

DOCUMENT RESUME

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[Department of Energy's Uranium Enrichment Activities].  
EHD-78-64; B-159687. May 22, 1978. Released May 30, 1978. 9 pp.

Report to Rep. Walter Flowers, Chairman, House Committee on Science and Technology: Fossil and Nuclear Energy Research, Development and Demonstration Subcommittee; by Elmer B. Staats, Comptroller General.

Issue Area: Energy: Making Nuclear Fission a Substantial Energy Source (1608).

Contact: Energy and Minerals Div.

Budget Function: Natural Resources, Environment, and Energy: Energy (305).

Organization Concerned: Department of Energy; Tennessee Valley Authority.

Congressional Relevance: House Committee on Science and Technology: Fossil and Nuclear Energy Research, Development and Demonstration Subcommittee; House Committee on Interior and Insular Affairs; Senate Committee on Environment and Public Works. Rep. Walter Flowers.

Authority: Atomic Energy Act of 1954, as amended (42 U.S.C. 2201(v)).

The Department of Energy negotiated a 354 megawatt year reduction in fiscal year 1978 electrical power purchases for uranium enrichment purposes from the Tennessee Valley Authority (TVA). The Department took this action to give it more operating flexibility in the 1980s in the event that enrichment demand is less than expected. Because TVA cannot supply enough electrical power, the Department has operated its enrichment plants below capacity since 1972 and expects to continue to do so until 1984. TVA has been unable to deliver all the electrical power the Department needs to operate its enrichment plants at full capacity because its nuclear powerplant construction program is behind schedule. Enrichment services prices and revenues will not be affected in fiscal year 1978 by the reduction in electrical power purchases but will be affected over a longer period of time. However, barring unforeseen production losses, the Department should be able to meet its contract demand for enrichment services in the 1980s. (RBS)

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

B-159687

May 22, 1978

The Honorable Walter Flowers  
Chairman, Subcommittee on Fossil and  
Nuclear Energy Research, Development  
and Demonstration  
Committee on Science and Technology  
House of Representatives

Dear Mr. Chairman:

In your letter of January 16, 1978, you raised a number of questions about the Department of Energy's decision to reduce electrical power purchases from the Tennessee Valley Authority for operating uranium enrichment plants in fiscal year 1978. You were particularly interested in:

- Whether the Department has been and is now operating its enrichment plants below full capacity due to a lack of electrical power.
- The status of the Authority's electrical power system, especially the timeliness of providing additional generating capacity; and whether other Authority customers have reduced their power purchases.
- The effect of the Department's decision to reduce electrical power purchases in fiscal year 1978 on enrichment services prices and revenues.
- The effect of the Department's decision to reduce electrical power purchases in fiscal year 1978 on its efforts to stockpile enriched uranium for future demand.

These matters are discussed below. At your request, we did not take the additional time to obtain written comments on this report; however, it was discussed with Department and Authority officials and their comments were incorporated as appropriate.

EMD-78-64  
(30514)

REASON FOR THE DEPARTMENT'S  
DECISION

The Department and the Authority negotiated a 354 megawatt year  $\frac{1}{2}$  reduction in fiscal year 1978 electrical power purchases for uranium enrichment plant operations, with the Department having the option to repurchase some of this power in fiscal years 1981 and 1982. The Department took this action to give it more operating flexibility in the 1980s in the event that enrichment demand is less than expected. The Department also believes that more enriched uranium could be produced, if needed, with the same amount of power in fiscal year 1981 and 1982 because a program to improve the efficiency of the enrichment plants will be completed by that time.

THE DEPARTMENT IS OPERATING ITS  
ENRICHMENT PLANTS BELOW CAPACITY  
DUE TO A LACK OF ELECTRICAL POWER

Because the Authority cannot supply enough electrical power, the Department has operated its enrichment plants below capacity since 1972, and expects to continue to do so until 1984. In addition, during emergencies such as severe winter weather and the 1978 coal miners' strike, the Department decided to release some of its contracted power so the Authority could supply additional power to its residential and commercial customers.

