

The United States Foreign Research Reactor (FRR) Spent Nuclear Fuel (SNF) Acceptance Program: 2007 Update

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ABSTRACT

The United States (U.S.) Department of Energy (DOE), in consultation with the Department of State, adopted the *Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel* in May 1996. The policy will expire May 12, 2019, providing Foreign Research Reactors (FRRs) an opportunity to return fuel to the U. S. This paper provides a brief update on the program, now under the National Nuclear Security Administration (NNSA) and discusses program initiatives and future activities. The goal of the program continues to be recovery of nuclear materials, which could otherwise be used in weapons, while assisting other countries to enjoy the benefits of nuclear technology. NNSA is seeking feedback from research reactor (RR) operators to help us understand ways to include eligible RRs who have not yet participated in the program.

1. Introduction

This paper presents the Foreign Research Reactor (FRR) Spent Nuclear Fuel (SNF) Acceptance Program, (the Acceptance Program). After an initial discussion of program history, contract extension and compliance are discussed. Planning issues are then set out to incorporate lessons learned from recent shipments in order to help FRRs understand issues which may assist in achieving their objective of proper disposition of SNF. The final discussion topic is DOE efforts to advance the goals of the Acceptance Program, with a conclusion that the Acceptance Program wants to work with FRRs to plan for shipment of their eligible spent fuel as early as possible.

2. Acceptance Program Metrics

The Acceptance Program, now in the twelfth year of implementation, has completed 39 shipments to date, safely and successfully, and another is expected to be completed soon. Twenty-seven countries have participated so far, returning a total of 7992 spent nuclear fuel elements to the United States for management at Department of Energy (DOE) sites in South Carolina and Idaho, pending final disposition in a geologic repository. Thirty one (31) of the 39 shipments contained aluminum-based spent nuclear fuel from research reactors and were placed into storage at the Savannah River Site (SRS) in South Carolina. One shipment was forwarded on to the Y-12 National Security Complex, since the fuel was only slightly irradiated and eligible for receipt at that facility. The remaining seven (7) shipments were placed into storage at the Idaho National Laboratory (INL). During the next calendar year (January - December 2008), the program is planning to receive as many as five shipments of SNF from various locations.

3. Contractual Requirements

3.1 Contract Extensions

Some research reactors which have already converted to LEU fuel may need a contract extension to authorize shipments wanted after May, 2009. DOE intends to modify these contracts with priority given to those who are scheduled to ship in the near future. Reactor Operators in this situation are strongly encouraged to coordinate with the Acceptance Program office to negotiate the extension of the FRR-DOE contract to authorize continued Acceptance Program participation. It would be very helpful at this time to present a proposed schedule of shipments to assist planning, both for receipt activities and for contract preparation.

3.2 Contract Implementation

DOE enters into a contract with each of the customers who return SNF to the United States. It is very important that the contracting parties clearly understand all of the provisions in the contract. Contract requirements are usually described in detail prior to the first shipment. As time passes and personnel change, some understanding may be lost. Further questions or discussion on contract requirements can always be addressed to the Acceptance Program office. Compliance with all contract requirements must be maintained. One very important article in the contracts which has recently been misunderstood covers public disclosure of any shipping plans or shipment information, or the individual details comprising such plans or information. Any such disclosure must comply with limitations required by U. S. government regulations. This means that information concerning dates and/or schedules and specific information about the contents of the shipment must be safeguarded and cannot be published or otherwise released until the shipment has arrived at the material's final destination, and during pre-arrival coordination, safeguarded information must only be revealed to those who have a legitimate need to know in order to support shipment activities. Information on security measures to protect shipments should not be published. Compliance with this article is an important obligation to support security for any shipment activity. During a recent shipment, a press release was made after the ship reached international waters on the way to the United States. DOE believes this is an unwarranted violation of the contract which made the security of the shipment more vulnerable. This premature release of information also violated the United States Nuclear Regulatory Commission regulations under which shipments are authorized. Further, The Convention on the Physical Protection of Nuclear Material entered into by states which support the Acceptance Program requires that each state protect the confidentiality of this information. Our ability to continue this program depends on our customers following the agreed process to protect all parties engaged in these shipments.

