

Interim Action Determination

Use of H-Canyon/HB-Line to Prepare Feed for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site

The Department of Energy, including the National Nuclear Security Administration (hereafter DOE) is preparing the Surplus Plutonium Disposition (SPD) Supplemental Environmental Impact Statement (SEIS) (DOE/EIS-0283-S2). In the SEIS, DOE is evaluating alternatives for disposition of plutonium that is surplus to the national security needs of the United States for which DOE has not made a disposition decision. The Department continues to evaluate alternative disposition paths for surplus plutonium materials and options for preparing plutonium oxide feed material for the Mixed Oxide Fuel Fabrication Facility (MFFF). DOE issued a Notice of Intent for the SPD SEIS on March 28, 2007 (72 Federal Register [FR] 14543), an Amended Notice of Intent for the SPD SEIS on July 19, 2010 (75 FR 41850) and, on January 12, 2012, a second Amended Notice of Intent (77 FR 1920). DOE currently anticipates issuing the draft SPD SEIS in the summer of 2012 and the final SPD SEIS early in 2013. In the interim, the Department has continued to explore options for preparing plutonium oxide feed material for the MFFF, with respect to certain plutonium that DOE previously decided to fabricate into mixed oxide (MOX) fuel.

DOE needs to assure a supply of plutonium oxide feed material, from surplus weapons-usable plutonium, for the MFFF. Construction of the MFFF is scheduled to be completed and operations are slated to begin in 2016. In the SPD SEIS DOE is examining options for converting surplus plutonium, the majority of which is in metal form, to plutonium oxide, the form required for disposition as MOX fuel or for disposition by immobilization. In 2003 DOE decided (68 FR 20134) to pursue a program of fabricating into MOX fuel approximately 6.5 metric tons (MT) of surplus weapons-grade plutonium originally destined for immobilization. This material, referred to as Alternate Feed Stock (AFS), is non-pit plutonium currently stored at the Savannah River Site (SRS) near Aiken, South Carolina. AFS originated at DOE sites across the complex: SRS, Rocky Flats Environmental Technology Site, Hanford Site, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory. The AFS has more impurities and some larger particle sizes than the plutonium DOE originally designated as MFFF feed material (65 FR 1608). In addition some AFS plutonium is in a metal form and must be prepared or processed to an oxide form for disposition through MFFF. In 2003 DOE planned to process AFS metal to meet the MFFF acceptance specifications using the Pit Disassembly and Conversion Facility (PDCF), which DOE had decided to construct at the SRS (65 FR 1608). Subsequently in 2005 (DOE 2005), DOE also examined the impacts of installing and operating a DOE-STD-3013¹ stabilization and packaging glovebox in K-Area at SRS to prepare some of the AFS for long-term safe storage pending final disposition, regardless of the disposition path.

¹ DOE-STD-3013 "Stabilization and Packaging of Plutonium Materials" provides guidance for stabilization, packaging, and safe storage of plutonium bearing metals and oxides, containing at least 30 weight percent plutonium and uranium, for up to 50 years.

DOE still needs to prepare a portion of the AFS plutonium (approximately 2.4 metric tons of the 6.5 metric tons designated as MFFF feed (68 FR 20134)) to meet the specifications for MOX fuel. However, construction of the PDCF has not started and alternative options for converting plutonium metal to oxide are under consideration in the SPD SEIS. Also, the K-Area DOE-STD-3013 project was cancelled. Therefore DOE is proposing to use the H-Canyon and HB-Line facilities at SRS, with some minor modifications, to prepare AFS metal as feed for the MFFF.

DOE regulations for implementing the National Environmental Policy Act (NEPA) at Title 10 Code of Federal Regulations (CFR) 1021.104 and 1021.211, and the Council on Environmental Quality NEPA regulations, 40 CFR 1506.1, describe requirements for allowable interim action concerning a proposal that is the subject of an ongoing project-specific EIS. No action concerning such a proposal may be taken if the action would: (1) have an adverse environmental impact, or (2) limit the choice of reasonable alternatives being evaluated in the ongoing EIS.

