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SUPPLEMENT ANALYSIS

Naval Reactors Facility
Sludge Pan Container Disposition Project

May 2009

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1. OVERVIEW

The potential environmental impacts associated with managing remote-handled transuranic (RH-TRU) waste[a] have been analyzed in several National Environmental Policy Act (NEPA) documents. At the U.S. Department of Energy Idaho Operations Office (DOE-ID), two Environmental Impact Statements (EISs) have analyzed RH-TRU management approaches. They are: (1) *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE 1995 Ref. 1) (hereafter referred to as the Final 1995 EIS) and (2) the *Advanced Mixed Waste Treatment Project Final Environmental Impact Statement* (DOE 1999 Ref. 2) (AMWTP EIS).

In January 2006, DOE-ID issued a supplement analysis (SA) that addressed management of 135 m^3 of RH-TRU at the Idaho Nuclear Technology and Engineering Center (INTEC) (DOE 2006 Ref. 3). Based on this analysis, DOE concluded the proposed activities for management of 135 m^3 of RH-TRU at INTEC were not expected to have environmental impacts significantly different from those previously analyzed in the Final 1995 EIS and the AMWTP EIS.

The DOE-ID Environmental Management Program is proposing to manage approximately 20 m^3 of RH-TRU waste at INTEC called the Naval Reactors Facility (NRF) Sludge Pan Container (SPC) Disposition Project. Therefore, the Department of Energy (DOE) has prepared this SA to determine whether there are "substantial changes in this proposed action that are relevant to environmental concerns" or significant new circumstances or information according to the Council on Environmental Quality (Title 40 Code of Federal Regulations [CFR] Part 1502.9 (c) [Ref. 4]) and DOE NEPA Regulations (10 CFR 1021.314 [Ref. 5]) that would require additional NEPA analysis.

The conclusion of this SA is that the differences are not significant enough to warrant additional NEPA analysis.

2. BACKGROUND

The 2006 SA (DOE 2006 Ref. 3) addressed management of 135 m^3 of RH-TRU waste. However, the project is nearly complete, and the actual quantity managed will total approximately 80 m^3 of RH-TRU waste moved from the Radioactive Waste Management Complex (RWMC) to INTEC for processing. Existing facilities at INTEC were modified to manage the RH-TRU waste. Waste management actions included characterization, treatment, repackaging, and transporting the RH-TRU waste to WIPP for final disposition. Characterization actions involved headspace gas sampling, real-time radiography, and measuring the gamma dose. Treatment included sizing, segregating, adding liquid absorbent, removing prohibited items, and filter processing. In addition, drum venting, repackaging, and payload preassembly actions in support of transportation were performed.

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a. Remote-handled transuranic waste is defined as packaged transuranic waste with an external surface dose rate greater than or equal to 200 mrem/h.

3. PROPOSED ACTIVITIES

The NRF SPC Disposition Project would provide for the receipt, storage, characterization, certification, and preparation of RH-TRU waste for transportation and disposition at WIPP. Currently, the 92 SPCs containing the RH-TRU waste are stored in hot cells and storage areas at NRF. Removing the RH-TRU waste would allow NRF operations to use the hot cells and storage areas for other projects.

The RH-TRU NRF-SPC waste consists of fuel fines, cutting wheels, etc., generated from the examination of naval fuels at the NRF Expended Core Facility. The waste may include kitty litter or Fullers earth from cleaning inside the glovebox, fines from cutting, structural metal chips, fines and ribbons, grinding wheel remnants, and cooling water. The waste material was dried, or liquid absorbent material (Floor-Dry) was added to contain the liquids. The RH-TRU waste was collected in sludge pans, which are small rectangular metal containers; these pans were then placed in cylindrical containers, designated sludge pan containers or SPCs.

Prior to transport of the 92 SPCs, NRF would vent and overpack them into shielded containers and place the SPCs in 55-gallon drums. Up to four 55-gallon drums would be placed in each interim storage container (ISC) and transported to INTEC.

At INTEC, the ISCs would be placed into existing radioactive or mixed waste storage areas, depending on NRF's hazardous waste determination for the SPCs. The SPCs would be processed, characterized, and prepared for transportation in CPP-659 using equipment and processes currently in place. An ISC containing 55-gallon shielded SPCs would be transferred to CPP-659 where the SPCs would be removed from the shielded container in a hot cell and overpacked into an unshielded drum. The drum, containing a single SPC, would be overpacked into larger drums for characterization using the existing radiography and dose measurement equipment. Any SPCs identified with prohibited items (free liquid, aerosol cans, etc.) by radiography would be returned to the CPP-659 decontamination cell (Room 308) for remediation.