4. Focus on Advance Planning

The FRR SNF Acceptance Program focuses on the planning and implementation of these shipments of research reactor spent fuel to the United States in support of worldwide nuclear nonproliferation efforts, while assisting other countries to enjoy the benefits of nuclear technology. Along with shipment logistics, the DOE Office of Global Threat Reduction (GTR) continues to address many other issues of importance to the program.

4.1 Shipment Scheduling

The most critical barrier to smooth operation associated with the program remains early scheduling and coordination of planned shipments. It is always important that NNSA clearly understands each Reactor Operator's intentions so that our planning can be well integrated and operational support provided to

meet the Reactor Operator's needs. It is also important that each Reactor Operator submit the required fuel data as early as possible in order to allow the receiving site adequate time to perform necessary reviews and prepare for receipt and storage. Early availability of fuel data is also important for use in verifying transport package license requirements or submitting for a license amendment when required. When transport package license amendments are required, this activity can quickly become critical path to initiating a shipment. Budget limitations could also challenge implementation of shipping plans while NNSA and the Department of Energy receiving facilities also face increasing challenges in preparing to receive material, particularly when shipping plans are not well known. The GTR Acceptance Program staff will be happy to answer questions about scheduling or clarify what type of information is needed to facilitate receipt of fuel.

As requested by many FRRs the program was extended to allow additional time for further development of LEU fuels and planning for back end solutions in the fuel cycle. The change was made to benefit the FRRs that needed justifiable relief. As an undesired effect of extending the program, some FRRs are now taking advantage of these benefits by extending their shipping schedules to defer costs. These delays are hurting DOE's ability to continue normal planning and to maintain adequate resources for the receipt facility. The FRRs are strongly encouraged to continue shipping as early as possible and maintain original schedules and plans as closely as possible. Deferring shipments when spent fuel is available for shipping could result in program and cost changes designed to improve shipping decisions. Additionally, deferring shipments may also result in a logjam at the program end. The United States does not guarantee that all who wish to ship late in the program can be accommodated. This will depend on numerous factors, including resources available to receive the material and cask availability. DOE is further evaluating actions to assist in stabilizing shipment schedules.

4.2 End –User Assurances

Some countries require the issuance of an End-Use or Dual-Use Undertaking in order to obtain an export license. In the past, DOE provided that document to the reactor operator when requested. DOE no longer provides that document because assurances are already provided through the Agreements for Cooperation between each country and the United States when one exists or through other avenues. The U.S. Department of State can validate those assurances to the participating country as necessary. We recommend that these requirements be identified and resolved by the reactor operators as early as possible to ensure this political process is completed without shipment delays.

4.3 Insurance Issues

Nuclear liability insurance associated with the ocean transport has the potential to adversely affect reactor operators in high-income economy countries who participate in joint shipments on a single ocean-going vessel. Different insurance pools may require overlapping insurance coverage and also may have different requirements for minimum coverage. NNSA is evaluating actions to mitigate this issue and to resolve this issue positively prior to the next shipment that may benefit from this assistance. However, without a change to DOE policy, it is important for reactor operators to plan early for the required coverage and how to provide coverage in the least expensive manner. Consideration should be given for reactor operators entering into a joint shipment to coordinate in obtaining their nuclear liability insurance with the same pool or under a joint contract, where possible, in order to mitigate overlapping insurance costs. It is also important to be conscious of this potential problem and budget for any added cost that cannot be mitigated.

4.4 Cask License Review

Because there are limited resources for review of cask licenses, our customers must provide adequate time in the preparation process for early application, review and approval of cask licenses. As discussed above, the late identification of the need to revise a cask license may quickly cause obtaining a license amendment to become critical path or cause a delay in the shipping schedule. The Acceptance Program enjoys a very good working relationship with Nuclear Regulatory Commission (NRC) staff and wishes to take every measure possible to respect this relationship by ensuring that cask applications are timely and complete. DOE has been meeting periodically with NRC to discuss planned shipments and forecasted support required to meet the needs of the Acceptance Program and our customers.

