C., and reviewed documents they provided us. We also interviewed and obtained documents from DOE officials familiar with the power contracts at DOE's Oak Ridge Operations Office in Oak Ridge, Tennessee, as well as TVA officials in Knoxville and Chattanooga, Tennessee, and officials from Electric Energy, Inc.³ and the Ohio Valley Electric Corporation.⁴ We verified the amount of power not taken or not expected to be taken by DOE with the actual contracts and the applicable subsequent modifications to the contracts, and with the fiscal year 1983 thru 1995 DOE Uranium Enrichment Operating Plan. We compared the contractual information provided with the actual power contracts and their modifications. We also checked the reasonableness of DOE's fiscal year 1983 projected power rates and the selection of key contract terms with TVA; Electric Energy, Inc.; and the Ohio Valley Electric Corporation. As discussed with your office, we did not take the additional time to examine the accuracy of the computer model DOE used to determine the impact of different power rates on its enrichment price.

As requested by your office, we did not obtain written agency comments on this report. We did, however, discuss the information in a draft of this report with officials from each organization contacted, and have incorporated their views where appropriate. Our review was primarily conducted during May and June 1983. Except as noted above, we performed our review in accordance with generally accepted government auditing standards.

³Electric Energy, Inc. is a corporation originally formed by five private utilities for the primary purpose of furnishing power to DOE's diffusion plant at Paducah, Kentucky.

⁴Ohio Valley Electric Corporation is a corporation originally formed by 10 private utilities for the primary purpose of furnishing power to DOE's diffusion plant at Portsmouth, Ohio.

OVERVIEW OF DOE'S URANIUM ENRICHMENT
PROGRAM AND ITS ELECTRIC POWER REQUIREMENTS

Uranium enrichment is the process by which uranium is prepared for use as fuel for nuclear reactors. At present, DOE primarily uses the gaseous diffusion technology to enrich uranium for its domestic and foreign customers at three enrichment plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. Although the three plants were built in the 1940's and 1950's, DOE has just completed a 10-year, \$1.5 billion program to improve their efficiency and increase their production capacity by about 60 percent. Despite these improvements, the plants require large amounts of electric power to enrich uranium. In fiscal year 1982, for example, DOE budgeted \$802 million, or 45 percent of its uranium enrichment program operating budget, to purchase the electric power required to operate its gaseous diffusion enrichment plants and to pay for the power it had contracted for but did not take.

In addition to the three gaseous diffusion enrichment plants, DOE is building a new enrichment facility in Portsmouth, Ohio. The new facility will utilize a different enrichment technology known as gas centrifuge, which requires significantly less electricity to operate. DOE believes the gas centrifuge technology will be more economical than the existing gaseous diffusion plants and will therefore enable DOE to lower its enrichment prices. Because of this, DOE is currently evaluating the impact of shutting down one of the gaseous diffusion plants. DOE is also developing two other enrichment technologies--advanced gas centrifuge and advanced isotope separation--which, according to DOE, have the potential of reducing enrichment prices to a level substantially below that possible from either the existing gaseous diffusion plants or the gas centrifuge plant now under construction.⁵ If successful, DOE expects to be able to utilize one or more of these advanced technologies for production of enriched uranium in the early 1990's.

To obtain the power needed to operate the gaseous diffusion enrichment plants, DOE has long-term power supply contracts with TVA; Electric Energy, Inc.; and the Ohio Valley Electric Corporation. The following table shows which of the power suppliers

⁵The effect of advanced enrichment technologies on DOE's gas centrifuge plant construction plans is discussed in our report entitled "Issues Concerning the Department of Energy's Justification for Building the Gas Centrifuge Enrichment Plant" (GAO/EMD-82-88, May 25, 1982), and a supplement to that report (GAO/EMD-82-88S, June 24, 1983).

service each of DOE's three diffusion plants, the length of DOE's contract with each supplier, and for fiscal year 1983, how much power DOE has contracted to take from each supplier and how much it actually expects to take.