Several SPCs would be randomly selected for radiochemical analysis. Depending on sample dose rates, samples may be prepared at the Remote Analytical Laboratory, or if not available, a shielded glovebox may be set up within CPP-659. The samples would be transported to the ICP Analytical Laboratory for radiochemical analysis. Alternatively, the use of an offsite WIPP-approved laboratory for performing radiochemical analysis may be used. Headspace gas sampling of randomly selected characterized SPCs would be performed. The containers would be transferred to the Environmental Chemistry Laboratory for sample analysis. After characterization, the SPCs would be returned to storage in ISCs.

After characterization data are collected for each SPC, the repackaged SPC would be returned to the ISC for storage pending approval for shipment to WIPP. The characterization data would be validated and certified, and the SPCs would be returned to Building CPP-659 for loading into a removable lid canister. After approval is received for shipping a removable lid canister, the removable lid canister (which would contain up to three SPC drums) would be loaded into the 72B cask, using existing equipment and processes, for shipment to WIPP.

4. PRESENT CONDITIONS

4.1 Remote-Handled Transuranic Waste

Currently, the 92 SPCs containing the RH-TRU waste are stored in hot cells and storage areas at NRF. Several of the 92 SPCs have been vented, overpacked, placed in ISCs, and are in storage at NRF. NRF would vent and overpack the remaining SPCs into shielded containers.

For shipment, each SPC (containing one sludge pan) is placed in a plastic bag and then in a shielded container, which has a shielding sleeve welded on the outside. The shielded container with the SPC and shielding sleeve is placed in a drum with cribbing to hold the shielded container in the center of the drum. Filtered vents are located on all the containers to prevent pressurization and allow release of gases. Figure 1 illustrates the packaging of the drum.

