Uranium Enrichment: Heading for a Cliff?

Although the U.S. enrichment business has slashed production costs and is now much more competitive, it still has two tough multibillion dollar problems to overcome

THIS is a story about a high-technology industry that was once dominated by the United States but is now under severe challenge from overseas competitors. The early technology was invented in the United States and U.S. researchers have a commanding lead in the development of new processes, yet there are increasing concerns that Japanese or European plants may be the first to use the most advanced technologies. Another example of America's inability to compete? Yes, but not for the usual reasons.

The industry is the $2.3-billion-a-year global business of enriching natural uranium for use as nuclear fuel. A unique twist is that the U.S. industry is entirely government-owned and the difficulties facing it are in large part self-inflicted.

Ironically, the U.S. enrichment business is in better shape now than it has been for a decade, yet it is facing problems that could virtually shut it down unless some politically difficult steps are taken soon. In essence, thanks to drastic cost cutting in the past 2 years, U.S. enrichment plants now have the lowest cost production in the world, but U.S. prices are still higher than those of overseas competitors because the business is paying for past mistakes.

The most serious difficulty is that the Department of Energy (DOE), which owns and operates the U.S. enrichment enterprise, is paying more than $500 million a year to the Tennessee Valley Authority (TVA) for electricity it once thought it would need but no longer requires. Another is that billions of dollars were spent in the 1970s and early 1980s to build new capacity that is now not needed. As a result, the enrichment enterprise has accumulated a debt to the U.S. Treasury that the General Accounting Office (GAO) estimates at $8.8 billion. Some members of Congress are urging that this debt be paid off as rapidly as possible to help reduce the federal deficit.

For now, DOE is managing to stay competitive in part by selling low-cost enriched uranium from a stockpile that accumulated when demand for nuclear fuel slackened in the late 1970s. This year, about half DOE's total sales will come from the stockpile and next year the proportion will be two-thirds. However, the stockpile will be eliminated by the end of fiscal year 1988. "It seems to me that DOE is about to fall off a cliff," observed Senator Wendell Ford (D–KY), chairman of a key Senate energy subcommittee, at recent hearings.

Unless the TVA and federal debt payments can be reduced before the cheap stockpile is gone, DOE's prices will soar. DOE officials argue that U.S. utilities will then go to Europe, perhaps even the Soviet Union, and eventually Japan for cheaper enrichment. Moreover, there will be no money available to develop the next generation of enrichment technology—a laser process that offers such significant cost savings that it is likely to be the key to the long-term future of the U.S. business.

DOE officials are looking to Congress for some relief. They would like to see the program totally restructured by removing it from the annual appropriations process and turning it over to a quasi-public corporation. A proposal along these lines was put forward last month. "We are trying to force a decision in Congress on the future of the business," says John R. Longenecker, the head of DOE's enrichment program.

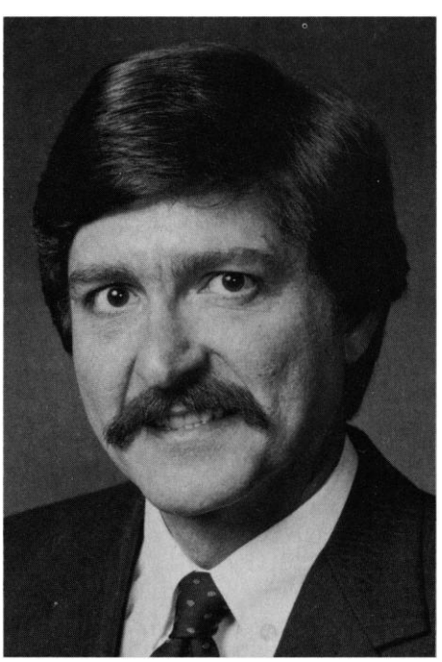
Before any restructuring takes place, the enrichment enterprise's looming problems must be dealt with. Perhaps the most difficult to solve is the TVA payment crunch. The problem stems from the late 1960s, when energy consumption in general and nuclear power in particular were expected to go on expanding at 6 or 7% a year. DOE anticipated that its three massive enrichment plants would be running flat out by the early 1980s to supply nuclear fuel to the nation's utilities, and it entered into long-term contracts with TVA for the electricity needed to operate them.

