DOE Undermines Own Nonproliferation Effort

The department is trying to persuade other countries to move away from highly enriched uranium in research reactors but is planning a reactor of its own that will use the material

A decade-old U.S. government program to eliminate the use of highly enriched uranium (HEU) in research reactors could be undermined by an unlikely source: the U.S. Department of Energy (DOE), the program's original sponsor. DOE now plans to use HEU itself in a new research reactor at its Oak Ridge complex in Tennessee.

The Reduced Enrichment in Research and Test Reactors (RERTR) program is aimed at reducing the use of HEU at research reactors around the world, thereby reducing the risk that the material could be used for nuclear weapons. With funds from the RERTR program, researchers at Argonne National Laboratory have developed nuclear fuels with a higher density of uranium, but containing a much lower fraction of the isotope uranium-235. Uranium with a concentration—or enrichment—of more than 20% of this isotope is defined as HEU, and could theoretically be used in a nuclear explosive. "Weapons-grade" uranium contains more than 90% uranium-235.

DOE's decision to go ahead with a new reactor fueled with HEU, in apparent disregard for the RERTR program, led to open conflict during a conference in Grenoble, France, in late October. At the meeting, Argonne experts met with representatives from Europe's premier research reactor facilities and made the case for replacing HEU—most of which has been supplied by the United States—with the new fuels. At another session, however, researchers from Oak Ridge presented plans for their next top-of-the-line research reactor, called the Advanced Neutron Source (ANS)—and announced that it will use 93% enriched HEU as its fuel.

The Europeans were not amused. French officials told DOE representatives flatly that they would insist on using HEU in their best research reactors if the United States builds the new facility at Oak Ridge, according to one official present at the conference.

Argonne's scientists have succeeded in developing nuclear fuel with an enrichment level of 20% that could be used in almost all research reactors worldwide. A few large, very high performance reactors, however, such as the High-Flux Reactor at Grenoble, would still require higher levels of uranium enrichment—around 45%—unless fuel densities can be increased further. "When you get into high-performance reactors, it's just like high-performance automobiles—at what point can you use unleaded fuel or whatever," said one U.S. official.

For the designers of two new state-of-the-art reactors, however, any compromise on enrichment levels that would limit performance appears to be unacceptable. "If you want to build the very best reactor possible, you want to use the highest enrichment possible," said Colin West, director of the ANS project. Similarly, Klaus Boening of the Technical University in Munich, West Germany, who is developing a much smaller, but superefficient reactor that could be built in the 1990s, said that HEU fuel is necessary to achieve his technical goals.

Funding for a program to develop new fuels is also in jeopardy.

According to West, substituting 45% enriched uranium for HEU in the current design of the ANS would either drastically shorten the life of each fuel core—from 14 days to less than 4—or require doubling or tripling the reactor's power. Construction of the ANS, a 250- to 300-megawatt thermal reactor, could start as early as 1991, and start-up is set for 1996. It would be the most powerful neutron source in the world.

The Nuclear Regulatory Commission (NRC) has issued regulations that call for eliminating the use of HEU in research reactors, but they do not cover reactors operated by DOE. Exports of HEU for the West German reactor would, however, require NRC approval. "To some extent, it's a matter of competition," said Boening. "I also think that it is a matter of fairness."

Even before plans to build a reactor using HEU became public, DOE's lack of enthusiasm for the RERTR program had been evident. As a consequence, funding for the program currently hangs by a thread, despite bipartisan support in Congress.

The DOE almost killed the RERTR program in 1986, claiming that its technical goals had been accomplished. The Arms Control and Disarmament Agency (ACDA) then gave the orphan program a new bureaucratic home. Supporters of the program tried this year to put it back into DOE, but the House succeeded in eliminating the program entirely from the budget, and the Senate cut funding for RERTR in half, to $2.6 million. Senators John Glenn (D–OH) and William Proxmire (D–WI) are currently trying to add money for RERTR to the budget, perhaps by using Defense Department funds.

If funding were cut to $2.6 million, said one ACDA official, little could be done to develop fuels with the higher density required by top reactors. Work could continue, he said, on the conversion of the majority of smaller reactors—those that can replace HEU with currently available low-enriched fuel. To persuade operators of reactors in other countries to agree to abandon HEU, the United States sometimes threatens to cut off its exports of HEU to them. "It's not done just by talking," according to the ACDA official.

European reactor operators, noting DOE's plans for the new Oak Ridge reactor, have already begun to test the U.S. government's commitment to the goals of the RERTR program. On 19 November, a delegation from the European Community's research reactor at Petten, the Netherlands, told officials at the State Department that they would be unable to convert their reactor to non-HEU fuel in the foreseeable future, and asked for HEU.

The delegation, said Michael Rogers, special assistant to the director of the Petten Research Center, was "testing the waters, if you will, to see what the attitudes of the U.S. government currently are" on HEU fuel conversion. News of the DOE's plans to build the ANS reactor, he said, indicated a possible "significant shift in U.S. policy." If the reactor were built with HEU, he said, "that would indicate to me that the policy is not going to be as strictly enforced."

"On the part of the other countries, there's really no incentive to convert," said an ACDA official. "If they have a machine that's working nicely and they have to convert, the operators are only asking for additional problems. It's just a matter of commitment to the nonproliferation spirit." ■

DANIEL CHARLES

Daniel Charles is a free-lance writer based in Washington, D.C.