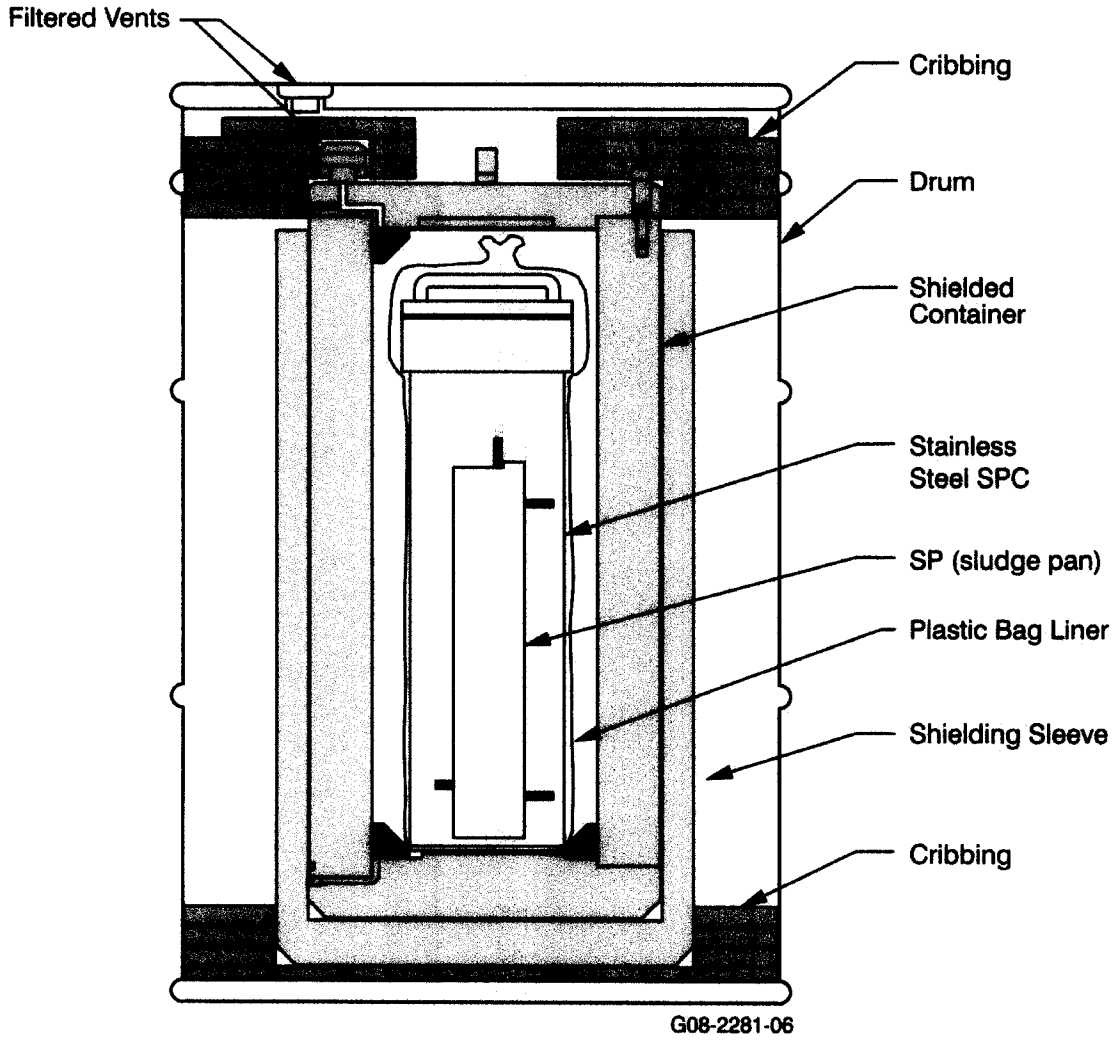

Figure 1. Schematic of Type 1 waste package (existing design) in 55-gallon drum packaging.

4.2 Facilities

The primary facility used for RH-TRU management at INTEC is CPP-659, which operates under a Resource Conservation and Recovery Act (RCRA) Part B final permit. To support RH-TRU waste management actions, a Class 3 RCRA Permit Modification was submitted to the Idaho Department of Environmental Quality (Safford 2005 Ref. 6). The Permit Modification (Monson 2006 Ref. 7) allows for additional container storage of mixed waste in the Crane Maintenance Area in CPP-659 and allows additional waste treatment methods consisting of sizing, compaction, repackaging, and adding absorbent in CPP-659 and CPP-1659.

5. ANALYSIS AND DISCUSSION

The 2006 SA (DOE 2006 Ref. 3) analyzed transportation impacts, construction impacts, and air emissions because they were the important environmental aspects affected by the proposed change. This SA discusses air emissions (see Section 5.1) and transportation impacts (see Section 5.2) for comparison to ensure the impacts from the proposed action are within the analysis originally performed in the Final 1995 EIS (DOE 1995 Ref. 1) and the AMWTP EIS (DOE 2006 Ref. 3).

The work performed at NRF has been addressed in two environmental checklists, NRFE-465 and NRFE-466. NRFE-465 references the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS-0203-F) Volume 2, Part A, Section 5.11 (DOE 1995). NRFE-466 is a Record of Categorical Exclusion Determination.

5.1 Air Emissions

In order to certify RH-TRU wastes for shipment to WIPP, a minimum of 10 and up to 50 sludge pans (see Figure 1) would be removed from the overpacking and opened to verify no prohibited items are in the waste or to collect samples for radiochemical analysis. For purposes of this analysis, 50 sludge pans are assumed opened. For each radionuclide,[b] the mean Ci inventory of the 92 sludge pans was applied to each of the 50 pans potentially to be opened. The inventory was screened using the National Council on Radiation Protection screening factors. Three radionuclides (Cs-137, Sr-90, and Pu-238) were found to pose 99% of the risk and are carried through for dose calculations.

Even though wastes likely are predominantly solids, a resuspension fraction of 0.001, applicable to particulates and liquids, is applied to estimate radiological releases; a single HEPA (high-efficiency particulate air) filter at 99% cleanup efficiency is credited. These assumptions are consistent with calculations for other RH-TRU wastes processed in CPP-659 (EDF-8799 Ref. 8).

The dose to a maximally exposed off-Site individual at the INL Site boundary was calculated with the CAP88 PC code, Version 3.0 (EPA 2007 Ref. 10). Ten-year average meteorological data from the Grid 3 tower near INTEC were used as input to dispersion calculations. Table 1 summarizes inventories, releases, and doses from opening the 50 sludge pans. The calculated dose to the maximally exposed off-Site individual from opening 50 sludge pans is 3.8E-04 mrem.

Table 1. Inventories, releases, and doses from opening 50 sludge pan containers.

