DOE/EIS-0283-SA-2

SUPPLEMENT ANALYSIS

WASTE SOLIDIFICATION BUILDING

INTRODUCTION AND PURPOSE

The National Nuclear Security Administration (NNSA), a separately organized agency within the U.S. Department of Energy (DOE), is proposing to construct and operate a standalone Waste Solidification Building[1] (WSB) in F-Area at the Savannah River Site (SRS) near Aiken, South Carolina. Certain liquid low-level radioactive waste (LLW) and liquid transuranic (TRU) waste expected to be generated in the Mixed Oxide Fuel Fabrication Facility (MFFF) and Pit Disassembly and Conversion Facility (PDCF) as part of the U.S. Surplus Plutonium Disposition Program would be treated and solidified in WSB.

The DOE/NNSA is responsible for implementing the U.S. Surplus Plutonium Disposition Program under which weapons-usable plutonium declared surplus to United States' defense needs is to be converted into forms not readily usable for nuclear weapons. This Program involves fabricating surplus pit and non-pit[2] plutonium into mixed uranium-plutonium oxide (MOX) fuel for irradiation in existing domestic, commercial nuclear reactors, thereby generating electricity and rendering the plutonium into a form not readily usable in nuclear weapons. In the Record of Decision (ROD) for the *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) (65 *Federal Register* (FR) 1608; January 11, 2000), DOE announced its decision to fabricate MOX fuel in MFFF, a facility currently being constructed in F-Area at SRS and scheduled to begin operating in 2016. In that ROD, DOE also announced its decision to construct and operate PDCF (currently in the design stage) in F-Area at SRS, in which pits would be disassembled and the plutonium from the pits converted into plutonium oxide to be provided as feedstock for MFFF. The DOE/NNSA is proposing to treat and solidify in a standalone WSB located in close proximity to MFFF and PDCF three waste streams, a high-activity (high-alpha) waste stream[3] generated in MFFF, a low-activity stripped-uranium waste stream generated in MFFF, and a low-activity laboratory waste stream generated in PDCF.

Previous DOE and DOE/NNSA National Environmental Policy Act (NEPA) evaluations of the U.S. Surplus Plutonium Disposition Program have considered waste management activities occurring within the MFFF and PDCF or in a standalone facility. The *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (Storage and Disposition PEIS) (DOE/EIS-0229, December 1996) (DOE 1996) and the *Supplement Analysis for Changes Needed to the Surplus Plutonium Disposition Program* (MOX SA) (DOE/EIS-0283-SA1) (DOE 2003) (as well as the

[1] A potential standalone WSB is evaluated in the *Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina* (MFFF EIS) (NRC 2005). A standalone WSB is also discussed in the Construction Authorization Request and the License Application submitted to the Nuclear Regulatory Commission by DOE/NNSA's contractor (Duke COGEMA Stone & Webster [now Shaw AREVA MOX Services]) to design, construct and operate MFFF.

[2] A pit is the central core of a primary assembly in a nuclear weapon and is typically composed of plutonium-239 metal, enriched uranium, or both, and other materials. Pit plutonium comes from dismantled pits. Non-pit plutonium is any plutonium that is not derived from pits.

[3] This TRU waste stream consists of liquid waste streams (including americium, other radionuclides, excess acid, and alkaline waste) from the aqueous polishing process in MFFF.

U.S. Nuclear Regulatory Commission's [NRC's] *Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina* [MFFF EIS] [NRC 2005]) each considered a separate building for waste management activities to support MFFF and PDCF, while the SPD EIS (DOE/EIS-0236, November 1999) evaluated waste management activities occurring within MFFF and PDCF.[4] While DOE and DOE/NNSA decisions to construct MFFF and other decisions furthering the progress of the U.S. Surplus Plutonium Disposition Program have been announced in Records of Decision (RODs) and amended RODs, none has explicitly stated or confirmed that a standalone building would be constructed and operated for the purpose of solidifying liquid TRU and LLW generated by MFFF and PDCF activities.

Council on Environmental Quality regulations implementing NEPA at Title 40, Section 1502.9(c) of the Code of Federal Regulations (40 CFR 1502.9[c]) require Federal agencies to prepare a supplement to an EIS when an agency makes substantial changes in the proposed action that are relevant to environmental concerns or there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. DOE regulations at 10 CFR 1021.314(c) direct that when it is unclear whether a supplement to an EIS is required, a Supplement Analysis (SA) be prepared to assist in making that determination. This SA describes the WSB and evaluates in the context of the MOX fuel fabrication program whether the proposal to construct and operate a standalone WSB requires preparation of a supplemental or new EIS, or whether existing NEPA documentation is sufficient.

