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Use of High-Enriched Uranium (HEU) in Research Reactors; Policy Statement

AGENCY: U.S. Nuclear Regulatory Commission.

ACTION: Statement of policy.

SUMMARY: The Nuclear Regulatory Commission (NRC) has licensing responsibility for domestic use and for export abroad of Special Nuclear Material, including High-Enriched Uranium (HEU), and is interested in reducing, to the maximum extent possible, the use of HEU in domestic and foreign research reactors. The NRC is pleased to note that the current U.S. Administration continues to support the Reduced Enrichment for Research and Test Reactors program and that to date the U.S. Congress has approved adequate funding for this program. In this connection, the NRC has prepared the following policy statement.

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SUPPLEMENTARY INFORMATION:

In the 1950's the U.S. entered into several short-term agreements for cooperation (5–10 years) allowing for the export of research reactors and fuel under the "Atoms for Peace" program. In subsequent years the U.S. has been a major supplier of high-enriched uranium (HEU) for use abroad, primarily in research and test reactors. Such reactors produce radioisotopes for use in such areas as medicine, agriculture, desalination, research in biological effects of radiation, etc. Materials test reactors are also used to train future operators of commercial power reactors and to test new materials and fuels.

In the mid 1970's, particularly following India's detonation of a nuclear explosive device in 1974, nuclear proliferation concerns began to increase. Expanded efforts were undertaken to prevent nuclear power programs from being exploited to produce nuclear weapons. Particular concerns were expressed with respect to the proliferation risks associated with inventories of HEU for research and test reactors abroad. The widespread use of HEU fuel, which involved a large number of domestic and international fuel shipments, increases the risks of proliferation through theft or diversion of this material. In contrast to HEU, the use of fuel with lower enrichments reduces proliferation risks.

In an effort to allay concerns of proliferation risks, efforts were made to reduce HEU inventories, on the assumption that any reduction in the potential for access to these inventories would constitute a reduction in the proliferation risk. These concerns eventually led to the establishment of the reduced enrichment for research and test reactors (RERTR) program. This program was established to develop and demonstrate the technology that will facilitate the use of reduced-enrichment uranium fuels in research and test reactors. If successful, this could lead to a significant reduction of HEU inventories abroad, and thereby increase the proliferation resistance of related fuel cycles.

The objective of the RERTR program is to develop research and test reactor fuels which will allow substitution of uranium of low enrichment (LEU, less than 20%) for HEU and which will not significantly affect reactor performance characteristics or fuel cycle costs. On an interim basis, some reactors may utilize intermediate enrichment fuels (45%), while the LEU fuel development program is in progress. It should be noted, however, that no U.S. effort will be made to develop fuels with enrichments significantly below 20%, because of the increasing magnitude of plutonium production in fuels with very low or no enrichment.

To date, DOE has initiated a development and test program managed by the Argonne National Laboratory (ANL) to prove the feasibility of the new lower enrichment fuels. Many foreign countries are cooperating with the U.S. in this effort, and, within the past year, NRC has issued several export licenses for reduced-enrichment uranium to be fabricated into test elements for foreign and domestic research reactors.

Assuming RERTR program success, most of the performance testing of LEU aluminide and oxide fuels with high uranium densities for use in plate-type reactors will be completed by the end of 1984. The irradiation of pin-type zirconium hydride fuel with high uranium density for use in Triga-type, and possibly plate-type, reactors will be completed in 1983. Assuming licensing approvals, these fuels could then enter into full scale use in appropriate reactors. Silicide fuels with very high uranium densities are also being developed and tested by the RERTR program. These fuels may be needed for conversion of high power reactors.

As part of the overall RERTR program, Argonne conducts for DOE a technical and economic evaluation of each significant HEU export license application including the potential of the reactor for conversion to reduced-enrichment fuel within the planned availabilities of appropriate reduced-enrichment fuels. Nearly all potential conversion candidates have been evaluated. Technical conversion schedules are being planned by reactor operators based on demonstration and licensability of the fuel. Based on the technical and economic evaluation by ANL, a coordinated Executive Branch recommendation on the license application is developed by the Department of State and is submitted to the NRC.

The objectives of the RERTR program have been fully supported by NRC since its inception. The Commission has also utilized Argonne's analyses in support of its reviews of proposed interim exports of HEU, particularly with respect to determining the dates when conversion to lower-enriched fuels can be anticipated. The Commission is pleased to note that the current Administration continues to support the RERTR program and that Congress has approved adequate funding for the program.

The Commission also notes that several types of LEU fuel are currently being tested in DOE's RERTR program. As soon as all the necessary tests are completed, the Commission is prepared to act expeditiously to review the use of the new fuel in domestic research and test reactors licensed by NRC.

With respect to future export license applications for HEU, bearing in mind the Commission's responsibility to make an overall finding that each export would not be inimical to the common defense and security of the U.S., the Commission intends to continue its current practice of careful scrutiny to verify that additional interim HEU exports are justified. The Commission plans to continue to monitor the progress of the RERTR program so that it can understand what would be appropriate conversion schedules, and to encourage that actions be taken to eliminate U.S.-supplied inventories of HEU to the maximum degree possible.

The Commission notes that U.S. research reactor operators have shown little interest in converting to lower enrichment fuel. As part of a policy to strongly encourage conversion by foreign operators, the Commission will take steps [1] to encourage similar action by U.S. research reactor operators.

Dated at Washington, D.C. this 17th day of August, 1982.

For the Commission.

Samuel J. Chilk,

Secretary of the Commission.

[1] Because the "steps" referred to in the above sentence have not been detailed or discussed, Commissioner Roberts does not agree to the sentence since it implies that a specific course of action will be followed by the NRC.