Because the amount of electricity involved was so large—4435 megawatts, enough to meet peak demand in a city the size of Washington—TVA said it would have to build up to five additional power plants. In order to offset some of the risk in making the huge investment required, TVA insisted on a clause in the contract that would require DOE to make so-called demand payments even if it did not take any electricity. The contract also required DOE to give 10 years' notice of cancellation. Similar clauses are inserted in contracts with all TVA's big industrial customers.

While the nuclear business was booming, nobody paid much heed to the risk the federal government was taking in signing such contracts. But when the bottom fell out of the business after the energy crisis of the early 1970s, those take-or-pay deals did not look so good. DOE was slow to react, however. It did not give TVA notice to terminate the contract until 1981, well after it had become obvious that the enrichment plants would require only a tiny fraction of the electricity DOE had contracted for. That means the contracts will not begin to expire until 1991.

As a result, the enrichment enterprise is now paying through the nose for electricity it is not using. The TVA demand charge for fiscal year 1987 is a staggering $510 million, and a similar amount is anticipated next year. "We are selling our assets [the stockpile] to pay TVA," says Longenecker, who adds that every utility is now paying $5 million per nuclear plant per year to TVA.

Nobody argues that DOE has a legal obligation to pay some demand charge. But DOE officials are incensed by the magnitude of the sum TVA is claiming. "It is a national disgrace," says Longenecker. The charge has shot up by 35% over the past 2 years, at a time when TVA's other industrial customers



John Longenecker. *"The only way we can be beaten is for the United States to choose not to compete."*

have seen their rates decline. DOE officials believe the enrichment enterprise is being gouged. The charge is higher than it should be by a factor of 2 or 3, claims Longenecker.

In response, Robert Steffy, manager of TVA's office of power, recently told Congress that because DOE did not serve its cancellation notice until 1981, the utility was already committed to constructing the capacity needed. If DOE gets out of paying the demand charge, TVA's customers would see their electricity bills rise by 12%, he said.

However, TVA now admits that it could not generate the electricity specified in the contract if DOE should need it. When electricity demand slackened, even before DOE gave notice of termination, TVA began to cut back its power plant construction. DOE officials therefore argue that if TVA cannot generate the power, it has not lived up to its end of the contract.

How this will be resolved is anybody's guess. DOE and TVA are negotiating, but so far TVA has said only that it will not raise the demand charge again. Last month, the utility notified DOE that about $2 billion must be paid before the contract expires. Congressional staff members say there is some sympathy on Capitol Hill for DOE's assertion that it is paying far too much, but legislators are reluctant to get into a fight that could cause a political backlash in the Tennessee Valley region. If all else fails, DOE officials are talking about going to court.

The enrichment program's other multibillion dollar problem, the accumulated debt, may be no easier to fix. Again, it stems from overoptimistic projections of demand for nuclear fuel in the 1970s and a belated reaction by DOE when the market changed.

Faced with projections in the early 1970s that demand for enrichment would outstrip capacity within a decade, DOE embarked on a $1.5-billion program to upgrade and expand its three gaseous diffusion plants. In 1977, it also began constructing a fourth plant which was expected to use the more efficient gas centrifuge process.

By the early 1980s, however, GAO and others were warning that this capacity would not be required, but it was not until early 1985 that DOE took drastic action. It scrapped the gas centrifuge plant after $2.5 billion had already been spent, and put one of its gaseous diffusion plants—the oldest one, located at Oak Ridge, Tennessee—in mothballs. This radical surgery has finally got DOE's production costs under control and enabled the department to reduce prices to stay within range of its competitors.

Those massive and, as it turned out, unneeded investments have created a debt problem, however—though there is substantial disagreement on its dimensions. According to GAO's calculations, when DOE began enriching uranium for utilities in the late 1960s, the three diffusion plants were valued at $1.5 billion, and the department was supposed to charge utilities enough for enrichment to pay off this sum. However, because the proceeds from the enrichment business were reinvested in construction, the debt accumulated. With interest, it has climbed to $8.8 billion, says GAO.

The utilities hotly dispute this figure, however. The Edison Electric Institute, for example, has argued that there was never any requirement to pay off the original investment in the diffusion plants, and the enrichment enterprise owes only the difference between annual appropriations and revenues over the years—about $350 million. The Administration, meanwhile, has taken a middle position, essentially accepting GAO's logic but arguing that the investment in constructing the gas centrifuge plant and upgrading the mothballed Oak Ridge plant be written off. That would put the accumulated debt at $3.5 billion to $4 billion.