<u>Power supplier</u>	<u>Gaseous diffusion plant supplied</u>	<u>Contract term</u>		<u>Amount of power under contract for fiscal year 1983</u>	<u>Amount of power expected to be taken for fiscal year 1983</u>
		<u>Initiation</u>	<u>Expiration</u>		
————(megawatts (note a))————					
TVA	Oak Ridge Paducah	4/71	6/95	3,165	1,752
Electric Energy, Inc.	Paducah	11/75	12/89	123 (note b)	123
Ohio Valley Electric Corp.	Portsmouth	9/79	10/92	785 (note b)	785

a/One megawatt equals 1,000 kilowatts.

b/Electric Energy, Inc. and the Ohio Valley Electric Corporation agreed to reduce the original amounts of power under contract (735 megawatts per year for Electric Energy, Inc. and 1,940 megawatts per year for the Ohio Valley Electric Corporation) to the amounts shown.

At the time DOE entered into the three power contracts, demand for its enrichment services was projected to be substantially greater than what it now is. Subsequently, DOE has chosen not to operate its enrichment facilities at full capacity, and therefore, as the chart illustrates for fiscal year 1983, does not need the full amount of power under contract.

Under the terms of its power contracts, DOE can take less power than it contracted for; however, it is required to pay a charge for the power under contract and not taken, unless relieved of this requirement by the supplier. This charge, known as a capacity or demand charge, is basically intended to pay for those expenses the utilities incurred to be able to provide the full amount of power under contract when needed. In fiscal year 1981, DOE paid its first demand charge of about \$27 million for power not taken. In 1982, DOE paid another \$111 million for power under contract but not taken, and in fiscal year 1983, DOE expects to pay about \$116 million in demand charges. All these demand charge payments have been or will be made to TVA. To

date, DOE has been successful in reducing the amount of power it has under contract with Electric Energy, Inc. and the Ohio Valley Electric Corporation. According to DOE officials, these reductions have been possible because these two suppliers have been able to sell power not taken by DOE to others. Because of this, DOE estimates that it has been able to reduce by about a half billion dollars the amount of demand charges it would have paid for power not taken. TVA officials, however, have not relieved and do not plan to relieve DOE of its obligation to pay demand charges for power not taken because, according to TVA officials, TVA has excess generating capacity and relieving DOE of its demand charge obligation would result in an unfair increase in power rates to other TVA customers. TVA believes this increase would occur because, by not paying demand charges, DOE would not be paying for the costs incurred by TVA to be able to provide the amount of power under contract to DOE, and these costs would then have to be recovered from other TVA customers.

SUMMARY OF INFORMATION OBTAINED

The following section contains the specific questions you asked and summarizes our answers to each. Detailed information pertaining to each of the questions is included as enclosures to this report.

--How much electricity is DOE obligated to buy from TVA that it will not use through 1992? What will the projected real dollar cost be for this electricity?

From fiscal year 1983 through fiscal year 1992, DOE plans indicate that it will not take 13,114 megawatts of power, or 34 percent of the power it has contracted to purchase from TVA. DOE projects that the demand charges it will pay to TVA for this power will total \$1.23 billion (costs for fiscal year 1984 through fiscal year 1992 are in fiscal year 1984 dollars). (See enc. I.)

--Do the other utilities that supply power to DOE's uranium enrichment facilities have the same sort of 10-year take or pay contract with DOE as does TVA? If there are any differences in contract terms between TVA and the other suppliers, what are they?

DOE's contracts with its three power suppliers each have take or pay provisions which require DOE to pay demand charges for power under contract but not taken. However, the specific provisions of the TVA contract differ from the provisions of the other two in how the amount of power under contract can be adjusted. The TVA contract also differs in (1) the length of notice required to terminate the contracts, (2) the amount of demand

charges required to be paid if the contracts are terminated, and (3) the right to automatically extend the contracts beyond their expiration dates. (See enc. II.)

--How much does TVA electricity cost DOE per kilowatt hour⁶ in comparison with electricity other utilities supply the diffusion plants?

DOE currently buys electricity from TVA at the price rate of 32.86 mills⁷ per kilowatt hour. This rate is 67 percent higher than the Ohio Valley Electric Corporation rate of 19.67 mills per kilowatt hour, and 49 percent higher than the Electric Energy, Inc. rate of 22.01 mills per kilowatt hour. (See enc. III.)

--What would be the price of enrichment if all electricity was 25 mills per kilowatt hour?

If all of the power used for enrichment was to cost 25 mills per kilowatt hour, DOE estimates show that the price of its enrichment services between 1984 and 1992 would be reduced by an average of about 12 percent. The reduction in fiscal year 1984, for example would be from \$138.87 to \$120.19 per Separative Work Unit.⁸ (See enc. IV.)

