DOE/EIS-0220-SA-01

Supplement Analysis
Interim Management of Nuclear Materials Final Environmental Impact Statement

1.0 Introduction

When the Department of Energy (DOE) considers a change to a proposed action evaluated in an existing environmental impact statement (EIS), or new information relevant to the action becomes available, DOE must decide if a supplement to the existing EIS or a new EIS is required. Criteria for determining the need for a supplemental EIS are found in the Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) [Title40 Code of Federal Regulations (CFR) Part 1502.9(c)] and in the DOE NEPA regulations [10 CFR 1021.314]. When the need for a supplemental EIS is unclear, DOE's regulations require the preparation of a Supplement Analysis (SA) (DOE 2005). DOE uses the SA to assist it in determining whether a change in a proposed action or the presentation of a new circumstance or information is relevant to environmental concerns and, consequently, sufficient to necessitate the preparation of a supplemental EIS or requires no additional NEPA review.

DOE proposes to chemically process and vitrify in SRS facilities approximately five kilograms of low assay plutonium (LAP) material received from the Hanford Site. In this SA, DOE will compare the proposed action with impact analyses in the *Interim Management of Nuclear Materials Final EIS* (IMNM FEIS) (DOE 1995a) and subsequent decisions published in Records of Decisions (RODs) regarding the stabilization of similar materials stored in Savannah River Site (SRS) vaults (plutonium and uranium stored in vaults, as described in the IMNM FEIS). The IMNM EIS evaluates the impacts of alternatives for managing materials stored at the SRS in 1995. The current proposal represents a change in circumstances because the subject LAP material, although originally produced at SRS in the early 1960's, was stored at the Hanford Site at the time the IMNM FEIS was prepared. The information in this SA will assist in determining if this changed circumstance is relevant to environmental concerns.

2.0 Existing NEPA Analysis and Decisions

In 1995, DOE prepared the IMNM FEIS to assess the potential impacts of a suite of alternatives for management of selected nuclear materials stored at SRS until decisions could be made regarding their ultimate disposition. The major categories of nuclear material considered in the IMNM FEIS were Stable Materials, Programmatic Materials, and Candidates for Stabilization. Candidates for Stabilization included those materials which represented environmental, safety, or health vulnerabilities in their existing physical or chemical forms or storage mode, or which could be expected to present vulnerability over the interim period. Following completion of the IMNM FEIS, DOE issued a series of RODs which documented the selection of alternatives for storage, stabilization, and processing of the materials considered. DOE continues to implement these decisions to manage nuclear materials at SRS.

In the IMNM EIS materials identified as Candidates for Stabilization include highly enriched uranium and Plutonium-239 (Pu-239) solutions, plutonium and uranium stored in vaults, Mark-

31 targets, Mark-16B and Mark-22 fuel, aluminum-clad Taiwan Research Reactor Fuel, and Experimental Breeder Reactor-II slugs. The plutonium and uranium vault materials considered in the EIS include alloys, compounds, oxides, large metal pieces (e.g., buttons and ingots), and metal fragments (see Table A-1, pages A-8 through A-12 of the FEIS). These vault materials consist primarily of Pu-239 (which includes LAP material), with some Uranium-235 and Neptunium-237. LAP material is predominately ^{239}Pu (50 – 70%) and ^{238}Pu (15-36%) lesser amounts of ^{240}Pu, ^{241}Pu, and ^{242}Pu (Chandler 2009). This description of LAP applies to both the LAP material stored in SRS vaults and the Hanford LAP material which is the subject of the proposed action described in this SA.

The stabilization alternatives evaluated in the IMNM EIS for plutonium and uranium vault materials are: (a) Processing to Metal, (b) Processing to Oxide, (c) Improving Storage, (d) Processing and Storage for Vitrification in the Defense Waste Processing Facility (DWPF), (e) Vitrification in F-Canyon (necessary modifications to F-Canyon were never implemented), and (f) No Action (i.e., continued storage in the existing forms) (Table 2, 60 FR 65300) (DOE 1995b). Although Processing and Storage for Vitrification in the Defense Waste Processing Facility was not a preferred alternative for the vault materials, analyses in the FEIS demonstrated that the impacts associated with that alternative would be similar to the impacts of the preferred chemical processing alternatives (i.e., Processing to Metal, Processing to Oxide, and Vitrification in F-Canyon) (Table 2-8; page 2-54 of FEIS).

Since publication of the FEIS in October 1995, DOE has issued four RODs which document decisions regarding the stabilization of plutonium-bearing vault material. The isotopic content of some of this plutonium-bearing vault material is similar to that of the LAP material which is the subject of the proposed action.

