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Supplement Analysis on the Transfer and Return of Low-Enriched Uranium Fuel Elements from the Idaho National Laboratory to the Research Reactor in Vienna, Austria

May 2012

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Idaho Operations Office

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List of References

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Introduction

The Department of Energy (DOE) has prepared this Supplement Analysis (SA) in accordance with Council on Environmental Quality (CEQ) and DOE implementing regulations under the National Environmental Policy Act [40 CFR § 1502.9 (c) and 10 CFR § 1021.314]. Section 1502.9(c) of the CEQ regulation requires agencies to prepare supplements to either draft or final EISs if: "(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns" or "(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."

In cases where it is unclear whether changes in a proposed action, new circumstances or new information relevant to environmental concerns warrant a supplemental or new draft or final EIS, DOE regulations at 10 CFR 1021.314 require the preparation of an SA to determine whether a change in a proposed action is "substantial" and relevant to environmental concerns or whether new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts are "significant," pursuant to 40 CFR 1502.9(c).

This SA has been prepared to evaluate whether a proposed action to exchange, with the Republic of Austria, highly-enriched uranium (HEU) and some low-enriched (LEU) nuclear fuel for LEU fuel currently stored at the Idaho National Laboratory and to take back the LEU fuel sometime around 2025, warrants supplemental review of the Environmental Impacts Statements (EIS) identified in the following section.

Prior NEPA Review

The DOE has analyzed the environmental impacts of the safe long-term management of its spent nuclear fuel (SNF). In 1995, DOE issued the Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (SNF EIS) (DOE 1995) that described the analysis of five alternatives for the safe management of DOE-owned SNF over a 40-year period. DOE issued the associated Record of Decision (ROD) in June 1995 and selected regionalization of fuel by type (Alternative 4a). As part of that ROD, DOE decided to transport up to 1,940 casks of non-aluminum clad SNF from various generators or storage locations, including 170 of Training, Research, Isotopes, General Atomics (TRIGA) SNF shipments from foreign research reactors to the Idaho National Laboratory (INL) Site in Idaho. For analysis purposes, DOE considered each SNF shipment to consist of one shipping container or cask. On October 16, 1995, DOE entered into a Settlement Agreement with the state of Idaho regarding specific SNF shipments to Idaho, and subsequently, issued an amended ROD in February 1996 that decided upon fewer SNF shipments to Idaho. The amended ROD reduced the total number of SNF shipments to Idaho from 1,940 to 1,133 and reduced the number of foreign research reactor shipments to Idaho from 170 to 162.

In February 1996, DOE issued the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (FRR EIS) (DOE 1996) focusing on the need to receive LEU (uranium with less than 20 percent of the uranium-235 isotope) and HEU (uranium with more than 20 percent of the uranium-235 isotope) nuclear fuel from various foreign research reactors. Included in the scope of that final EIS was the analysis of the receipt of 162 shipments of non-aluminum clad SNF from various foreign research reactors (Volume 1, Table 2-2). The analysis in that document included the environmental impacts from ground transportation, port of entry operations, and the marine transport from the foreign reactors to the United States receiving port of entry. On May 17, 1996, DOE issued the ROD associated with that EIS and decided to implement the preferred alternative, which was a combination of the implementation elements of Management Alternative 1. As part of the overall decision related to the management of foreign research reactor SNF, DOE decided to accept 162 shipments of non-aluminum SNF from foreign research reactors, including the Vienna TRIGA Research Reactor in Austria (Vienna Reactor). DOE also decided to use the Charleston Naval Weapons Station in South Carolina, now under Management of the US Air Force and named Joint Base Command-Weapons Station, to receive SNF from foreign research reactors.

