



UNITED STATES GENERAL ACCOUNTING OFFICE

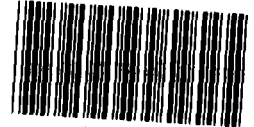
RESTRICTED -- Not to be distributed outside the General Accounting Office except as authorized in writing by the Office of Congressional Relations.

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

October 11, 1983

B-207463

RELEASED



122844

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

Dear Mr. Chairman:

Subject: Estimated Effect of Eliminating TVA Electricity Demand Charges on the Price of Enriched Uranium (GAO/RCED-84-18)

Your letter of August 16, 1983, requested information on the estimated effect of eliminating the Tennessee Valley Authority's (TVA's) demand charges for power not taken on the price of the Department of Energy's (DOE's) uranium enrichment services. Demand charges are that portion of the power rate which is basically intended to recover capital costs a utility incurred to be able to provide the full amount of power required by its customers. TVA is one of the three electric utilities which supply power to DOE's uranium enrichment plants. Our July 15, 1983, report¹ stated that DOE is paying TVA demand charges for power DOE is contracted to purchase but does not use. You asked us to obtain from DOE its estimates of the effect of those TVA demand charges on the price of enriched uranium assuming three different TVA electricity rates and to provide our response in early October 1983.

In making its estimates DOE was to assume, at the request of your office, a high rate of 35 mills² per kilowatt hour.³ This rate reflects DOE's current projection that TVA will charge 35.38 mills per kilowatt hour (in 1984 dollars) for fiscal years 1984-95. DOE was also to assume a low rate of 25 mills per

¹Data on DOE's Uranium Enrichment Power Contracts and the Cost of Power (GAO/RCED-83-196).

²A mill is one-tenth of one cent.

³A 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.

027186

(301642)

kilowatt hour, which reflects DOE's average estimated electricity rate from its two other power suppliers, and a medium rate of 30 mills per kilowatt hour, which is the average of the assumed high and low rates.

OBJECTIVE, SCOPE, AND METHODOLOGY

The objective of our work was to provide you with DOE's estimate of the price of enrichment services from fiscal years 1984 through 1995 assuming demand charges were eliminated and TVA power rates were as set forth above. We interviewed DOE uranium enrichment program officials to determine DOE's current estimate of the TVA power rate and discussed with TVA officials the reasonableness of that estimate. Based on discussions with DOE officials, we updated information presented in our July 1983 report on the amount of demand charges DOE must pay TVA. We also requested DOE to analyze the effect of eliminating demand charges on the price of enriched uranium for the three TVA power rate assumptions, and to provide us with estimates of these prices for fiscal years 1984 through 1995.

As requested by your office, in order for us to provide the information in the time frame requested, we did not verify the estimates DOE provided nor did we obtain written agency comments on this report. We did, however, discuss the information presented in a draft of this report with DOE officials and incorporated their views where appropriate. Our review was conducted during September 1983. Except as noted above, we performed our review in accordance with generally accepted government auditing standards.

OVERVIEW OF THE RELATION BETWEEN POWER COSTS AND THE PRICE OF ENRICHED URANIUM

Uranium enrichment is the process by which uranium is prepared for use as fuel for nuclear reactors. DOE enriches uranium for domestic and foreign customers at its three enrichment plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. These plants use the gaseous diffusion enrichment technology which requires large amounts of electric power to enrich uranium. To obtain this power, DOE has long-term power supply contracts with TVA; Electric Energy, Inc.; and the Ohio Valley Electric Corporation. In fiscal year 1983, DOE budgeted \$884 million, or 46 percent of its uranium enrichment program budget, for electric power to operate its gaseous diffusion enrichment plants.

Under the terms of its power contract with TVA and its other two suppliers, DOE can take less power than it contracted for; however, it is required to pay a demand charge for the power under contract and not taken, unless relieved of this requirement by the supplier. DOE projects that from fiscal year 1984 through fiscal year 1995 when the current power contract with TVA will expire, it will not take 11,701 megawatts of power, or about 31 percent of the power it has contracted to purchase from TVA. DOE estimates that the demand charges for the power not taken will total \$1.11 billion in fiscal year 1984 dollars. DOE has been able to reduce the amount of power under contract with its other two power suppliers and therefore is not in the situation of paying them demand charges for power not taken. 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.