PROPOSED ACTION

During fiscal year 2012, DOE would initiate activities in H-Canyon and HB-Line to support plutonium oxide production. Following completion of these preparations, DOE would initiate dissolution of AFS plutonium in H-Canyon in the fourth quarter of fiscal year 2012 and production of plutonium oxide in HB-Line in the first quarter of fiscal year 2013 (October through December of 2012). During the first year of operation DOE expects H-Canyon and HB-Line to produce approximately 250 kilograms of plutonium oxide that meets the MFFF specifications. In the second year of facility operation, plutonium oxide production would increase to approximately 650 kilograms. In the third and each subsequent year² of operation the production rate would reach approximately 1,000 kilograms per year (i.e., one metric ton (MT) per year). Therefore, preparing this limited quantity of approximately 2.4 MT of plutonium is estimated to take approximately 4 years,

The purpose and need for this action is to ensure sufficient early feedstock will be readily available when the MFFF begins operations. This analysis is limited to certain plutonium materials that DOE has decided, through previous NEPA decisions, to use as feedstock for MFFF (68 FR 20134), i.e., early feedstock of approximately 2.4 MT of non-pit plutonium. The analysis and decision whether to use H-Canyon and HB-Line for pit plutonium and additional non-pit plutonium are not in the scope of this analysis. In addition, because H-Canyon/HB-Line would not be capable of carrying out the entire mission of producing plutonium oxide from plutonium pits and metal for the MFFF or even a significant fraction of the mission, use of these facilities in the

² On this schedule DOE would complete preparation of the 2.4 metric tons of plutonium oxide from AFS plutonium in fiscal year 2016. H-Canyon/HB-Line is an alternative for preparing additional plutonium for disposition, including preparation of feed for the MFFF. DOE will decide on the alternative to prepare and disposition this additional material following completion of the ongoing SPD SEIS.

near term, prior to selection of an option for plutonium conversion, does not limit the choice of reasonable alternatives being evaluated in the SPD SEIS³.

Facility Modifications and Preparation

DOE recently operated H-Canyon and HB-Line to (1) dissolve highly-enriched uranium and blend or dilute with natural uranium to provide a low-enriched uranium product for use in manufacturing commercial power reactor fuel, (2) process plutonium material from the DOE-STD-3013 surveillance program (DOE 2008a), and (3) prepare surplus plutonium for disposal at the Waste Isolation Pilot Plant in New Mexico (DOE 2011a, DOE 2011b). Even so, planning for the proposed preparation of AFS and similar material will require upgrade of the Documented Safety Analyses for these facilities to authorize safe operation of the new process. In addition, DOE would design, fabricate, and install a specialized glovebox, automated welding equipment, leak testing equipment, weld evaluation tools and ancillary equipment necessary to weld the stainless steel inner DOE-STD-3013 container.

Installation of the glovebox would not change the HB-Line footprint. Installation of the glovebox and HB-Line preparations, maintenance, and restart activities would generate up to 20 cubic meters of transuranic (TRU) waste and up to 35 cubic meters of low-level radioactive waste (LLW). Normal annual operations at H Canyon and HB-Line could generate up to 112 cubic meters of TRU waste and 1,400 cubic meters of LLW. Therefore, the additional waste generated would be a small percentage of the normal annual waste generation at H-Canyon and HB-Line. Also during this period, DOE estimates that approximately 60 workers would receive a cumulative whole-body radiation dose of 3 person-rem. DOE expects no changes in liquid or air emissions from the facility during activities planned for the proposed processing of the AFS material.

Operation

The AFS materials would be brought from K-Area into HB-Line where the materials would be repackaged in dissolvable cans that will dissolve in nitric acid in the H-Canyon dissolvers. In H-Canyon, the materials would be loaded into charging bundles for dissolution and dissolved in the existing H Canyon dissolvers. The resultant plutonium solution from H-Canyon would be transferred through a series of piping and tanks, internal to the H-Canyon building structure, to HB-Line for production of plutonium oxide. HB-Line is constructed on top of H-Canyon and is integral to the H-Canyon structure. The equipment needed to package and weld the stainless steel inner 3013 containers would be installed as part of a new glovebox within HB-Line.

³ In the SPD SEIS, the use of H-Canyon and HB-Line to prepare steady state feedstock for MFFF, as an option for pit disassembly and conversion, and as an option for disposition of non-pit plutonium, is limited to 10 MT of plutonium due to the limited availability of the H-Canyon and HB-Line facility and the supporting liquid waste system facilities.