Proposed Action

In September 2011, DOE and the Republic of Austria entered into a Memorandum of Understanding (MOU), memorializing their intent to coordinate conversion of the Vienna Reactor from HEU fuel to LEU fuel. Under the terms of the MOU, Austria agreed to remove HEU and LEU fuel elements before December 2013, and ship these materials to the United States. DOE agreed to provide usable LEU TRIGA fuel to the Vienna Reactor, which would ultimately be returned to the United States sometime before 2025. In view of the unique role the Vienna Reactor plays in supporting the critical mission of the International Atomic Energy Act (commonly referred to as the IAEA), DOE is now proposing that, in addition to accepting some SNF currently at the Austrian reactor in accordance with the FRR EIS ROD, DOE would ship up to 88 previously irradiated but usable LEU TRIGA research reactor fuel elements currently in storage at the INL Site to the Vienna reactor for use until it (and up to 14 additional unirradiated and slightly irradiated fuel elements currently at the Austrian reactor that would be used simultaneously) is returned to the INL Site sometime around 2025 for further storage and for ultimate disposal out of Idaho. This would entail completing two additional shipments of SNF, one shipment from the INL Site to Vienna, Austria and one shipment from Vienna, Austria to the INL Site in Idaho.

The previously irradiated but usable fuel elements currently in storage at the INL Site were received from other foreign research reactors in accordance with the 1995 Settlement Agreement with the state of Idaho as well as the SNF EIS and its associated amended ROD. The 14 additional unirradiated and slightly irradiated fuel elements currently at the Austrian reactor are US-origin fuel previously provided to the Austrians by the DOE. DOE is not proposing any changes to its overall management of its SNF.

The proposal would not increase the quantities of SNF indentified in the SNF EIS and amended ROD or the FRR EIS and associated ROD. Effectively, the proposal simply allows the reuse of slightly used nuclear fuel (for a period of time) that would otherwise remain in storage at the INL Site awaiting final disposition. The DOE would use the Charleston, South Carolina port of entry if the port was available after 2019 for the proposed fuel shipments, but may use any eastern seaboard port of entry for a shipment occurring after 2019.

Analysis and Discussion

DOE evaluated the SNF EIS and FRR EIS to determine if DOE's proposed action represented substantial changes in either the FRR EIS or the SNF EIS that are relevant to environmental concerns, and whether there are new circumstances or information relevant to environmental concerns that bear on the proposed action.

DOE considered the range of resource areas that could be impacted by the proposal based on Chapter 5 of the SNF EIS. DOE eliminated all resource areas from further consideration in this SA except socioeconomic impacts, electric use, waste generation, and radiological and transportation impacts. DOE determined shipping LEU to and from Vienna, Austria would have inconsequential impacts on electric use, socioeconomic considerations, and waste generation. Therefore, DOE focused its analysis on the radiological and transportation impacts as the important considerations regarding whether to prepare a new or supplemental EIS.

The SNF EIS contained an analysis of the environmental impacts of the transportation and management of SNF within the continental United States. Subsequently, the FRR EIS incorporated the analysis from the SNF EIS for transportation impacts within the United States and added the transportation impacts that would occur at the United States ports of entry and while the SNF was in transit within the global commons.

In Appendix I of the SNF EIS, DOE presented a summary of the estimated transportation impacts of 170 shipments of FRR SNF to the INL Site (Table I-2 and Table I-8). DOE assumed FRR SNF would be received at one of six ports of entry, including Charleston, SC (Appendix I 3.2) and could be transported to one of several DOE sites including the INL Site. DOE also assumed a shipment distribution of those 170 shipments to be 121 shipments from the east coast and 49 shipments from the west coast (Maheras, 1995). In the amended ROD for the SNF EIS, DOE decided that it would only complete up to 162 of the 170 shipments of foreign research reactor SNF to the INL Site. In this SA, DOE assumed all eight shipments eliminated as a result of the 1995 Settlement Agreement would be along the east coast route. Therefore, based on the SNF EIS, DOE can complete a total of 113 shipments of FRR SNF along the east coast route.

Because of the 1995 Settlement Agreement, the FRR EIS contained the environmental impacts of transporting only162 shipments of non-aluminum clad SNF and included marine transport, port of entry operations, and ground transportation (Sections 4.2.1,

4.2.2, 4.2.3 and Appendix E). In addition, the FRR EIS assumed 107 east coast shipments and 55 west coast shipments (Section 2.6.4.1).