Section 161(v) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2201(v)), requires DOE to recover, over a reasonable period of time, all the government's cost of providing enrichment services. Thus, in determining the price of enrichment services charged to its customers, DOE includes power costs as one of the cost components to be recovered. Power costs represent nearly half of DOE's current price for enrichment services, with costs such as depreciation, interest, and other operating costs making up the balance. Since the price of enrichment services is directly tied to DOE's enrichment program costs, an increase or decrease in the power rates, and therefore the costs, would similarly affect the price, assuming all other variables remain the same.

In an effort to reduce costs and therefore prices, DOE is building a new enrichment facility in Portsmouth, Ohio. The new facility will use a different enrichment technology, known as gas centrifuge, which requires only about 5 percent as much electric power as the gaseous diffusion plants. Accordingly, DOE believes the gas centrifuge plant will be more economical than the existing gaseous diffusion plants and will therefore enable DOE to lower its enrichment prices. 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.⁴ If successful, DOE

⁴The 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).

expects to be able to use one or more of these advanced technologies for production of enriched uranium in the early 1990's.

SUMMARY OF DOE'S ESTIMATES

DOE estimates, prepared in response to your question, are included as three separate enclosures to this letter--each with a different TVA power rate assumed. The enclosures show the estimated separative work unit⁵ prices of DOE's enrichment services if demand charges for power not taken are included and if such charges are eliminated. Since DOE's power contract with TVA is due to expire in 1995, the enclosures provide estimates through that year.

The estimated prices shown in the enclosures are for DOE's enrichment contracts which require customers to commit to enriched uranium deliveries at least 6 years in advance. Such contracts make up about 50 percent of DOE's active enrichment contracts. The balance of the contracts are requirements-type contracts which require customers to commit to deliveries with only 6 months notice. Because of the shorter notice period, DOE charges the requirements-contract customers a higher price, currently \$11.20 more per separative work unit.

Enclosure I shows the estimated price of DOE's enrichment services assuming a TVA power rate of 35 mills per kilowatt hour.⁶ Eliminating the demand charges for power not taken under this assumed rate would reduce the price of enrichment services by nearly 5 percent in fiscal year 1984. In subsequent years, the effect of eliminating demand charges decreases and will amount to about 2.4 percent in fiscal year 1995. According to these DOE estimates, the average annual uranium enrichment price would be reduced by about 3.4 percent from fiscal year 1984 through 1995.

Enclosures II and III show the estimated price assuming TVA power rates of 30 and 25 mills per kilowatt hour, respectively.

⁵A separative work unit 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.

⁶DOE's current TVA power rate estimate of 35.38 mills per kilowatt hour on which the 35 mill case is based is lower than the 39.0 mills per kilowatt hour on which the current enriched uranium price of \$138.65 is based. DOE continually monitors the power rate trends and, in December 1983, will factor its latest TVA power-rate projection into its price calculation for fiscal year 1985.

Eliminating the demand charges for power not taken under either of these assumed rates would reduce the price by over 4 percent in fiscal year 1984, and similar to the 35 mill assumption, the effect decreases in subsequent years and will amount to slightly more than 2 percent in fiscal year 1995. DOE's estimates indicate that, for the 30 and 25 mill assumptions, the average annual price of enrichment services would be reduced by slightly over 3 percent from fiscal year 1984 through 1995.

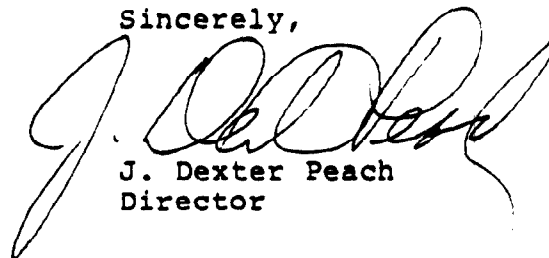
In each of the cases shown, the estimated future price of DOE's enrichment services, shown in constant fiscal year 1984 dollars, gradually decreases. According to DOE officials, if DOE's analyses had included an inflation or escalation factor, the price in real dollars would increase. These officials pointed out, however, that even though the price would increase in real dollars, it would still be lower than it would have been without DOE's planned introduction of the gas centrifuge plants. They explained that this is because DOE's replacement of energy-intensive gaseous diffusion enrichment plants with more efficient gas centrifuge plants reduces enrichment costs, thereby reducing the price.