--Has DOE done all it can to renegotiate the TVA power contract to minimize the cost of power not taken?

Both TVA's and DOE's legal counsels agree that DOE is contractually obligated to pay TVA demand charges for power under contract but not taken. DOE has sought to renegotiate its contract to minimize its cost for power not taken, but TVA has not been willing to do so. DOE has tried to find buyers for unneeded TVA power under contract, but has not been successful. In this regard, according to TVA officials, the contract prohibits DOE from selling or otherwise disposing of TVA power. TVA

⁶A kilowatt hour is the measure of a unit of power steadily supplied to or taken from an electric circuit during a 1-hour period of time.

⁷A mill is one-tenth of one cent.

⁸The production capacity of enrichment plants is defined in terms of Separative Work Units. This is a measure of the amount of effort expended to separate a given amount of natural uranium into two components--one having a higher concentration and one having a lower concentration of fissionable uranium-235.

officials point out that the demand charges represent the capital costs incurred by TVA to enable it to be in a position to provide DOE with the power it has contracted for. Thus, they explained that a decrease in DOE's demand charges would result in TVA having to make an unjustified increase in the price of electricity to its other customers to enable it to recover its capital costs. (See enc. V.)

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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this letter until 3 days from the date it is issued. At that time we will send copies to the Secretary of Energy; the Chairman of the Board of Directors, TVA; the Presidents of Electric Energy, Inc. and Ohio Valley Electric Corporation; and make copies available to others upon request.

Sincerely yours,



J. Dexter Peach
Director

Enclosures - 5

AMOUNT AND COST OF TVA ELECTRICITY DOECONTRACTED FOR BUT DOES NOT PLAN TO TAKE (note a)

<u>Fiscal year</u>	<u>Electricity under contract (note b)</u>		<u>Electricity not taken (note c)</u>		<u>Percent of electricity under contract not taken</u>
	<u>Megawatts per year</u>	<u>Purchased Power Cost</u>	<u>Megawatts per year</u>	<u>Cost</u>	
		(in millions)		(in millions)	
<u>TVA</u>					
1983	3,165	\$ 911	1,413	\$ 116	45
1984	3,786	1,177	2,271	217	60
1985	4,485	1,390	2,120	202	47
1986	4,485	1,390	1,600	152	36
1987	4,485	1,390	1,360	130	30
1988	4,485	1,394	1,435	137	32
1989	4,485	1,390	1,655	157	37
1990	3,715	1,151	1,130	107	30
1991	2,715	841	130	12	5
1992	<u>2,195</u>	<u>682</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	<u>38,001</u>	<u>\$11,716</u>	<u>13,114</u>	<u>\$1,230</u>	<u>34</u>
<u>Ohio Valley Elec. Corp.</u>					
1983-1992	15,325	3,151	320	18	2
<u>Electric Energy Inc.</u>					
1983-1992	<u>6,248</u>	<u>1,453</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	<u>59,574</u>	<u>\$16,320</u>	<u>13,434</u>	<u>\$1,248</u>	<u>22</u>

a/Fiscal year 1983 costs are in fiscal year 1983 dollars. Fiscal year 1984 costs and after are in fiscal year 1984 dollars.

b/Electricity under contract is the total amount and cost of the electric power DOE has contracted from each supplier in the stated year or years.

c/Electricity not taken is the amount of electric power under contract which DOE does not plan to take from its suppliers and the demand costs it expects to incur for the power not taken.

SOURCE: Office of Uranium Enrichment and Assessment DOE, May 1983.

POWER SUPPLIER CONTRACT TERMS

DOE, TVA, Ohio Valley Electric Corporation, and Electric Energy, Inc., agreed that the "take or pay," contract termination, and contract extension rights provisions are key terms of their contracts.

"TAKE OR PAY"

Each of DOE's three power contracts states the amount of power that DOE has contracted for during each year of the contract. DOE can unilaterally decide to take less than the amount of power it has contracted for in a given year, but if it does so, it must pay a demand charge for the power under contract but not taken (also see enc. V). However, each contract gives DOE the right to reduce the amount of power it has under contract, as long as certain criteria are met. DOE's contract with TVA permits DOE to cancel up to 1,000 megawatts in each 12-month period without paying a demand charge for the power, provided that DOE gives TVA an 8-year notice for each cancellation. The Ohio Valley Electric Corporation contract also permits DOE to reduce the amount of power it is required to take without incurring a demand charge. In this case, if DOE gives Ohio Valley Electric Corporation 5 years advance notice it can reduce the amount of power it has contracted to take by up to 300 megawatts in each 6-month period. The Electric Energy, Inc. contract permits temporary reductions of unspecified amounts with 10 days notice. These reductions, however, must last not less than 30 days and not more than 6 months.

