

Supplement Analysis

Transportation of Depleted Uranium Hexafluoride for Conversion to Depleted Uranium Oxide

Background

To reduce the threat of nuclear weapons proliferation, the DOE is engaged in a program to disposition its surplus, weapons-usable plutonium in an environmentally sound manner by converting such plutonium in proliferation-resistant forms that can never again be readily used in nuclear weapons. The Department of Energy (hereafter DOE or the Department) prepared the Surplus Plutonium Disposition (SPD) Environmental Impact Statement (EIS) (DOE/EIS-0283) in 1999. In the SPD EIS, DOE evaluated alternatives for disposition of plutonium that is surplus to the national security needs of the United States and, as documented in the Record of Decision (65 Federal Register [FR] 1608) decided to implement a disposition strategy that included manufacturing mixed oxide (MOX) fuel (i.e., plutonium oxide and uranium oxide) for irradiation in commercial nuclear power plants.

Manufacturing MOX fuel to disposition surplus plutonium requires a supply of depleted uranium oxide (DUO) for mixing with plutonium oxide. In the SPD EIS (DOE, 1999) DOE evaluated the impacts of shipping depleted uranium hexafluoride (DUF) from the Portsmouth Gaseous Diffusion Plant (PGDP) in Piketon, Ohio to the Global Nuclear Fuel-Americas, LLC Fuel Fabrication Facility in Wilmington, North Carolina for conversion to DUO and shipping DUO from Wilmington to the Mixed Oxide Fuel Fabrication Facility (MFFF) at the Savannah River Site (SRS) near Aiken, South Carolina. The transportation route and conversion facility site were selected for purposes of analysis. There were no contractual agreements in place at that time for depleted uranium conversion services. Since that time, Shaw-AREVA MOX Services¹ has, through an open and competitive procurement process, awarded a contract for depleted uranium conversion services to AREVA-NP in Richland, Washington.

This action is needed to allow DOE to meet its MFFF mission requirements. DOE needs to assure that an adequate supply of DUO is available at the MFFF when construction is completed and operations are slated to begin in 2016. In order to ensure an adequate supply of DUO to manufacture MOX fuel, DOE has a need to acquire cylinders of DUF from the PGDP in Piketon, Ohio, ship these cylinders to an AREVA-NP facility in Richland, Washington for conversion to DUO, and then ship the DUO to the SRS.

DOE has prepared this Supplement Analysis (SA) in accordance with the Council on Environmental Quality (CEQ) and DOE implementing regulations under the National Environmental Policy Act (NEPA) [40 Code of Federal Regulations {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

¹ Shaw-Areva MOX Services is contracted by the Department to design, construct, and operate the MFFF.

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 or its impacts are “significant,” pursuant to 40 CFR 1502.9(c).

Proposed Action

DOE proposes to transport cylinders of DUF from the PGDP in Piketon, Ohio to the AREVA-NP Fuel Fabrication Facility at Richland, Washington; a distance of approximately 2,342 miles (3,768 km) beginning as early as September 2012. An empty cylinder weighs approximately 2,700 pounds and full cylinders weigh 30,000 pounds. Each cylinder will be over-packed in a refurbished and recertified CI-48 over-pack, weighing approximately 18,000 pounds. The shipping packages will meet U.S. Department of Transportation requirements at 49 CFR 173.420. The shipper-of-record (Shaw-AREVA MOX Services) will have both hazardous and radioactive materials certifications and the shipment will meet U.S. Department of Transportation regulations at 49 CFR 100, Part 185.

After arrival of the cylinders at the AREVA-NP facility in Richland, Washington, they will be unloaded, and the DUF processed into DUO and stored until just prior to the operation of MFFF. During MFFF operations, 45 shipments of DUO would be sent from Richland, Washington to the SRS. In 2009, the Nuclear Regulatory Commission (NRC) granted a request for license renewal from AREVA-NP for the operation of AREVA-NP Fuel Fabrication Facility. The NRC prepared an environmental assessment of the operation and issued a finding of no significant impact, which informed the decision to renew Special Nuclear Material License SNM-1227 (NRC, 2009). Therefore, this Supplemental Analysis does not further address the impacts of the conversion operation at the AREVA-NP Fuel Fabrication Facility.