5. Efforts to Improve and Accelerate

The Acceptance Program also enjoys a good working relationship with most participating FRRs working together scheduling shipments to optimize shipment efficiency over the remaining years of the program. DOE will assist in any way possible within the acceptance program polices and requirements to improve or accelerate eligible fuel return. Countries or FRRs interested in participating in the Acceptance Program should express their interest as soon as possible so that fuel and facility assessments can be scheduled and shipments may be entered in DOE's long-term shipment forecast. New and current Acceptance Program participants should also coordinate with DOE approximately 18 - 24 months in advance to ensure DOE can meet the Reactor Operator's plans and needs. Accelerated schedules may be possible if there are no significant issues over past shipments. However, decreasing resources in many areas including DOE's receiving sites and coordination requirements with other agencies such as the Nuclear Regulatory Commission and Department of Transportation have the potential to limit DOE's capability to support these accelerated schedules. Specifically, the Acceptance Program may not be able to accommodate a large number of requests at the end of the program, particularly from geographically isolated regions.

5.1 Material Disposition

The DOE Environmental Management (DOE-EM) organization that used to manage the FRR SNF Acceptance Program is making strides to further disposition the repatriated spent nuclear fuel. The DOE-EM organization is considering continuing with the DOE Programmatic Spent Nuclear Fuel Environmental Impact Statement [1] and associated Record of Decision [2]. This decision included transporting fuel to place all aluminum clad spent fuel at the SRS and stainless steel fuel such as TRIGA fuel at INL. This allows for a potential decision to further treat the aluminum clad fuel in the H-Canyon facilities at SRS for disposition as waste in the same fashion as other high level waste material within the DOE complex. Any decision to further treat the material would be subject to further evaluation under the National Environmental Policy Act. This activity will require coordination with FRR shipments as the additional fuel is moved to SRS, adding to the need for early identification and adherence to shipment schedules.

5.2 Potential Fee Changes

NNSA continues to evaluate ways to accelerate repatriation activities. Therefore, fees may change in the future and/or other changes may be implemented, if DOE believes the changes will positively influence program goals. DOE is also continuing to try to keep the reactor operator's cost to participate in the Acceptance Program low as possible. Any suggestions of methods to accelerate repatriation of SNF, especially Highly Enriched Uranium (HEU), would be welcomed and given all due consideration.

5.3 Coordination with Other Programs

A primary goal of the Acceptance Program is to support worldwide nonproliferation efforts by disposition of HEU which contains uranium enriched in the United States. Integral to this process is the U.S. assistance offered in helping reactor operators convert their cores to low enriched uranium (LEU) as the reduced enrichment fuels become qualified and available. In addition, DOE plays a strategic role in ensuring a supply of enriched uranium for fuel fabrication. In the Acceptance Program, the primary goal is intertwined with the missions of the Reduced Enrichment for Research and Test Reactors (RERTR) Program and the Enriched Uranium Operations group from DOE's Y-12 National Nuclear Security Complex in Oak Ridge, Tennessee. DOE Acceptance Program staff remain committed to working with staff in these other program offices within DOE and to do whatever is possible to assist in smooth transitions of core enrichment level and a steady supply of fuel.

5.4 IAEA Technical Conference

The Acceptance Program participated in the August 2006 IAEA Technical Meeting on "National Experiences on Return of RRSNF to the Country of Origin" Numerous presentations which highlight participation in the Acceptance Program will soon be available on the IAEA website at <http://www-pub.iaea.org/mtcd/publications/tecdocs.asp> for those who may be interested. These presentations provide information on all aspects of the process of returning SNF to the country of origin which may be useful to any facility considering options for dispositioning SNF, including participation in the Acceptance Program.

6. Conclusion

The United States remains committed to supporting worldwide nonproliferation goals while assisting other countries to enjoy the benefits of nuclear technology such as those for which this program was designed. The programmatic goal is to accept eligible fuel sooner rather than later. Reactor operators are strongly encouraged to work closely with technical points-of-contact in order to ensure shipping schedules are accurate and achievable. The GTR staff hopes to work with all remaining eligible research reactors to plan for shipments of their eligible spent fuel as early as possible. NNSA continues to support research reactor operators' needs and would be happy to meet any interested parties to discuss the program.

7. References

[1] Final Environmental Impact Statement for Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs DOE/EIS-0203-F (60 FR 20979, April 28, 1995)

[2] Record of Decision on the Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (60 FR 28680, June 1, 1995)