60 FR 65300 (DOE 1995b)

DOE decided to stabilize plutonium and uranium materials stored in vaults by: (1) heating or repackaging the materials into better containers (Improving Storage), and (2) dissolving some materials to chemically remove impurities or radioactive decay products, converting the resulting purified solutions to a metal, an oxide or a glass (Processing to Metal, Processing to Oxide, or Vitrification in a modified portion of F-Canyon, respectively). DOE said that the chemical processing of these materials would take place in the H-Canyon, HB-Line, F-Canyon and FB-Line facilities. The F-Canyon/FB-Line facilities have since been deactivated.

61 FR 6633 (DOE 1996)

DOE decided to stabilize the Other Aluminum-Clad Targets" by dissolving them in the SRS canyon facilities and transferring the resulting nuclear material solution (which included LAP discard) to the liquid radioactive waste tanks for future vitrification in the DWPF (Processing for Storage and Vitrification in DWPF). The average isotopic content of the LAP discard solution generated by processing these targets was ^{239}Pu = 59.4%; ^{238}Pu = 24.6%; ^{240}Pu = 11.91%; ^{241}Pu = 3.06%; and ^{242}Pu = 0.96% (Chandler 2009). This is very similar to the LAP material which is the subject of the proposed action (^{239}Pu = 65.21%; ^{238}Pu = 18.24%; ^{240}Pu = 10.40%; ^{241}Pu = 5.36%; and ^{242}Pu = 0.79%) (SRNS 2009).

62 FR 61099 (DOE 1997)

DOE, after further review of the Plutonium and Uranium Stored in Vaults and consideration of the agency's recent adoption of a phased canyon strategy for current and potential nuclear material management missions, decided to add an additional alternative, Processing and Storage for Vitrification in the DWPF, to those alternatives being used for the management of plutonium and uranium stored in vaults. This decision allowed for the processing and discard of plutonium containing oxide materials (e.g., LAP material) to the high level waste tanks for ultimate vitrification in the DWPF. This alternative was being implemented principally for approximately 10 kilograms of plutonium-bearing materials containing ^{238}Pu. In the ROD, DOE also said that other low-fissile content plutonium and uranium vault materials, upon inspection, may also be managed in this manner. This decision permits the stabilization and ultimate disposition of scrap and residue material containing ^{238}Pu in DWPF glass canisters.

68 FR 44329 (DOE 2003)

DOE determined that some of the Plutonium and Uranium Stored in Vaults may be directly disposed of as transuranic (TRU) waste without further processing. This decision was tiered to analyses conducted in the *SRS Waste Management EIS* (DOE 1995c). Prior to this ROD, DOE had characterized and stabilized about 90 percent of the approximately 3,000 containers of Plutonium and Uranium material stored in vaults.

3.0 Proposed Action

DOE proposes to dispose of 12 drums containing approximately five kilograms of LAP material by processing and storing the material for vitrification in the DWPF. The average isotopic plutonium distributions for this material are as follows: ^{238}Pu = 18.24%; ^{239}Pu = 65.21%; ^{240}Pu = 10.40%; ^{241}Pu = 5.36%; and ^{242}Pu = 0.79% (SRNS 2009). DOE proposes to remove this material from storage at the Hanford Site and ship it via truck, up to three drums at a time, to SRS for disposition. Once received at SRS, the shipping cask(s) would be offloaded in H-Area. The overpack containers would be removed and immediately transferred to the HB-Line. In a contamination controlled environment inside of the HB-Line, the outer layers of the shipping package (the overpack, outer drum, bird cage, and carbon steel shipping container) would be stripped and the stainless steel source capsule removed. The source capsule would then be transferred to an HB-Line glovebox where the source capsule and inner aluminum containers would be cut open and the LAP material discharged into a Scrap Recovery Dissolver. The resulting Pu nitrate solution from the recovery dissolver would be routed to H-Canyon and held until the results of several dissolver batches had been collected. The remaining plutonium solution would transferred directly to preparation tanks to be incorporated in sludge batches (this is waste that does not contain cesium, or salt waste) in preparation for processing in the DWPF.

The LAP material which is the subject of this SA was originally produced and packaged at SRS in HB-Line in the 1960's and shipped to the Pacific Northwest Labs (Hanford Site) for research purposes. The material was never used and the shipping containers never opened.

