THE UNITED STATES SPENT FUEL ACCEPTANCE POLICY – A YEAR IN REVIEW

By David G. Huizenga
Acting Deputy Assistant Secretary for
Nuclear Material and Facility Stabilization
Office of Environmental Management
United States Department of Energy

The 20th International Meeting
on Reduced Enrichment for Research and Test Reactors (RERTR)
October 5 - 10, 1997
Jackson Hole, Wyoming, USA

Through the combined efforts of the United States and many other nations participating in the Reduced Enrichment for Research and Test Reactors (RERTR) program, much progress has been made toward reducing the amount of highly enriched uranium (HEU) in international commerce. A little more than a year ago, the U.S. Department of Energy adopted a new 1 0-year policy to accept research reactor spent nuclear fuel into the United States from other nations. The policy supports U.S. nuclear weapons nonproliferation objectives and demonstrates the continued commitment of the U.S. to the RERTR program. This paper is a review of the past year's activities and addresses the progress made since the policy was implemented.

At the time the policy was adopted in 1996, the United States determined that spent nuclear fuel and target material from 41 countries would be eligible for acceptance. The total amount of eligible materials was approximately 20 metric tons of heavy metal of spent fuel and target material containing about 5 metric tons of HEU. While the United States has received indications that several nations are going to pursue other initiatives for the disposition of their spent fuel and may not participate in the program at this time, the overall response to the new policy has been extremely positive. For example, Canada has chosen to focus efforts over the next three years on developing domestic management alternatives for the disposition of their spent fuel and as a result may not ship research reactor fuel to the United States under the acceptance policy. The United States applauds and encourages eligible countries to begin efforts such as those being undertaken by Canada. However, we would also caution that eligible countries

must formally enter into an agreement with the United States during the policy period (May 13, 1996 to May 12, 2006) if they are to participate in the acceptance program. The policy period will not be extended and early sign-up is recommended. While the acceptance policy expires on May 12, 2006, the acceptance program expires on May 12, 2009, to allow the shipment of spent fuel which is removed from the reactor by May 12, 2006. In other words, spent fuel generated through May, 2006 can be shipped through May 2009.

To date, research reactors in 14 countries have entered, or are in the final stages of negotiating, formal contractual agreements with DOE. These reactors are from countries which include Chile, Colombia, South Korea, Indonesia, Germany, Italy, Sweden, Canada, Switzerland, Japan, Greece, Denmark, Spain and Australia. Presently, contract discussions are underway with reactors in several other countries, including the Philippines, Brazil, Thailand, Slovenia, and Romania. We anticipate formal agreements with other eligible countries as well.

Last year, at this time, l reported that the first shipment of spent fuel under the United States' 10-year acceptance policy had recently been completed and that planning for the next several shipments was actively underway. We can now say that three more shipments of aluminum-based (MTR) spent fuel have been completed with plans well underway for a fifth MTR shipment and the first shipment of TRIGA (non-aluminum-based) research reactor spent fuel.

Four shipments of research reactor spent fuel have been successfully completed since the acceptance policy was implemented in May 1996. The first shipment, received in September 1996, consisted of 8 casks containing 280 aluminum-based spent fuel elements from research reactors in Germany, Sweden, Switzerland, Chile and Colombia. In December of 1996, we received a truck shipment of 41 spent fuel elements in one cask from Ontario, Canada. In April of this year, we received a European shipment from research reactors in Germany, Switzerland, Spain, and Italy consisting of 269 elements in 7 casks. The most recent shipment, 232 elements in 7 casks, was received in August from Japan, Sweden, Germany, and Spain. In total, approximately 0.25 metric tons of heavy metal spent nuclear fuel in 822 aluminum-based (MTR) spent fuel elements have been returned to the United States. The Department of Energy is proud of its successful efforts to implement the program and its demonstrated capability to accept research

reactor spent nuclear fuel from other nations. We are also appreciative of the outstanding cooperation from research reactor operators and government officials.