Nuclide	Mean per Sludge Pan Inventory (Ci)	Inventory of 50 Sludge Pans (Ci)	Release to Inside Air (Ci)	Release to Atmosphere (Ci)	Unit Ci Dose (mrem/Ci)	Dose (mrem)[a]
Cs-137	2.07E+00	1.04E+02	1.04E-01	1.04E-03	7.18E-02	7.43E-05
Sr-90	1.95E+00	9.75E+01	9.75E-02	9.75E-04	1.29E-01	1.26E-04
Pu-238	1.29E-01	6.44E+00	6.44E-03	6.44E-05	2.12E+00	1.37E-04
					Total	3.8E-04

b. The radiological inventory of each of the 92 sludge plans was provided to ICP by NRF in letter NRF-WS-372, dated January 12, 2009, "Updated Sludge Pan Container Activity Estimates."

a. Dose is to maximally exposed offsite individual located 13,900 m south-southwest of INTEC.

The AMWTP EIS addressed the impacts of managing 135 m^3 of RH-TRU wastes. The dose presented in that EIS for managing the 135 m^3 was 2.2E-02 mrem to the maximally exposed off-Site individual (Table 5.7-4). The scope was subsequently reduced to just 80 m^3 of RH-TRU wastes; thus the impacts from processing 55 m^3 were never realized. Table 2 shows that the dose from opening the 50 sludge pans is well below (~24 times lower) the dose that would have occurred if the remaining 55 m^3 of RH-TRU waste had been managed.

Table 2. Comparison of dose from opening 50 sludge pans to dose documented in the Advanced Mixed Waste Treatment Project Environmental Impact Statement.

	RH-TRU Volume (m^3)	Dose to MEI (mrem)
AMWTP EIS (DOE 1999)	135	2.2E-02
RH-TRU waste not managed	55	9.0E-03[a]
NRF SPC wastes	11[b]	3.8E-04

a. Dose derived as follows: (55 ÷135) x (2.2E-02 mrem) = 9.0E-03 mrem.

b. This is the approximate volume of NRF SPC wastes (50 sludge pans) to be examined in detail; this volume is not used in dose calculations.

Finally, atmospheric releases from RH-TRU repackaging in CPP-659 are continuously monitored, and to date, monitored actual releases have been far below those estimated by the conservative assumptions used here and in air permitting applicability determinations for other RH-TRU wastes. For example, Table 3 shows that, in 2008, monitored releases were far below those calculated for just one activity in 2008, repackaging 64 drums (13 m^3) of 135 m^3 RH-TRU wastes (EDF-8799 Ref 8).

Table 3. Comparison of predicted vs. actual radionuclide releases from Vent CPP-659-033.

Nuclide	EDF-8799 Release for Repackaging 64 Drums (Ci)	Monitored Release in 2008[a] (Ci)
Am-241	8.2E-05	4.0E-09
Cs-137	8.6E-05	1.2E-07
Pu-238	2.9E-04	Statistically not present

a. Source: EDF-9089.

5.2 Transportation

Currently, the RH-TRU waste is in storage at NRF. Trucks would transport the waste to INTEC. All transportation would be performed in compliance with a transport plan and procedure developed by NRF and approved by DOE-Naval Reactors. Approximately 31 shipments would be made to transport the waste from NRF to INTEC. The distance from NRF to INTEC is 6.1 miles; therefore, the additional transportation to implement the proposed action is approximately 189 miles. On-Site transportation was addressed in the Final 1995 EIS, which projected 17,145 radioactive shipments from 1995 to 2005 (DOE 1995 Ref. 1). The 2005 SA that updated the INL portion of the Final 1995 EIS documented 2,087 actual shipments for a nine-year period (DOE 2005 Ref. 12). Since 2005, 6,094 radioactive shipments have been completed on the INL Site. The total on-Site radioactive shipments (8,181) is one-half what was projected in the 1995 EIS.

After characterization data are collected for each SPC drum and the data validated and certified, the drums would be loaded into the 72B cask or approved equal, using existing equipment and processes, for shipment to WIPP. Transportation impacts from RH-TRU waste shipments from the INL Site to WIPP have been analyzed in the *Waste Isolation Pilot Plant Disposal Phase Final Environmental Impact Statement* (DOE 1997 Ref. 13).

6. CONCLUSIONS

DOE's review of the proposed NRF SPC Disposition Project shows that the potential environmental impacts are bounded by the impacts analyzed in the Final 1995 EIS and the AMWTP EIS. The estimated impacts of performing the project at INTEC in CPP-659 do not differ significantly from impacts analyzed in the 2006 SA. Therefore, no further NEPA review is required.

Approved

M. Christine Otto

Dennis M. Miotla
Interim Manager
Department of Energy Idaho Operations Office