BACKGROUND

Existing NEPA Documentation

The U.S. Surplus Plutonium Disposition Program was first evaluated under NEPA in the Storage and Disposition PEIS (DOE 1996), in which DOE evaluated a wide range of disposition technologies and potential sites for several disposition facilities. Among the alternatives evaluated, the Reactor Category and Common Activities Alternative included a MOX fuel fabrication facility with a standalone building to manage wastes. The ROD for the Storage and Disposition PEIS (62 FR 3014, January 21, 1997) outlined DOE's decision to pursue a hybrid disposition strategy that allowed for both immobilization of surplus plutonium for disposal in a geologic repository and fabrication of MOX fuel for use in existing domestic, commercial nuclear power reactors followed by disposal of the spent MOX fuel in a geologic repository. In the ROD, DOE also reduced the number of sites and technologies to be considered and indicated that decisions regarding site selection, specific technologies, and timing and extent to which either disposition approach would be deployed would require follow-on site-specific environmental review.

Subsequent to the Storage and Disposition PEIS, DOE prepared the SPD EIS, which supported selection of specific technologies and sites for surplus plutonium disposition. In the ROD for the SPD EIS, DOE announced its decision to fabricate 33 metric tons (36 tons) of surplus plutonium in pits and clean metal into MOX fuel for use in existing domestic, commercial nuclear power reactors and to immobilize 17 metric tons (19 tons) of surplus non-pit plutonium in a ceramic matrix surrounded by Defense Waste Processing Facility (DWPF)[5] high-level radioactive waste glass. In the ROD, DOE also announced that

[4] During preparation of the SPD EIS, DOE considered the potential benefit of combining similar activities. In the description of Alternative 3 (locating all three facilities at SRS) in the SPD EIS, DOE states: "Should DOE decide to collocate all three disposition facilities at SRS, as indicated in the Preferred Alternative .... the final design of these facilities would coordinate potential common functions among the facilities to the extent practicable as a means to reduce space requirements and the associated environmental impacts."

[5] Nuclear materials production operations at SRS resulted in generation of large quantities of high-level radioactive waste. The Defense Waste Processing Facility was constructed at SRS to convert this high-level radioactive waste to a stable glass form suitable for disposal in a geologic repository.

the three facilities required to effect this disposition (MFFF, PDCF, and an Immobilization Facility) would be constructed and operated at SRS.

On April 19, 2002, DOE/NNSA announced in an amended ROD for the Storage and Disposition PEIS and the SPD EIS (67 FR 19432) that it was cancelling the immobilization component of the U.S. Surplus Plutonium Disposition Program, thereby reducing the number of facilities to be constructed at SRS from three to two. In the amended ROD, DOE explained that the new disposition strategy involved a MOX-only approach, under which up to 34 metric tons (37 tons) of surplus plutonium would be dispositioned by converting it to MOX fuel and irradiating the fuel in existing domestic, commercial nuclear power reactors. The amended ROD indicated that the 34-metric ton (37-ton) disposition program would implement the September 2000 *Agreement Between the Government of the United States and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation.* The DOE/NNSA also indicated that no final decisions would be made with respect to the MOX portion of the revised disposition program until DOE had completed additional analysis pursuant to NEPA.

That additional NEPA analysis was completed upon issuance of the MOX SA in April 2003 (DOE 2003) and the associated determination that no additional NEPA analysis was needed to process into MOX fuel 6.5 metric tons (7.2 tons) of plutonium originally intended for immobilization (referred to as alternate feedstock) or to implement the MFFF design changes identified during detailed design. An amended ROD was subsequently issued (68 FR 20134, April 24, 2003) announcing DOE/NNSA's decision to fabricate 34 metric tons (37 tons) of surplus plutonium into MOX fuel, including up to 6.5 metric tons (7.2 tons) of plutonium originally intended for immobilization.

In the MOX SA, DOE/NNSA evaluated changes needed to the Surplus Plutonium Disposition Program that were necessary to accommodate fabrication of this additional plutonium into MOX fuel at MFFF and also those refinements identified through the design process for MFFF. Consistent with the design at the time, a standalone WSB in which both liquid LLW and TRU waste would be treated and solidified was evaluated in the MOX SA. This was a refinement from the facility designs assumed in the SPD EIS, in which MFFF and PDCF each included waste processing equipment to treat and solidify LLW and TRU waste. A standalone WSB would take advantage of an economy of scale in that similar waste streams from both MFFF and PDCF would be treated together in the same location, rather than having duplicate equipment installed in both facilities. A standalone WSB was also evaluated by the NRC in the MFFF EIS.[6]

Waste Solidification Building History

As indicated in the previous discussion, the Surplus Plutonium Disposition Program has evolved over time. This section briefly discusses the development of waste management activities relevant to this SA.