Overall, the United States anticipates receiving about one shipment every two to three months during the remaining twelve years of the program's duration (ending in May 2009). We are making every effort to consolidate shipments from neighboring countries when possible to minimize costs and the number of shipments in response to the concerns of program participants and affected communities in the United States. One of the issues that has been the subject of much interest is the definition of “failed” fuel and the U.S. Department of Energy requirements for canning. Prior to shipment, the Department has been actively studying questions regarding the transportation and storage of research reactor fuel that could be characterized as "damaged". Canning “damaged” spent fuel adds substantial costs to a shipment because of the actual canning process, new cask baskets, and the resulting reductions in the quantity of fuel that will fit in a cask. Based on past experience and an examination of the unique physical characteristics of metal alloy spent fuels, our preliminary conclusions are that research reactor fuel, particularly MTR-type fuel, with corrosion damage and through-clad pitting may be acceptable for shipment without canning. Cask certification and transportation regulations do not appear to prohibit the shipment of such damaged spent fuel. Eliminating the need to can corrosion-damaged spent fuel, while still ensuring the safety of the shipment Will be welcome news to many research reactor operators In thc very near future. We will he issuing a Failed Fuel Report which _will contain recommendations for canning criteria.

As shown by our successful acceptance record, the Department of Energy is working diligently to implement the program and provide relief to as many facilities as quickly as possible. The Department is collecting data on spent fuel inventories from a number of research reactors through existing documentation and site visits. Last weeks Department of Energy staff returned from site visits at research reactors in Germany. Romania, Slovenia and Italy. During these trips, officials met with reactor operators and regulatory authorities to discuss program participation and conducted facility assessments. In the next few months, teams will also be conducting site visits in Australia, Japan, Venezuela, Brazil, and Uruguay. During the site visits, Department officials explain the program, assess the facilities' capabilities to

support a fuel shipment, discuss logistics associated with shipping spent fuel, and answer questions from research reactor operators and appropriate government authorities.

Once research reactor spent fuel is accepted into the U.S., all aluminum-based MTR-type spent fuel is managed at the U.S. Department of Energy's Savannah River Site in the State of South Carolina, and all non-aluminum-based TRIGA spent fuel will be managed at the Idaho National Engineering Environmental Laboratory in the State of Idaho. Management activities are focused on: (I) safe interim storage; and (2) getting the spent fuel in "road ready" condition for eventual transport to and disposal in a geologic repository. The later activity is a challenge because of the HEU nature of the aluminum-based spent fuel which, in the United States, has not historically been destined for the geologic repository. Criticality, for example, has been a major concern for the highly enriched aluminum-based spent fuels. Our strategy to address this issue is to develop non-processing alternative technologies that will achieve disposal in a repository with minimal treatment. We are proceeding with the parallel development of two treatment technologies. The primary technology is the most technically simple approach -- direct disposal in “co-disposal” packages. In this approach, canisters of spent fuel are co-disposed with high-level waste canisters within the same repository disposal package. We have completed design efforts and prepared technical specifications for fabrication of a co-disposal canister to predict performance of aluminum-based fuel in a repository environment. We are studying the use of neutron absorbers such as boron stainless steel plates to control criticality. The backup technology is dilution -- or mixing the fuel with natural or depleted uranium. Castings of melted and diluted material have been poured for the initial material examination.

If these two technologies -- direct disposal and dilution -- do not prove to be technically achievable for aluminum-based spent fuel, we would consider processing small amounts of research reactor spent fuel received under the acceptance program and from our own research reactors. However processing of this material is not our preferred management approach. Moreover it any such processing is deemed necessary it would not involve the extraction of plutonium and any resulting HEU would be blended down to LEU in keeping with our nonproliferation objectives.

We are committed to cooperate with interested countries and the research reactor community in developing high density LEU fuels for research reactors and remain willing to assist in developing solutions for the management of spent fuel in your own countries after the United States acceptance period expires in 2009. Just as we have begun formulating and studying technical strategies for the storage, disposal, and management of spent nuclear fuel in the U.S., the results of which can be made available to you, we encourage other nations to do the same. A key lesson we have learned in implementing this program is that it is never too early to begin one's planning efforts.

In closing, the United States acceptance policy has enjoyed much success in the first year of implementation. We have demonstrated that shipments can be made safely and securely, even under difficult conditions. The vast level of support provided by many countries is evidenced by the level of participation to date and in the contractual agreements established between us. We continue to work on long-term solutions to the disposition of research reactor spent nuclear fuel and have made good strides in formulating the much needed technical strategies for storing and disposing of spent nuclear fuel. Through long standing commitments to peaceful uses of nuclear materials, and participation in the RERTR program, we are creating an environment where the benefits of nuclear technology can be fully enjoyed without fearing the potential proliferation of nuclear weapons.