Presently, DOE has received at the INL Site 20 shipments of non-aluminum clad foreign research reactor SNF from the east coast. Assuming the most conservative scenario, which consists of completing only 107 east coast shipments as identified in the FRR EIS, DOE can still complete 87 additional shipments of foreign research reactor SNF from the east coast. Based on current planning, DOE anticipates less than 20 additional shipments of FRR non-aluminum SNF before the Foreign Research Reactor Program expires in 2019. Therefore, DOE would still be able to complete 67 additional shipments after all anticipated FRR shipments are complete. Completing the additional two shipments if the proposal is implemented would not entail an appreciable risk of exceeding the overall cumulative risk associated with acceptance of non-aluminum clad foreign research reactor SNF analyzed in the EIS for the FRR Program and would not change the results reported. Additionally, implementation of the proposed action would not cause the overall total quantity of FRR SNF projected to be received under the FRR SNF Acceptance Program to exceed the estimates in the FRR SNF EIS.

The potential for transportation accidents has already been analyzed sufficiently in the SNF EIS (Section 5.1.5 and Appendix I-5 through I-10) and in the FRR EIS (Sections 4.2.1 through 4.2.2).

The analysis contained in the FRR EIS and updated by a Supplement Analysis (SA) for the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program, DOE/EIS-0128-SA-3, November 2004 (DOE 2004), is still valid for the shipment of the HEU to the INL Site and the LEU shipment to Vienna, Austria. For the return of the LEU to the INL Site, the potential worker impacts during marine transport and at ports of entry described in the FRR EIS and the 2004 SA remain the same regardless of when they occur. Based on the analysis in Table 5 of the 2004 SA, there would be a very slight increase in estimated radiological risk to the general public residing in the vicinity of the port of entry during accident conditions. The potential impacts to the public of shipping the LEU from the port of entry to the INL Site were analyzed in the SNF EIS and were assumed to occur through 2035.

DOE also evaluated potential greenhouse gas (GHG) emissions from the additional two shipments of SNF. There would not be additional GHG emissions associated with the transport of the SNF within the global commons because in the FRR EIS DOE assumed commercial ships would be used to transport the SNF and would be operating independent of the proposed action. Because the proposed action would increase the total number of SNF shipments, DOE calculated the GHG emissions for the ground transportation of the SNF. The total distance for those two shipments would be 4,892 miles and the total GHG emissions would be approximately 9.2 tons (Safford 2012).

Conclusion

DOE has completed only 20 shipments from foreign research reactors to the INL Site, which is a very small number of shipments relative to the number analyzed in both the SNF EIS and FRR EIS. The environmental impacts of completing two additional SNF shipments, one shipment from the INL Site to Vienna, Austria and one shipment from Vienna, Austria to the INL Site in Idaho are clearly encompassed by the analyses in the SNF EIS and FRR EIS. Even though the foreign research reactor program is anticipated to expire in 2019, the analysis contained in the FRR EIS will remain valid because the termination of an agency program would not affect the potential environmental impacts of a proposed action or the methodology applied to analyze them.

Determination

DOE performed this SA on the SNF EIS and FRR EIS, in accordance with 40 CFR § 1502.9 (c) and 10 CFR § 1021.314, for the proposal to ship up to 88 previously irradiated but usable fuel elements to Vienna, Austria and receive that SNF, and up to 14 additional used SNF fuel elements, back at the INL Site sometime around 2025. Based on this analysis, DOE's proposed action does not represent substantial changes in either the FRR EIS or the SNF EIS that are relevant to environmental concerns, and there are no new circumstances or information relevant to environmental concerns that bear on the proposed action or its impacts that would warrant additional NEPA Analysis.

Approved

for Raymond A. Furstenau Date 5-11-2012

Richard B. Provencher, Manager
U.S. Department of Energy
Idaho Operations Office