

**BUILDING ON SUCCESS---
THE FOREIGN RESEARCH REACTOR SPENT NUCLEAR FUEL
ACCEPTANCE PROGRAM**

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**The 21st International Meeting
on Reduced Enrichment for Research and Test Reactors (RERTR)
October 18-23, 1998
São Paulo, Brazil**

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ABSTRACT

The second year of implementation of the research reactor spent nuclear fuel acceptance program was marked by significant challenges and achievements. In July 1998, the Department of Energy completed its first shipment of spent fuel from Asia via the Concord Naval Weapons Station in California to the Idaho National Engineering and Environmental Laboratory (INEEL). This shipment, which consisted of three casks of spent nuclear fuel from two research reactors in the Republic of Korea, presented significant technical, legal, and political challenges in the United States and abroad. Lessons learned will be used in the planning and execution of our next significant milestone, a shipment of TRIGA spent fuel from research reactors in Europe to INEEL, scheduled for the summer of 1999. This shipment will include transit across the United States for over 2,000 miles. Other challenges and advances include: clarification of the fee policy to address changes in the economic status of countries during the life of the program; resolution of issues associated with cask certification and the specific types and conditions of spent fuel proposed for transport; revisions to standard contract language in order to more clearly address unique shipping situations; and prioritization and scheduling of shipments to most effectively implement the program. As of this meeting, eight shipments, consisting of nearly 2,000 spent fuel assemblies from fifteen countries, have been successfully completed. With the continued cooperation of the international research reactor community, we are committed to building on this success in the remaining years of the program.

PAPER

The second year of implementation of the research reactor spent nuclear fuel acceptance program was marked by significant challenges and achievements. The program continues to make progress toward reducing the amount of highly enriched uranium (HEU) in international commerce. As of this meeting, eight shipments consisting of nearly 2,000 spent fuel assemblies from fifteen countries have been successfully completed. Contained in these assemblies were more than 340 kilograms of weapons useable uranium.

This paper describes the recent challenges and advances in the program, and discusses the Department of Energy's efforts to build on the success of the United States foreign research reactor spent fuel acceptance program.

One of the biggest achievements this year took place in July 1998, when the Department of Energy successfully completed the first west coast shipment of Training, Research, Isotope, General Atomics (TRIGA) spent nuclear fuel from two storage facilities in the Republic of Korea (South Korea). The shipment of 299 spent fuel rods arrived safely at the Idaho National Engineering and Environmental Laboratory (INEEL) in Idaho on July 23, 1998. This shipment presented significant legal, political, and technical challenges both in the United States and abroad. First, the Department of Energy overcame a legal challenge brought by local jurisdictions in the State of California who challenged the selection of the Concord Naval Weapons Station as the west coast port-of-entry for the receipt of foreign spent nuclear fuel. The U.S. District Court ruled in the Department's favor on March 18, 1998, confirming that the Department's selection of the Concord Naval Weapons Station was in compliance with all applicable requirements and regulations.

On the political front, the Department of Energy encountered challenges both domestically and internationally. Considerable political unrest in Indonesia during the time of shipment operations resulted in a U.S. decision not to include spent fuel from reactors in Bandung and Yogyakarta, Indonesia in this first shipment. We are currently evaluating options for transporting the TRIGA fuel from Indonesia as part of a future shipment.

In the United States, concerns were raised by State and local elected officials as well as members of the public regarding the safe transport of spent fuel shipments through local communities both at the port of entry (i.e., the San Francisco Bay Area) and along the transportation route. The Department worked closely with other federal agencies and Tribal, State, and local governments to address these concerns and to prepare for the rail transport of the spent fuel from Concord to southeastern Idaho. Plans for the shipment were developed with the assistance of the U.S. Nuclear Regulatory Commission, the U.S. Coast Guard, the Federal Railroad Administration, the U.S. Navy, and the Federal Bureau of Investigation. State agencies in California, Nevada, Utah, and Idaho, as well as Tribal government professionals, lent their expertise to the planning process. As part of the pre-shipment preparations, the Department of Energy provided radiation monitoring equipment to emergency responders along the route, trained over 3,000 emergency

personnel to ensure they were prepared to respond in the unlikely event of a radiological incident, and completed thorough inspections of the rail, locomotives, railcars and shipping containers used for the shipment.