Although we did not assess the reasonableness of the assumed TVA power rates, TVA officials told us that they believe the DOE-projected 35.38 mills per kilowatt hour is reasonably accurate and they do not expect it to change significantly. Further, as we reported in July 1983, DOE has sought to renegotiate its TVA power contract to eliminate demand charges for power not taken. However, TVA has not been willing to do so because such demand charges are intended to recover capital costs incurred to enable it to provide DOE with the contracted amount of power. Therefore, if DOE does not pay demand charges for power not taken, TVA states that it would have to increase electricity prices charged to its other customers to recover the capital costs.

- - - -

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this letter until 30 days from the date it is issued. At that time we will send copies to the Secretary of Energy and make copies available to others upon request.

Sincerely,



J. Dexter Peach
Director

Enclosures - 3

DOE-ESTIMATED SEPARATIVE WORK UNIT
PRICE ASSUMING TVA POWER RATE OF
35 MILLS PER KILOWATT HOUR

<u>Fiscal year</u>	<u>With demand charges</u>	<u>Without demand charges</u>	<u>Percent difference</u>
	----(in constant 1984 dollars)----		
1984	\$ 131.54	\$ 125.29	4.7
1985	129.13	123.41	4.4
1986	126.38	121.15	4.1
1987	123.75	118.96	3.9
1988	121.27	116.88	3.6
1989	118.84	114.81	3.4
1990	116.50	112.79	3.2
1991	114.70	111.26	3.0
1992	112.52	109.35	2.8
1993	110.41	107.48	2.6
1994	108.39	105.68	2.5
1995	106.48	103.97	2.4
Cumulative averages	118.33	114.25	3.4

Source: Prepared by GAO using Office of Uranium Enrichment and Assessment, DOE, September 1983, estimates.

DOE-ESTIMATED SEPARATIVE WORK UNIT
PRICE ASSUMING TVA POWER RATE OF
30 MILLS PER KILOWATT HOUR

<u>Fiscal year</u>	<u>With demand charges</u>	<u>Without demand charges</u>	<u>Percent difference</u>
	----(in constant 1984 dollars)---		
1984	\$ 126.21	\$ 120.60	4.4
1985	123.99	118.85	4.1
1986	121.41	116.72	3.9
1987	118.95	114.66	3.6
1988	116.62	112.68	3.4
1989	114.33	110.71	3.2
1990	112.13	108.79	3.0
1991	110.41	107.32	2.8
1992	108.35	105.50	2.6
1993	106.33	103.70	2.5
1994	104.40	101.96	2.3
1995	102.56	100.31	2.2
Cumulative averages	113.81	110.15	3.2

Source: Prepared by GAO using Office of Uranium Enrichment and Assessment, DOE, September 1983, estimates.

DOE-ESTIMATED SEPARATIVE WORK UNIT
PRICE ASSUMING TVA POWER RATE OF
25 MILLS PER KILOWATT HOUR

<u>Fiscal year</u>	<u>With demand charges</u>	<u>Without demand charges</u>	<u>Percent difference</u>
----(in constant 1984 dollars)---			
1984	\$ 121.16	\$ 115.94	4.3
1985	119.09	114.31	4.0
1986	116.69	112.32	3.7
1987	114.38	110.38	3.5
1988	112.18	108.51	3.3
1989	110.01	106.64	3.1
1990	107.91	104.81	2.9
1991	106.29	103.41	2.7
1992	104.32	101.66	2.5
1993	102.39	99.93	2.4
1994	100.53	98.26	2.2
1995	98.77	96.67	2.1
Cumulative averages	109.48	106.07	3.1

Source: Prepared by GAO using Office of Uranium Enrichment and Assessment, DOE, September 1983, estimates.