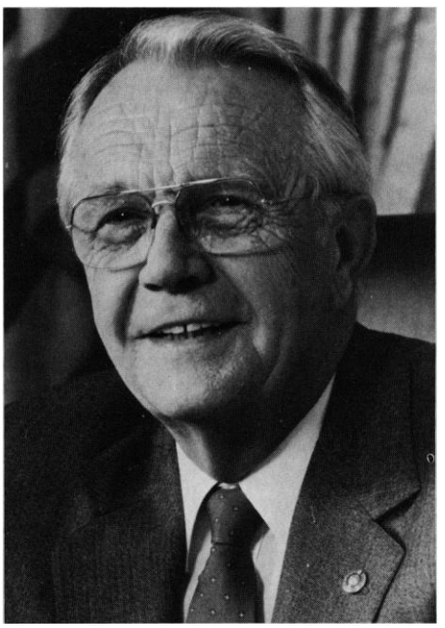
Last year, Congress stepped into the dispute. It essentially said it alone would decide the size of the accumulated debt. That may not be easy, however, for two contradictory approaches are already emerging on Capitol Hill.

The House version of the budget resolution would require the enrichment business to pay an additional $200 million to the Treasury in fiscal year 1988 as a step toward paying off the debt. The Administration had already proposed paying $213 million. Although the House Budget Committee took no formal stand on what the total debt should be, it has clearly not accepted the Edison Electric Institute's argument.

The committee noted that additional revenues could be gained if DOE raised its prices and, to prevent American utilities from buying overseas, it suggested that Congress pass legislation requiring domestic utilities to buy enrichment from DOE. Alternatively, the committee suggested imposing a fee on U.S. utilities that would be related to their past use of DOE's enrichment services.

The Senate seems likely to take a very different tack. A bill introduced by Senators Ford and Bennett Johnston (D–LA) would set the total debt at $364 million and require that it be paid back over 20 years. Ford and Johnston carry a lot of clout in these matters. Johnston chairs the Senate Energy Committee and the appropriations subcommittee that oversees DOE's budget, and Ford chairs the energy R&D subcommittee.

The Ford-Johnston bill would do more than solve the enrichment program's debt problem. It would also restructure the enterprise along the general lines advocated by DOE, by establishing a government enrichment corporation with ability to borrow up to $1 billion from the Federal Financing Bank at market rates. Additional profits would go back to the Treasury.



Senator Ford. *"It seems to me that DOE is about to fall off a cliff."*

DOE and the utilities have responded favorably to the bill, although the Administration would prefer a public rather than a government-owned corporation. Those backing the House Budget Committee's approach hate it, however. In a letter to key members of Congress last week, for example, the National Taxpayers' Union called the legislation an effort "to grant further enormous subsidies to DOE's civilian enrichment program."

The future of the U.S. enrichment enterprise will depend on the outcome of the debate that appears to be shaping up in Congress.

If the House approach prevails, payback to the Treasury would be increased in the short term but the enrichment program would be reduced to serving a mostly captive domestic market over the long term. The Department of Energy argues this would sharply reduce, if not shut off, foreign sales, which now account for about one-third of the U.S. business, or $400 million a year.

If the approach embodied in the Senate legislation prevails, the enrichment enterprise would be placed on a business footing and its long-term prospects would be greatly enhanced. Payback to the Treasury would depend on how profitable the business be-

comes, however, and there would be little chance of recouping the debt that GAO calculates has accumulated.

In the midst of this debate over the future of the enterprise, the development of the next generation of enrichment technology is being placed in jeopardy. Two years ago, when it cancelled the gas centrifuge plant, DOE decided to push ahead rapidly with the development of a laser process for enriching uranium that promises to cut enrichment costs in half. Known as atomic vapor laser isotope separation, or AVLIS, the process was viewed as the key to the long-term competitiveness of U.S. enrichment. The United States then had at least a 5- to 7-year lead in the technology.

A plan was drawn up to demonstrate the technology in the late 1980s, with the goal of operating a commercial plant around 1992. As the federal deficit mounted, however, funding for the AVLIS program was cut back and the timetable was stretched out. Now the Administration has proposed eliminating all direct funding for AVLIS in FY 1988, on the grounds that developing the technology should be the responsibility of the enrichment corporation.

The House Science, Space, and Technology Committee has approved a bill to provide $100 million for AVLIS next year, but this would reduce the payback to the Treasury, which would run counter to the House budget resolution. Congress is expected to provide enough to keep the program going but the timetable is likely to slip.