In addition to political and logistical challenges presented by the first west coast shipment, the Department has encountered several technical and regulatory issues that require the coordination and cooperation of cask owners and research reactor operators. One of the technical challenges includes the completion of cask certifications. Last year, we reported that cask certification and transportation regulations did not appear to prohibit the shipment of damaged spent fuel. However, in preparation for the shipment from South Korea, issues associated with the poor condition of some of the fuel resulted in a need for hermetically sealed cans in order to ensure compliance with the cask certification requirements. Similarly, several other countries have identified fuel with severe corrosion leading to exposed fuel meat. This issue has raised questions from the U.S. Nuclear Regulatory Commission regarding whether or not the safety analysis documentation (specifically the containment analysis) for the transportation casks considered the dispersal of the resulting oxide that would form on these areas of corrosion. This issue has already resulted in delays to several shipments. Failure to adequately address this issue (e.g., by amending the safety analysis for various casks) will likely constrain transport of fuel elements to those with nothing more than hairline cracks or pin hole leaks. To solve this problem, the Department is working closely with the U.S. Nuclear Regulatory Commission to develop a methodology [1] for consideration of this condition in safety analyses for transportation casks. Once this methodology is finalized, it can be used by cask vendors and regulatory authorities to determine how much fuel in this damaged condition can be transported in a particular cask. We expect this methodology to be completed in the very near future. Representatives from the Savannah River Site will present this issue in more detail later in the conference and plan to hold meetings with cask vendors and foreign regulatory authorities late this calendar year to review the final report. The prompt incorporation of the results of this effort into safety analysis documentation will enable us to move forward in addressing this issue and will allow us to safely ship damaged fuel on current program schedules. Given our expectation that this issue will be resolved quickly, we anticipate rescheduling for next year those shipments that were delayed for this reason.

To avoid future cask certification issues, we encourage reactor operators to identify to Department of Energy officials early in their planning processes any fuel conditions that may need to be addressed in a cask certification. Cask certification for transporting damaged fuel may require the design and manufacture of new cans, sealed containers, new baskets and more detailed technical reviews as part of the U.S. Competent Authority Certification process. This process takes time and is critical to a successful shipment. The U.S. Nuclear Regulatory Commission is committed to working with us and to supporting this program, but we must work with reactor operators and shippers to build in adequate time for the U.S. Nuclear Regulatory Commission to complete their technical reviews and evaluations.

All of the lessons learned from the first eight successful shipments under this program will be used in planning and executing our next significant program milestone. Specifically, the United States

will receive TRIGA spent fuel from research reactors in Europe through the Charleston Naval Weapons Station and then transport the fuel overland in the United States for approximately 2,400 miles to INEEL. This first cross-country shipment is being planned for the summer of 1999 and may consist of up to eight casks of spent fuel from research reactors in Germany, Italy, Slovenia, and Romania. A contract between the Department of Energy and the Medical University at Hannover, Germany is already in place. We look forward to completing contracts and agreements with Italy, Slovenia and Romania soon. We have begun preparation for this shipment and will be participating in a planning effort with States throughout the Southern, Midwestern, and Western United States over the next several months.

In addition to planning and executing shipments of spent fuel under the acceptance program over the past year, the Department of Energy also clarified its implementation of the policy in several important areas and has addressed a number of implementation questions from reactor operators. One such example involves our upcoming clarification to the fee policy. The Department of Energy published its fee policy for the acceptance of foreign research reactor spent nuclear fuel on May 28, 1996 [2]. For purposes of determining a fee schedule for participating in the program, the Department of Energy, in consultation with the Department of State, divided countries eligible for participation into two categories: "high-income-economy countries" and "other-than-high-income-economy countries," based on the World Bank's annual World Development Report. Since the initial publication of the fee policy, certain countries have undergone a change in their economic status, and others may change during the course of the program. The fee policy announced in 1996 did not address how, during the course of the acceptance program, a change in the economic status of a country with a participating research reactor operator would affect the fee charged for participation in the program. We have prepared a clarification of the fee schedules relative to a country's status both prior to the time the contract between the research reactor operator and the Department is signed and during the term of a contract already in place. If, during the term of the contract, a change in a country's economic status is reported in the World Bank Development Report, the change in status will affect the fee for shipments conducted in the fiscal year (starting October 1) after the change is published. Thus, for example, if the World Bank Development Report, which is published each year in October, reports a change in a country's economic status, the fee will be adjusted for any shipments arriving at the United States port of entry in the following fiscal year and beyond. In this way, reactor operators will have adequate time (approximately one year) to make any necessary financial arrangements in the event a country goes from an "other-than-high-income economy" to a "high-income economy." We plan to publish this clarification of the fee policy in the Federal Register in the very near future.