4.0 Disposition Alternatives

DOE evaluated several alternatives for the stabilization of Plutonium and Uranium Stored in Vaults in the IMNM EIS: No Action, Improved Storage, Processing to Metal, Processing to Oxide, and Processing for Storage and Vitrification in DWPF. Continued or improved storage of the LAP material are not viable alternatives because the existing storage containers do not comply with DOE Standard 3013, *Stabilization and Storage of Plutonium*. SRS lacks the repackaging capabilities to attain that standard. In addition, there is no programmatic need identified for the LAP material to justify its continued storage. Although the LAP material is eligible for disposition as TRU waste at the Waste Isolation Pilot Plant (WIPP) (DOE 2003), this alternative presents additional risk to the worker and is not cost-effective because of the excessive material handling (splitting, blending, assaying, repackaging) required to meet WIPP waste acceptance criteria and the large number of TRU waste containers that would be generated (Chandler 2009). For these reasons, the best disposition alternative for the LAP material is Processing and Storage for Vitrification in DWPF.

5.0 Impact Analysis

DOE proposes to process approximately five kg of LAP material in the HB-Line and H-Canyon, and store the resulting solution for vitrification in the DWPF. Precedent exists for the proposed action. In Fiscal Year 2000, LAP material taken from the inventory of Plutonium and Uranium Stored in Vaults considered in the IMNM FEIS was dispositioned using the above methodology (see ROD 62 FR 61099). The Waste Compliance Plan for this campaign documents the isotopic content of the approximately 8.5 kg of plutonium material discarded: ^{239}Pu = 50.96%; ^{238}Pu = 35.94%; ^{240}Pu = 9.63%; ^{241}Pu = 1.38%; and ^{242}Pu = 2.08% (WSRC 2000). The higher than normal ^{242}Pu content is believed to be attributable to the LAP material being mixed with residual material from a prior ^{242}Pu campaign. Note that the ^{238}Pu content of the LAP material stabilized in FY 2000 is higher than that of the LAP material which is the subject of this SA (35.94% vs. 18.24%, respectively). Consequently, the radiological risk associated with the proposed action would be less than that of the previous discard action.

In evaluating the stabilization alternatives considered in the IMNM FEIS, DOE conservatively derived impact data by not taking credit for reductions in impacts which would result from co-processing of materials or similar decisions that would optimize facility usage and reduce environmental impacts. Similarly, to bound the impact estimates, DOE calculated environmental impacts, assuming that for each alternative listed, all of the plutonium and uranium stored in vaults would be dispositioned using that alternative. A characterization of the impact estimates for human health effects, air and water resources, utilities, and waste management can be found in Table 2-8, Page 2-54 of the FEIS. To date, a significant proportion of the plutonium-bearing materials stored in SRS vaults has been stabilized by simple heating and repackaging, processing to oxide or disposal as TRU waste rather than by Processing and Storage for Vitrification in DWPF. Consequently, the potential environmental impacts associated with implementing the proposed action would be bounded by the impacts calculated in the IMNM FEIS. Implementation of the proposed action would require no modifications to the SRS facilities that would be used (HB-Line and H-Canyon, liquid radioactive waste tanks, and DWPF).

Construction and operation of a temporary shipping cask offloading station on a paved area would have negligible environmental impact. The impacts of transporting the LAP material from the Hanford Site to SRS were previously evaluated in a separate NEPA review and categorically excluded (CX B1.30 – Transfer Action) (Klein 2005).

6.0 Conclusion

DOE has reviewed the NEPA documentation which addresses the impacts of stabilizing Plutonium and Uranium Stored in Vaults using the alternatives described in the IMNM FEIS. The IMNM FEIS specifically identifies and evaluates the impacts of stabilizing LAP material by first processing it through the HB-Line and H-Canyon, and then vitrifying the resulting solution in DWPF. DOE finds that the impact analyses conducted in the FEIS adequately address the proposed action and bound any resulting impacts. DOE also finds that implementation of the proposed action is consistent with a decision published in an ROD to stabilize Plutonium and Uranium Stored in Vaults using the Processing for Storage and Vitrification in DWPF alternative (DOE 1997). While the IMNM FEIS is over 10 years old, the DOE continues to take actions and implement decisions, up to the present time, that are described in that FEIS and associated RODs.

7.0 Determination

This SA demonstrates that the proposed action presents neither substantial changes relevant to environmental concerns nor significant new circumstances or information relevant to environmental concerns. Because DOE has already identified and evaluated the potential impacts which could result from implementing the proposed action, and has previously processed LAP material based on the analysis in the IMNM EIS and a Record of Decision (DOE 1997), no further NEPA review or documentation is required.

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8.0 References

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