CONTRACT TERMINATION

All three power contracts contain provisions, although somewhat different, which allow DOE to terminate the contracts.

--DOE can terminate the TVA contract by providing TVA with an 8-year notice of its desire to initiate incremental reductions of power under contract not to exceed 1,000 megawatts per year. Therefore, the earliest DOE could terminate the TVA contract in its entirety would be in fiscal year 1994. Until this time DOE is required to pay demand charges to TVA for the amount of power remaining under contract.

--DOE may terminate the Ohio Valley Electric Corporation contract by giving 5 years notice. DOE's obligation to pay demand charges ceases at the date of contract termination and does not continue until the original contract expiration date. During the 5-year notice period, however, if DOE notifies the Ohio Valley Electric

Corporation that it will not require the contracted amount of power, the contract indicates the demand charge to be paid by DOE will be less than it would have been had DOE not given termination notice and only reduced the amount of power to be taken during that period. Therefore, if on October 1, 1983, for example, DOE gives the Ohio Valley Electric Corporation 5 years notice that it will terminate the contract in 1988, and simultaneously gives them notice that it will not require any power during the 5-year notice period, DOE would be obligated to pay a reduced demand charge for the amount of power under contract and not taken during fiscal years 1984 through 1988.

--The Electric Energy, Inc. contract states that it can be cancelled by DOE with a 10-year notice without charge, or it can be cancelled with a 7-year notice with a demand charge to be paid for the term of the contract subsequent to the 7-year period or 3 years, whichever is less. Under these terms, DOE pays demand charges on the full amount of power under contract at the time of its termination notice. The contract further states that Electric Energy, Inc., although under no obligation to do so, will try to sell unneeded power under DOE's contract to other users. To the extent that power is sold to others, the charges to DOE are to be reduced. However, because DOE's contract with Electric Energy, Inc. expires on December 31, 1989, DOE cannot provide the 7-year notice required to terminate the contract prior to its expiration date.

CONTRACT EXTENSION RIGHTS

Each of DOE's three power contracts state the date that they expire. DOE does not have the automatic right to extend the length of its contracts with TVA or the Ohio Valley Electric Corporation, which expire on June 30, 1995, and October 14, 1992, respectively. Thus, any contract extension with TVA or the Ohio Valley Electric Corporation must be negotiated. The Electric Energy, Inc. contract, however, states that DOE can automatically extend the contract from its current expiration date of December 31, 1989, until May 31, 1993, provided that DOE notifies Electric Energy, Inc. in writing prior to June 1, 1983. On May 31, 1983, DOE notified Electric Energy, Inc. that it did not plan to exercise its option to extend its contract beyond the current December 31, 1989, expiration date.

COMPARISON OF DOE'S FISCAL
YEAR 1983 ELECTRICITY COSTS (note a)

	<u>Demand</u> <u>(note b)</u>	<u>Energy</u> <u>(note c)</u>	<u>Total</u> <u>(note d)</u>
	----- (in mills per kilowatt hour) -----		
TVA	9.38	23.48	32.86
Electric Energy, Inc.	4.08	17.93	22.01
Ohio Valley Electric Corp.	4.98	14.69	19.67

a/All rates are DOE projections. Each of the three suppliers told us the DOE projections are reasonable.

b/Demand charges are those power charges which DOE pays to the power suppliers for the power it has contracted for, regardless of whether or not DOE takes all the power.

c/Energy charges are those power charges in addition to demand charges which DOE pays to the power suppliers for the power it has contracted for and takes. Unlike demand charges, DOE does not pay power charges for power it does not take.

d/Total energy charges, comprised of demand and energy charges, are the total power charges to DOE if it takes the full amount of power it has contracted for.

SOURCE: Power Branch, Oak Ridge Operations Office, DOE, May 1983.