Another question addressed within the past year regards the types of fuel eligible for acceptance under the policy. It should be noted that the *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (DOE/EIS-0218, February 1996) (FEIS)* clearly defines the types of fuel eligible for shipment: TRIGA and aluminum-clad (highly enriched and low enriched) fuels and target material containing U.S.-origin enriched uranium. The FEIS also specifically excludes fuel elements containing U.S.-origin enriched uranium from reactors such as fast reactors, thermal research reactors, thermal homogeneous liquid and solid fueled reactors, and other special

purpose reactors (i.e., fuels that were not eligible for return to the United States under the “Offsite Fuels Policy” in effect until 1988). We have been and will continue to be consistent in implementing this policy as described in the FEIS.

Given the clear definition of fuel eligible for shipment under the policy, the Department has addressed several questions during the past year regarding exact numbers of elements to be shipped from specific reactors. Since publishing the FEIS in February 1996 and in the course of implementing the policy, the Department has received more detailed information regarding exact locations and quantities of eligible spent fuel elements from several research reactors. For example, material eligible for acceptance under the policy has been identified in countries listed in the FEIS, but at eligible research reactors not specifically mentioned in the FEIS. Additionally, as we gather more detailed information at each reactor on the exact numbers of elements from a given reactor that are available for shipment, the estimates included in the FEIS are being refined. This past year, the Department completed an analysis to confirm that refinement of these estimates is within the potential impacts analyzed in the FEIS as long as the total number of elements shipped to the United States does not exceed the total number estimated in the FEIS. As a result, we are working with reactor operators to ensure that all of their eligible spent fuel is considered in shipment planning.

In addition to more refined information on spent fuel inventories, the Department of Energy has obtained updated information on the inventory of spent fuel casks available to support the program. When the FEIS was prepared, eight casks on a vessel was assumed to be the maximum number of casks that would be available for any one shipment. This assumption was then incorporated into the assessment of potential environmental impacts. The worldwide supply of spent fuel casks has now increased to the point where more than eight casks could be available on a single shipment. The Department has confirmed that increasing the number of casks per vessel from eight per ship up to sixteen per ship is within the bounds of the analysis presented in the FEIS and within all regulatory requirements. An amendment to the Record of Decision will be published in the near future to address the shipment of up to sixteen casks on a ship. This revision will enable both the Department and the reactor operators to be more efficient in their shipment planning and will help reduce cost of transporting spent fuel to the United States.

While we are here together I would like to take the opportunity to address other questions posed by the research reactor community concerning the Foreign Research Reactor Spent Nuclear Fuel Program over the past year. Several reactor operators who have fuel eligible for acceptance have requested that the Department give “credit” for the value of the uranium in unirradiated fuel being shipped back to the United States. As is clearly stated in the FEIS and the Record of Decision [3], the Department treats unirradiated fuel as spent fuel for purposes of the acceptance program and does not put a value on this material. The Department of Energy is not accepting spent fuel from foreign research reactors for the purpose of recovering uranium, but is instead accepting the fuel as an important nonproliferation initiative to reduce the use of highly enriched uranium worldwide. From the reactor community’s viewpoint, we continue to strongly believe that this program offers significant economic advantages over the other management and disposition options available to reactor operators. The United States has demonstrated its commitment to the

program by subsidizing shipments from “other-than-high-income-economy” countries and by charging fees that are less than full cost recovery to “high-income-economy” countries (i.e., the United States is not recovering enough fee to cover the life cycle cost of fuel management). While implementation of the policy will cost U.S. taxpayers money, it is a cost that we believe fairly balances nuclear nonproliferation goals with fairness to taxpayers.

Finally, I want to emphasize that the program will end on May 12, 2009. A great deal of spent fuel eligible for shipment to the United States still remains in reactor facilities and is not yet scheduled for shipment to the United States. We continue to encourage all reactor operators who are eligible to decide as soon as possible on their participation in the program. We look forward to learning the results of PETTEN’s ongoing study on the conversion of their reactor and hope to work with them on a shipment in the near future should they decide to convert to low enriched uranium fuel. Additionally, we anticipate working more closely with several other countries which will make their first shipments under the policy during the next year.

It has become very clear over the past two years that each country and each reactor presents unique challenges. We hope to continue to bring other eligible countries into the program and are interested in discussing any and all aspects of the program with you. It has been another exciting and challenging year. We remain fully committed to the successful implementation of the Foreign Research Reactor Spent Nuclear Fuel Program. The new Secretary of Energy, Bill Richardson, has given his full support to this important nonproliferation initiative. We look forward to another successful year and the opportunity to work with you in continuing to make this program a success.

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