The PDCF that DOE described and analyzed in the SPD EIS (DOE 1999) would have utilized LLW and TRU waste treatment, storage, and disposal processes and facilities at SRS. Similarly, processing AFS materials in H-Canyon and HB-Line would generate LLW and TRU waste that would be managed using processes and facilities that have been used to manage these wastes from H-Canyon and HB-Line operations for many years and have sufficient capacity to manage the small increment of waste material that would be generated by the proposed action. Thus duplicate facilities would not be required.

DOE planned to manage liquid high-activity waste generated by PDCF operations using the Waste Solidification Building (DOE, 2008b). Liquid high-activity waste generated by the proposed action would be treated using existing SRS storage and treatment facilities, including the Defense Waste Processing Facility (DWPF).

ENVIRONMENTAL IMPACTS

Environmental impacts would include those resulting from minor modifications that would take place within HB-Line. In addition to impacts from modifications, there would be some environmental impacts from annual operations at H-Canyon and HB-Line. Environmental impacts were determined by comparison to (1) similar activities that may be conducted at H-Canyon and HB-Line for future plutonium preparation for MFFF (SRNS 2011), (2) similar activities that would have been conducted at PDCF for plutonium preparation for MFFF (DOE 1999), (3) similar activities that DOE evaluated in DOE/EA-1538 (DOE, 2005), and (4) similar activities conducted at H-Canyon and HB-Line for plutonium stabilization (DOE 1995). These impacts are discussed below:

Air Quality

There would be no additional radiological or non-radiological air pollutants emitted during modification activities because the minor modifications would be conducted inside an existing building. No changes from historical norms are expected in non-radiological and radiological air emission pollutants from either diesel generators or from operation of H-Canyon and HB-Line as a result of the proposed AFS processing. As analyzed in the SPD EIS (DOE 1999:4-55), concentrations of non-radiological air pollutants would not exceed the Federal or state ambient air quality standards. In addition, total concentrations at the SRS boundary from non-radiological air pollutants emitted during similar activities analyzed in the *Final Environmental Impact Statement, Interim Management of Nuclear Materials (IMNM EIS)* (DOE 1995:4-51) would be much less than the regulatory standards. Radiological releases are evaluated below in Health Risk to the Public.

Waste Management

DOE estimates that operations would generate up to 10 cubic meters of TRU waste and 18 cubic meters of LLW per year, with no expected generation of mixed low level

radioactive waste (MLLW), hazardous waste, or liquid waste for the proposed modifications activities at H-Area. Normal annual operations at H-Canyon and HB-Line could generate up to 112 cubic meters of TRU waste, 1,400 cubic meters of LLW, 2.4 cubic meters of MLLW, and 200,000 cubic meters of non-hazardous (sanitary waste) waste. These wastes would be managed using the existing infrastructure at SRS and would not exceed the capacity of existing waste management facilities. There would be negligible amounts of hazardous, liquid LLW, or liquid non-hazardous waste generated during operations (SRNS 2011). Therefore, the additional waste generated by processing the non-pit plutonium would be a small percentage of the normal annual waste generation at H-Canyon and HB-Line.

DOE estimates that up to 200,000 gallons/year of high level liquid waste will be generated and transferred to the Liquid Waste Tank Farm Tank 39, the Tank Farm receipt tank from H-Canyon, as a direct result of HB-Line operations. Processing 2.4 metric tons of plutonium through H-Canyon and HB-Line would generate liquid waste that would be solidified (vitrified) with glass formers at DWPF, resulting in less than 2 additional DWPF canisters. As of January 2012, more than 3,350 canisters had been poured. Each canister takes approximately one day to pour.

Health Risk to Workers

DOE estimates that during modification activities an average construction worker could receive a dose of up to 25 millirem (mrem) per year (3 person-rem for 60 workers over 2 years). Doses to radiation workers would be monitored and maintained below administrative control levels (500 mrem per year) through the implementation of engineered controls, administrative limits, and ALARA (as low as reasonably achievable) measures. DOE estimates that the average annual worker doses to support operations and repackaging at HB-Line would be 240 mrem (40 person-rem/MT x 2.4 MT/4 years for 100 workers (SRNS 2011)⁴. Using the risk factor of 0.0006 LCFs per rem, no LCFs would be expected in the worker population.