Environmental Impacts

The potential radiological impacts of transportation of DUF-DUO material to support plutonium disposition are very small. DOE has evaluated all transportation environmental impacts associated with transporting DUF from Piketon, Ohio, to Richland, Washington, and subsequent transportation of DUO from Richland, Washington, to the SRS, using the RadCat 3.0 code (SNL, 2009). These impacts are based on transport of cylinders containing DUF from Piketon to Richland and transport of cylinders containing DUO from Richland to the SRS.

Piketon to Richland

Incident-free: 1.6 person-rem resulting in zero (0.0010 latent cancer fatality [LCF]) to crew
3.5 person-rem resulting in zero (0.002) LCF to exposed population

Accident: Zero (0.00002) LCF to exposed population
Zero (0.04) non-radiological fatalities

Richland to SRS

Incident-free: 4.6 person-rem resulting in zero (0.003) LCF to crew
2.7 person-rem resulting in zero (0.002) LCF to exposed population

Accident: Zero (0.00003) LCF to exposed population
Zero (0.01) non-radiological fatalities

As is often the case with transportation of radiological materials, the risk of fatalities from trauma resulting from the accident is greater, although still very small, than the risk of fatalities resulting from exposure to radiation.

In the SPD EIS (DOE 1999), DOE evaluated the transportation impacts associated with alternatives, such as the preferred alternative of constructing and operating plutonium disposition facilities at SRS. This analysis included impacts of DUF-DUO shipments to support manufacture of MOX fuel, but did not separate these impacts from those that could result from transportation of other materials, including plutonium, that would also be required to manufacture MOX fuel and ship it to commercial power reactors. Therefore the transportation impacts estimated in the two documents are not directly comparable. The all-inclusive estimates of transportation impacts calculated for the preferred alternative were:

Incident-free: Zero (0.024) LCF to transportation workers
Zero (0.034) LCF to exposed population

Accident Zero (0.044) LCF to exposed population
Zero (0.053) non-radiological fatalities

Conclusion

In the 13 years since DOE prepared the SPD EIS, the facility for conversion of DUF to DUO has changed. The AREVA-NP plant in Richland, Washington will perform the conversion, rather than the Global Nuclear Fuel-Americas, LLC Fuel Fabrication Facility in Wilmington, North Carolina. Therefore DUF-DUO material will be transported over a longer distance than the analysis in the SPD EIS assumed. Nonetheless, the impacts of this transportation are very small; DOE expects that no latent cancer fatalities or non-radiological accident fatalities will result.

Determination

DOE prepared this SA in accordance with 40 CFR § 1502.9(c) and 10 CFR § 1021.314, for the proposal to transport cylinders of DUF from the PGDP in Piketon, Ohio to the AREVA-NP Fuel Fabrication Facility at Richland, Washington, and subsequent transport of cylinders containing DUO from Richland to the SRS. Based on this analysis, DOE's proposed action does not represent substantial changes that are relevant to environmental concerns for DUF-DUO transportation actions evaluated in the SPD EIS 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. Furthermore, DOE has previously decided to prepare DUO from DUF to support MOX fuel fabrication (65 FR 1608) and is not changing that decision. Therefore no revision to the record of decision is required.

Approved at the Savannah River Site, Aiken, South Carolina, August 27, 2012



David C. Moody
Manager
Savannah River Operations Office

References

DOE (Department of Energy), 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283, Office of Fissile Materials Disposition, Washington, DC, November.

NRC (U.S. Nuclear Regulatory Commission), 2009, Notice of Availability of Environmental Assessment and Finding of No Significant Impact for License Amendment for AREVA-NP, Inc., Richland, WA. *Federal Register* 74, 15312, April 3.

SNL (Sandia National Laboratories), 2009, *RadCat 3.0 Users Guide*, SAND2009-5129P, Albuquerque, New Mexico and Livermore, California, May.