There are three Department-owned uranium enrichment plants in the United States. These plants are located at Oak Ridge, Tennessee; near Paducah, Kentucky; and near Portsmouth, Ohio. The plants enrich uranium to fulfill contracts with domestic and foreign utilities and to supply Government research and military needs.

The enrichment process currently being used by the plants requires large amounts of electrical power. For example, the Department would need about 6,000 megawatt years of power--the full capacity of six large 1,000 megawatt powerplants--in fiscal year 1978 to operate the plants at their improved capacities. Electrical power for the enrichment plants is supplied by the Authority and two other electric utilities.

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$\frac{1}{2}$  megawatt year is one thousand kilowatts of electrical power for 1 year.

In 1971 the three enrichment plants had a combined annual capacity of 17.2 million separative work units <sup>1/</sup>--it takes about 1 million units to fuel a nuclear powerplant for 10 years. In the same year, a plant improvement program was started that the Department estimates will increase the plants' combined capacity by 10.1 million separative work units. The Department expects to complete this improvement program in phases by 1981 but, as each phase is completed, the plants' combined enrichment capacity is increased. For example, the capacity expected to be available in fiscal year 1978 is 19.7 million separative work units, assuming that all of the electrical power the plants could use is available.

The Department is also constructing another enrichment plant adjacent to the existing Portsmouth plant which will increase the annual capacity by another 8.8 million separative work units. When complete, the new plant will bring the Department's total enrichment capacity to about 36.1 million separative work units. The new plant is using a different enrichment process which uses about 96 percent less electrical power than the current enrichment process. The plant will consist of eight separate enrichment process buildings plus common support facilities. The Department originally expected to complete the new plant by the end of fiscal year 1978. It recently announced, however, that it will complete only two enrichment process buildings, with a production capacity of 2.2 million separative work units, by that time. The remaining six enrichment process buildings will be added sequentially at a rate to match future enrichment demand. Department officials told us that the entire plant will probably be completed sometime between 1990 and 1995.

From 1973 through 1984 the Department has lost or expects to lose 44.9 million separative work units of production due to a lack of electrical power--enough production to fuel 41 nuclear powerplants for 10 years. Specifically, the Department:

--Lost 15 million separative work units of production capacity from 1973 through 1977 because the Authority could not supply enough electrical power for full capacity operations.

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<sup>1/</sup>The production capacity of an enrichment plant is defined in terms of separative work units. This is a measure of the effort expended to separate a given quantity of uranium feed into enriched and depleted uranium streams.

- Expects to lose 25.5 million separative work units of production capacity from 1977 to 1985 because the Authority will be unable to supply all of the additional power needed to operate the enrichment plants at their improved capacities until 1984.
- Lost an additional 4.4 million separative work units of production capacity in recent years when it decided to forego electrical power purchases so the Authority could provide electricity to residential and commercial customers in emergencies. For example, the Department lost 3 million separative work units of production during the 1978 coal miners' strike.

THE AUTHORITY'S NUCLEAR POWER-  
PLANT CONSTRUCTION PROGRAM IS  
BEHIND SCHEDULE

The Authority has been unable to deliver all of the electrical power the Department needs to operate its enrichment plants at full capacity because its nuclear powerplant construction program is behind schedule. At one time, the Authority expected to have eight nuclear powerplants generating electricity in 1977. By 1977, however, only three were completed and the Authority does not expect the other five to be completed until 1979 and 1980.

In 1977 customer demand for electrical power from the Authority's system peaked at 21,803 megawatts. During this peak the Authority's total electrical power generation was 18,641 megawatts; consequently, the Authority had to purchase electrical power from other utilities and/or exchange power with other utilities under seasonal interchange agreements. Moreover, the Authority offered its industrial customers, and several accepted, a one-time opportunity to reduce their contract demand.