Health Risk to the Public

Modifications at H-Canyon and HB-Line would not result in any radiological impacts to the public given that the modifications would be conducted inside an existing building. For normal operations at H-Canyon and HB-Line, the annual Maximally Exposed Individual dose for a hypothetical person residing at the closest point accessible to the public outside the SRS boundary would be 0.0024 mrem, which is a small fraction of the dose from natural background radiation (SRNS 2011), and would not be expected to result in a LCF.

⁴ This calculation is modified from the calculation representing the entire quantity of plutonium material DOE is considering in the SPD SEIS for processing in H-Canyon/HB-Line (10 MT).

Health Risk from Facility Accidents

The *SPD EIS* (DOE 1999) evaluated possible process-related accidents during construction and operation of a PDCF. In addition, the accident analysis in the *IMNM EIS* (DOE 1995) evaluated potential facility accidents for processes in H-Canyon and HB-line buildings. None of the PDCF design-basis accidents evaluated in the *SPD EIS* would be expected to result in an LCF in the offsite population. The PDCF accident with the highest potential dose would be a beyond-design-basis earthquake. This accident could result in 5 (4.3) LCFs in the offsite population (DOE 1999). Similarly, the plutonium processing accident with the highest dose at H-Canyon would be a severe earthquake that could result in 5 (4.5) LCFs in the offsite population (DOE 1995). Impacts on the public and noninvolved worker from potential facility accidents during processing of the 2.4 metric tons of surplus plutonium in H-Canyon and HB-Line are not expected to exceed applicable accidents analyzed in the *SPD EIS* (DOE 1999) and the *IMNM EIS* (DOE 1995). DOE is, however, preparing a revised Documented Safety Analysis incorporating the latest Nuclear Safety Rules for the HB-Line facility as part of ongoing operations, separate from this proposed AFS processing action. The draft HB-Line DSA concludes that the safety measures in HB-Line are reasonable and adequately protect the public under current standards for existing facilities.

Intentional Destructive Acts

Both H-Canyon and HB-Line are located within an existing Limited Area. Impacts from intentional destructive acts are classified, but are not expected to change appreciably because the activities, and the amount of plutonium present, would not be significantly different from historical levels.

Environmental Justice

The environmental impacts of H-Canyon and HB-Line operation would be within the bounds of past operation of these facilities. Therefore, modification and operation of H-Canyon and HB-Line would not produce disproportionately high and adverse impacts to minority or low-income populations near SRS (DOE 1995: 4-43).

Water Resources

No change in liquid effluent locations, release rate, or concentration of contaminants, including releases from process cooling water, would be expected during modification activities over normal facility operations (SRNS 2011). No surface water would be used to support facility operation. Operations would not involve releases to groundwater, thus no impacts on groundwater quality are expected. Sanitary wastewater would be treated in existing treatment plants. Discharges from these plants would continue to meet National Pollutant Discharge Elimination System permit limits (SRNS 2011). Therefore, no impacts on surface water quality would be expected.

Socioeconomics

No impacts on local socioeconomics would be expected during modification activities given that existing staff would be used and no additional staff added. During restart activities and daily operations, reassignment of staffing resources would be required to accomplish the different activities and goals; however no new staff would be needed. H-Canyon and HB-Line staffing to support this mission is estimated at approximately 600 full time equivalents (SRNS 2011).

Infrastructure

There would be no expected increase in utility needs (i.e. water, fuel, and electricity) during modification activities as the proposed modifications only include installation of equipment. The use of utilities at H-Canyon and HB-Line to produce the MFFF feed is expected to be within historical levels and within SRS infrastructure capacities (SRNS 2011).

Other Resource Areas

Impacts from transportation of materials, from K-Area to H-Canyon and HB-Line, and from H-Canyon and HB-Line to MFFF, would be within historical levels and no offsite transportation of plutonium would be required. There would be no additional impacts beyond those discussed in the SPD EIS (DOE 1999) on cultural and paleontological resources, land use, visual resources, ecological resources, geology and soils, or from noise given that the modifications would be conducted inside an existing building within an industrialized area and operations would be similar to or less than those analyzed for PDCF and similar or less than historic operating levels for H-Canyon and HB-Line.