Nobody is now expecting Congress to provide the funds for an AVLIS production plant, however. "We cannot afford to spend scarce federal dollars on something that should be paid for by the utilities," says one key House staff member. In the meantime, Japan and France have both announced plans to develop AVLIS technology, and the U.S. lead is slipping.

The U.S. enrichment program has reached the point at which Congress will be forced to make some politically difficult decisions. The Department of Energy itself has managed to pull the business back from the brink with some severe and painful cost cutting, but only Congress can settle the dispute over the accumulated debt and the overall structure of the program.

"This is a profitable niche of the nuclear business internationally. The United States has a low-cost base and a lead in the technology. The only way we can be beaten is for the United States to choose not to compete," says Longenecker. The political and financial price of competing, which would involve writing off past mistakes, may be too high for Congress to pay, however. ■

COLIN NORMAN

Libraries Stunned by Journal Price Increases

U.S. subscribers have been hit hard by the decline of the dollar; research libraries also believe they are being exploited by journal publishers

RESEARCH libraries across the country face large cancellations of subscriptions to scientific journals next year because of leaping prices. Although there have been substantial increases in the prices of American journals over the 1980s, the real crisis has been precipitated by the decline of the dollar overseas.

The prices of United States journals rose close to 10% this year, according to Charles Hamaker of Louisiana State University (LSU), and overall prices have jumped by 14 to 18%. The result has been that research libraries have experienced big cost overruns this year. Harvard University, which has the nation's largest academic library with 106,000 periodicals, exceeded its budget this year by $480,000. Librarians around the country report that next year's subscription lists will have to be cut back by 5 to 15%. The University of California, Berkeley, with 92,000 serials, ran $300,000 over its $2.5-million budget and is cutting back its list by 8 to 12%. Book budgets are being eaten into in some cases to make up shortfalls.

"The crisis of library funding for serials is something that literally hit us in the fall of last year" with the drop in the dollar, says Hamaker, who has been devoting considerable time to analyzing the situation. This occurred after subscriptions had been ordered for the current academic year, so subscription-paring exercises will be going on all summer.

With European journal publishers becoming increasingly dominant in the international market, American consumers are being hard-hit. Hamaker says, for example, that three major foreign publishers—Elsevier of the Netherlands, Springer of West Germany, and Pergamon of England—account for 25% of the serials budget at LSU. Foreign journals account for 40% of the titles and 60% of the costs.

The price for *Brain Research*, Elsevier's "hottest" journal, says Hamaker, rose this year from $2871 to $3826. A press release from Stanford University reports that the prices of French journals have increased by 42%, Italian by 28%, and Japanese by 25%. One of the biggest offenders is Germany's Verlag Chemie, which, according to Jay Lucker of the Massachusetts Institute of Technology (MIT), increased its U.S. prices by 61.1% from 1985 to 1986. The publisher has explained that it has incurred higher costs, including problems from a printers' strike, but librarians generally do not find the explanations convincing.

Libraries are also complaining that subscription prices for American journals are rising at a considerably faster rate than the rate of inflation as measured by the Consumer Price Index. Richard Dougherty of the University of Michigan, which is cutting back its materials acquisitions by 10%, says there has been a 36% increase in the past year in the price of publications from the American Chemical Society (ACS). *Chemical Abstracts* went from $6400 to $8400 in 3 years. According to a December 1986 article in *Physics Today*, the price of physics journals increased 32% from 1985 to 1986. Sheila Dowd of Berkeley says a review of core journals—most of them domestic—in 15 disciplines showed a 2-year price increase averaging 31.9%.

Library officials are responding to the crunch by giving presentations to educate faculty members about the situation, and by instituting reviews to find out which journals can be dispensed with. Professional associations are also getting involved. The 26-member Research Libraries Group, for example, is conducting a detailed survey to ascertain which journals will be retained at which institutions over the next few years.

Librarians are having a uniform reaction to the situation: they do not see any way out of the bind in the short term other than substantial cancellations, and they are blaming publishers, particularly foreign ones, for profiteering by raising prices beyond what is necessitated by economics. They also say that some British and German publishers are engaging in "discriminatory" pricing by charging North Americans more than other international customers.

Publishers are charging what the market will bear, contends Gay Dannelly of Ohio State University. "What they're going to be seeing this coming year is how much the market can *not* bear." Other librarians echo