The Authority's power contract with the Department requires it to increase in two increments the amount of electrical power which it can continuously deliver; one of 1,825 megawatts and another of 1,320 megawatts <sup>1/</sup>. Delivery of the first increment is contingent upon the Authority's ability to increase its electrical generating capacity. The Authority originally expected to begin delivering the first increment of power by April 1, 1976, but was able to start delivering only

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<sup>1/</sup>Continuous delivery of 1,825 and 1,320 megawatts for 1 year is equivalent to 1,825 and 1,320 megawatt years of power, respectively.

1,000 megawatts by that date. It now expects to begin supplying the remaining 825 megawatts by March 1, 1980.

The Authority must supply the second increment of 1,320 megawatts by July 30, 1984. The Authority reserves the decision to begin delivering portions or all of the power earlier, but Authority officials told us that an early delivery is unlikely.

The Authority's power contract with the Department also requires delivery of some incremental power on a noncontinuing basis. The amount of power delivered varies from month to month, and is delivered during off-peak periods of system demand. The Department had originally agreed to purchase 591 megawatt years of this power in fiscal year 1978. The Department's 354 megawatt year power reduction came from this increment of power.

ENRICHMENT SERVICES PRICES AND REVENUES WILL NOT BE AFFECTED IN FISCAL YEAR 1978 BUT WILL BE OVER A LONGER TIME PERIOD

Section 161(v) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2201(v)), and the uranium enrichment services criteria set out in accordance with the act, requires the Department to charge for enriching services on the basis of cost recovery over a reasonable time period. The current enrichment services prices are based on recovering costs over the 10-year period from fiscal year 1977 through 1986.

Our review of the 10 year cost and production estimates used by the Department to compute the current prices showed that because of the decision to purchase less power in fiscal year 1978 the total cost to be recovered will be reduced by four-tenths of one percent and the number of separative work units will be reduced by one-half of one percent. Spreading this lower cost over less production will increase the separative work unit price over the 10-year period about 10 cents. This is less than two-tenths of one percent of the Department's present long-term contract price of \$74.85 per separative work unit.

The Department's decision to reduce fiscal year 1978 electrical power purchases will not affect revenues from enrichment services in that year because neither enrichment services prices nor sales will change as a result of the decision. Theoretically, any change in costs will affect enrichment services prices and revenues because revenues must equal costs over a reasonable time period. The enrichment

services criteria, however, require the Department to keep prices reasonably stable as it periodically updates cost and production estimates. Therefore, the Department does not recompute prices each time its operating plans and costs change. Prices are changed only when the cumulative increases or decreases in actual and/or estimated costs significantly differ from the costs used to compute the then current prices. Since 1969, the Department has made eight major and three minor adjustments to its enrichment services prices. The Department does not plan a price change to compensate solely for the 10 cent unit cost increase due to its decision to reduce power purchases and production in fiscal year 1978.

Likewise, the Department's enrichment services sales in fiscal year 1978 will not change because of its decision to reduce power purchases, although the Department will produce about 1 million fewer separative work units of enriched uranium in that year. The Department had planned to stockpile these separative work units for sale in the 1980s. Unless the Department decides to purchase some or all of the 354 megawatt years of electrical power in fiscal year 1981 and/or 1982, enrichment services revenues will eventually be lower because the costs to be recovered will be lower.

If the Department exercises its option to purchase the electrical power in 1981 and/or 1982, its total enrichment operating costs and the separative work units produced for the 10-year period will increase. How much total costs will increase depends on the cost of the power. For planning purposes, the Department estimates that power from the Authority will cost about 20 mills 1/ per kilowatt hour in 1981, versus about 18 mills in 1978. The ultimate price of the separative work units and the revenues to be obtained from them will depend on the amount and cost of the purchased power.

THE DECISION SHOULD NOT PREVENT  
THE DEPARTMENT FROM MEETING  
CONTRACT DEMAND IN THE 1980S

Barring further unforeseen production losses of the magnitude experienced because of the 1978 coal miners' strike, the Department should be able to meet its contract demand for enrichment services in the 1980s. Nevertheless, to meet this demand, the Department will have to reduce the enriched uranium stockpile well below the minimum level it wants to maintain.

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1/A mill is one-tenth of one cent.