CHOICE OF REASONABLE ALTERNATIVES

In the SPD SEIS, DOE is evaluating options for preparing plutonium metal for disposition. The options are (1) a stand-alone PDCF at F-Area at SRS, (2) a Pit Disassembly and Conversion Project at K-Area at SRS, (3) a pit disassembly and conversion capability in the Plutonium Facility (PF-4) in Technical Area 55 at Los Alamos National Laboratory (LANL) and metal oxidation in MFFF at SRS, and (4) a pit disassembly and conversion capability in PF-4 at LANL with the potential for pit disassembly in K-Area, conversion in H-Canyon/HB-Line, and metal oxidation in MFFF at SRS. Each option involves processing the metal to oxide. The vast majority of surplus plutonium is in metal form, either plutonium pits or metal pieces. The AFS metal represents a small fraction of the plutonium metal that will require conversion to oxide. While the H-Canyon/HB-Line has the existing, proven capability to convert AFS in the near term, using these facilities in this manner will not prejudice the upcoming selection of an option for conversion of plutonium metal. Indeed, H-Canyon/HB-Line does not have the capacity for the entire metal conversion mission and for that reason is not a separate option in the SPD SEIS. H-Canyon/HB-Line is

only considered along with other capabilities for the overall metal conversion mission.

CONCLUSIONS AND DETERMINATION

DOE has reviewed the environmental analyses relevant to processing AFS metal to oxide in H-Canyon/HB-Line. Based on these analyses, DOE finds that the impacts of processing these materials would be significantly less than the historical levels of operating the H-Canyon and HB-Line facilities. Therefore, no adverse environmental impacts would result from processing AFS material in H-Canyon/HB-Line. In addition, because H-Canyon/HB-Line would not be capable of carrying out the entire mission of producing plutonium oxide from plutonium metal for the MFFF, or even a significant fraction of the mission, use of these facilities in the near term, prior to selection of an option for plutonium conversion, does not limit the choice of reasonable alternatives being evaluated in the SPD SEIS. Therefore this action is an allowable interim action in accordance with DOE and CEQ regulations for implementing NEPA, at 10 CFR 1021.104 and 1021.211, and 40 CFR 1506.1, respectively.

Approved at the Savannah River Site, Aiken, South Carolina, June 26, 2012



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REFERENCES

- DOE (U.S. Department of Energy), 1995, *Final Environmental Impact Statement, Interim Management of Nuclear Materials*, DOE/EIS-0220, Savannah River Site, Aiken, South Carolina, October.
- DOE (U.S. Department of Energy), 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283, Office of Fissile Materials Disposition, Washington, DC, November.
- DOE (U.S. Department of Energy), 2003, *Supplement Analysis and Amended Record of Decision, Changes Needed to the Surplus Plutonium Disposition Program*, DOE/EIS 0283 SA1, Office of Fissile Materials Disposition, Washington, DC, April.
- DOE (U.S. Department of Energy), 2005, *Environmental Assessment for the Safeguards and Security Upgrades for Storage of Plutonium Materials at the Savannah River Site*, DOE/EA-1538, Savannah River Operations Office, Aiken, South Carolina, December.
- DOE (U.S. Department of Energy), 2008a, *Interim Action Determination, Processing of Plutonium Materials from the DOE Standard 3013 Surveillance Program in H-Canyon at the Savannah River Site*, Savannah River Operations Office, Aiken, South Carolina, December 8.
- DOE (U.S. Department of Energy), 2008b, *Supplement Analysis for Waste Solidification Building at the Savannah River Site*, Aiken, South Carolina, November 26.
- DOE (U.S. Department of Energy), 2011a, *Amended Interim Action Determination, Disposition of Plutonium Materials from the Department of Energy (DOE) Standard 3013 Surveillance Program at the Savannah River Site*, Savannah River Operations Office, Aiken, South Carolina, March 30.
- DOE (U.S. Department of Energy), 2011b, *Interim Action Determination, Disposition of Certain Plutonium Materials Stored at the Savannah River Site*, Savannah River Operations Office, Aiken, South Carolina, October 17.
- SRNS (Savannah River Nuclear Solutions), 2011, *H-Canyon/HB-Line/K-Area to MFFF Information Request – SRNS-RP-2011-01601*, Aiken, South Carolina, November 14.