DOE CALCULATED URANIUM ENRICHMENT PRICES BASED ON
DOE-PROJECTED POWER COSTS AND REDUCED POWER COSTS

<u>Fiscal year</u>	<u>Separative Work Unit Prices (note a)</u>		
	<u>At currently DOE- projected power cost (note b)</u>	<u>At 25 mills per kilowatt hour</u>	<u>Difference</u>
1984	\$138.87	\$120.19	\$18.68
1985	135.95	118.17	17.78
1986	132.69	115.80	16.89
1987	129.60	113.51	16.09
1988	126.72	111.34	15.38
1989	123.93	109.20	14.73
1990	121.27	107.12	14.15
1991	119.19	105.52	13.67
1992	116.75	103.56	13.19

a/The Separative Work Unit prices shown are for DOE's adjustable, fixed commitment contracts, which make up about 50 percent of DOE's active enrichment contracts. In July 1978, the U.S. replaced its long-term, fixed-commitment contract with an adjustable, fixed-commitment contract which provides the enrichment customer with greater flexibility to adjust the scheduled deliveries of enrichment services.

b/These Separative Work Unit prices are projected to decrease because of the planned introduction of the gas centrifuge technology.

SOURCE: Office of Uranium Enrichment and Assessment, DOE, May 1983.

DOE EFFORTS TO MINIMIZE THE COST
OF TVA POWER NOT TAKEN

According to DOE and TVA officials, DOE is doing all that it can to reduce the cost of TVA power not taken. Because of the terms of its contract with TVA, however, DOE is somewhat limited in the actions it can take to minimize this cost. Under the terms of the contract, DOE is required to pay for both the power it takes from TVA and the power it does not take. Although the contract allows DOE to pay less for the power not taken, it is still required to pay a demand charge for this unused power. The demand charge represents DOE's share of expenses incurred by TVA in order to be capable of providing DOE with the amount of power it originally contracted for. DOE and TVA officials agree that, unless TVA releases DOE from this requirement, DOE is obligated under the contract to pay TVA demand charges for the power not taken.

Since 1980, DOE has repeatedly sought to renegotiate its TVA contract to reduce the amount of demand charges it is required to pay for power under contract but not taken. TVA officials told us that they expect to have a power surplus between fiscal year 1983 and 1995 which will range from about 1,800 megawatts to 4,000 megawatts per year. However, TVA officials have also told us that they will not renegotiate the DOE power contract to either release DOE from its demand charge payments or otherwise reduce charges to DOE for power not taken. TVA's reason for holding DOE to the contract requirement is that TVA has fixed costs which it incurred to be prepared to provide the level of power DOE contracted for, and these costs must be paid for regardless of whether or not DOE takes the power it originally wanted. TVA explained that if it renegotiated its contract with DOE so as to eliminate or reduce DOE's demand charges, the reduction in TVA revenue would have to be offset by increasing the power rates paid by other TVA customers. According to TVA, reducing DOE's costs at the expense of its other customers would be unfair to those customers.

In addition to its contract renegotiation efforts, DOE has tried to find buyers for the TVA power it contracted for but will not use. Although TVA officials explained that the contract prohibits DOE from selling or otherwise disposing of TVA power, DOE has explored the possibility of selling some of this power to DOE's Strategic Petroleum Reserve facilities in Louisiana and to several Southern States including Alabama and Florida. However, due to legal, institutional, and technical barriers to selling this surplus power, to date DOE has not been successful.

DOE has, however, implemented an option under its contract with TVA which permits it to reduce the amount of power it has under contract. This affects the amount of demand charges DOE pays TVA for power under contract and not taken because it reduces the amount of power actually under contract. To exercise this option DOE must provide TVA with 8 years prior notice, and can reduce the amount of power under contract by up to 1,000 megawatts per year. Each 1,000-megawatts reduction may be applied to each remaining contract year. In fiscal year 1982, DOE provided TVA with the required notice to reduce the amount of power under contract by 1,000 megawatts for fiscal year 1990 and each succeeding contract year. In fiscal year 1983, DOE similarly provided notice, thus reducing the amount of power under contract by an additional 1,000 megawatts in fiscal year 1991 and each remaining year of the contract. DOE is considering providing TVA with notice for still another 1,000 megawatts beginning in fiscal year 1992. The reductions for fiscal years 1990 and 1991 have saved DOE an estimated \$95 million in demand charges each year. According to DOE officials, DOE did not exercise this option for the time period before fiscal year 1990 because, until the end of fiscal year 1981, its projections showed that the gaseous diffusion enrichment plants would need all of the power under contract to satisfy the expected demand for enrichment services.