From 1973 through 1977 the Department enriched more uranium than was needed to meet customer and Government requirements even though it operated its enrichment plants below full capacity. The Department has been stockpiling the excess enriched uranium to (1) maintain a working inventory, (2) provide for contingencies, and (3) help meet customer and Government requirements in the 1980s. Beginning in fiscal year 1981, however, the demand for enrichment services which the Department has contracted to supply will exceed production capability at least through fiscal year 1988. The Department estimates that it needs to maintain a stockpile of about 15 million separative work units for contingencies and a working inventory.

At the beginning of fiscal year 1978, the Department's enriched uranium stockpile totaled 29.8 million separative work units. At that time, the Department planned to increase the stockpile to 40.6 million separative work units at the end of fiscal year 1980, and to use 23.3 million units from the stockpile through 1988 to meet contract demand in excess of production. This would leave 17.3 million separative work units in the stockpile at the end of fiscal year 1988, when the Department expected to begin full production from the new enrichment plant. The lost production in fiscal year 1978 would further reduce the 1988 stockpile figure to 13.3 million separative work units. In addition, the Department's recent decision to defer the schedule for the new enrichment plant would further reduce the 1988 stockpile figure by about 7.8 million separative work units to only 5.5 million separative work units.

The above figures do not, however, consider (1) expected major reductions in contract demand due to the Department's recent decision to grant customers relief from their present contracts and (2) possible increases in demand if the Department begins executing new enrichment services contracts.

In 1974 the Department stopped executing new enrichment services contracts because it had fully committed the expected improved capacities of the three plants. Shortly thereafter, however, many utilities canceled or deferred their planned nuclear powerplants because of financial difficulties and lower forecasts of future electrical demand. The Department then allowed the utilities to cancel their enrichment services contracts or defer enriched uranium delivery dates. The resulting reduced contract demand enabled the Department to increase its enriched uranium stockpile and to defer from 1985 to 1988 the time when new enrichment capacity would be needed.



The reduction in demand for enrichment services has continued. For example, in a recent Department survey existing customers expressed a desire to terminate contracts totaling 19.4 million separative work units, and to delay delivery of 28.6 million separative work units by an average of 2 years. The Department recently announced that it would offer its present domestic customers contract relief by allowing them to convert their present contracts to the Department's new enrichment services contract. The new contract provides for a 5-year period of firm contractual customer commitments instead of the 10-year period under the present contract. A decision has not yet been made on whether to extend this offer to the Department's foreign customers.

The Department is confident that many domestic customers will take advantage of the offered contract relief, thus reducing existing contract demand. According to the Department, any separative work units not needed under existing contracts could be used to (1) write new contracts with other domestic or foreign utilities, (2) add to the enriched uranium stockpile, or (3) reduce enrichment plant production levels. The Department is uncertain, however, just how many customers will decide to convert their present contracts, and what the reduction in demand will be.

Offering new enrichment services contracts is consistent with the Administration's announced intention to maintain this country's position as a reliable worldwide supplier. To further the Administration's objective, the Department has asked the Congress for authority to start executing new contracts for the production capacity of the new enrichment plant. This matter is currently under consideration.

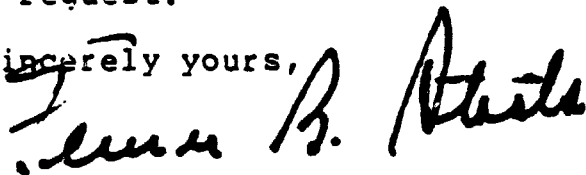
Reducing the contract demand for enrichment services in the 1980s should reduce the need for a large enriched uranium stockpile. On the other hand, executing contracts now for the new plant's capacity would increase the need for a large stockpile as a hedge against possible delays in completing incremental portions of the new plant. Until the above is acted upon it is difficult to project whether the demand for the Department's enrichment services in the 1980s will change, and by how much, from the existing contract demand.

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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this

report until 7 days after the date of the report. At that time, we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

A handwritten signature in black ink, appearing to read "James B. Atchafalua". The signature is written in a cursive style with a large initial "J" and "A".

Comptroller General  
of the United States