Through a competitive procurement, DOE awarded a contract in 1999 to the team of Duke COGEMA Stone & Webster (DCS) (now Shaw AREVA MOX Services) to design, construct and operate MFFF in accordance with NRC regulations. During the detailed design process, and after DOE/NNSA considered using existing SRS facilities for processing all or some of the MFFF and PDCF waste streams, the design was refined from the conceptual design evaluated in the SPD EIS to include the standalone WSB. DCS originally submitted the *Mixed Oxide Fuel Fabrication Facility Environmental Report* (MOX ER) (Revision 0) to the NRC (Docket Number 070-03098) in December 2000, in support of its license

[6] Pursuant to Section 202(5) of the Energy Reorganization Act as added by Section 3134 of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, MFFF must be licensed by the NRC. NRC prepared the MFFF EIS in accordance with NEPA to support NRC licensing decisions concerning MFFF. Neither WSB nor PDCF will be licensed by NRC, but both were evaluated in the MFFF EIS as connected actions.

application for the MFFF.[7] The MOX ER is based on the specific facility design rather than the conceptual facility described in the SPD EIS, and includes the WSB. The MOX ER was used by the NRC to prepare the MFFF EIS, and was updated several times by DCS in response to NRC requests for additional information, and to reflect design changes, including those related to the universe of waste streams to be treated in the WSB. The last revision to the MOX ER, Revision 5, was issued in September 2004. At that time, the proposed WSB was designed to process five liquid waste streams. Prior design iterations had included processing some waste streams in existing SRS facilities rather than in WSB. However, closure schedules for these SRS facilities were not at that time compatible with the Surplus Plutonium Disposition schedule, and DOE/NNSA determined that use of these existing facilities was not a reasonable alternative.

Also in 2004, planning for WSB was suspended because of uncertainties with the Plutonium Disposition Program. Specifically, delays in negotiations with the Russian Federation (for Russian disposition of excess Russian weapons-grade plutonium) coupled with significant funding constraints for the domestic program had caused the project schedules for MFFF and PDCF to be extended. At that time, detailed design for WSB was about to begin, with the assumption that treatment for five liquid waste streams from MFFF and PDCF would occur in WSB. Because of the programmatic uncertainties, DOE/NNSA determined instead to suspend WSB planning activities, and funding was terminated through 2005.

Design activities resumed in fiscal year 2006. During the project suspension, changes in closure schedules for certain SRS waste management facilities allowed DOE/NNSA to reconsider their use. As a result, DOE/NNSA requested the SRS management and operations contractor to undertake an analysis to identify potential reasonable alternatives that would lead to the optimum WSB configuration. The goal of this study was to identify which waste processing and management operations could be conducted in existing SRS facilities and which, if any, would need to be provided independently.

The study comparing a range of potential alternatives comprising combinations of new and existing facilities was submitted in June 2005 (WSR-2005-00131) (WSRC 2005). Four alternatives with options were evaluated in this study (1) provide dedicated waste management capabilities (i.e., construct and operate a WSB) for all surplus plutonium disposition activity wastes, or only for those for which existing SRS capabilities would not be compatible; (2) transfer high-activity waste by truck or pipeline to the H-Area Tank Farm for processing through the SRS Solid Waste site infrastructure and process liquid LLW in the existing SRS Effluent Treatment Project (ETP); (3) construct independent storage (a 50,000-gallon seismically qualified storage tank) for high-activity waste for transfer by truck or pipeline to DWPF for processing through the SRS Solid Waste site infrastructure and processing of liquid LLW in ETP; and (4) remove americium in MFFF and treat the remaining liquids in a greatly simplified WSB, an "enhanced wastewater treatment process" that would result in a liquid waste stream suitable for processing in ETP (WSRC 2005). The DOE/NNSA evaluation of these alternatives (including options) showed that the most reasonable alternative with the least project risk would be to: (1) use existing SRS facilities for waste treatment for two waste streams projected to have minimal (or no) radioactive contamination;[8] (2) use existing SRS facilities for certification, packaging and shipping wastes solidified in a proposed WSB or generated during WSB operations; and (3) provide independent treatment and management capabilities (i.e., construct and operate a WSB) for three waste streams that are not compatible with existing SRS operations without major, costly modifications to SRS facilities and planned closure schedules. This optimized waste management alternative would reduce the number of waste streams to be treated in WSB from the five to three, and would reduce the WSB footprint from

[7] An environmental report is a document submitted by an applicant to the NRC pursuant to 10 CFR Part 51 as part of the licensing process. An environmental report contains information used by the NRC to prepare an EIS for an NRC proposed action such as issuance of a license to possess and use special nuclear material for fuel fabrication.
[8] As discussed later in this SA, these waste streams would be transferred to ETP for treatment prior to discharge through a permitted outfall.

approximately 50,000 square feet (4,600 square meters) to approximately 33,000 square feet (3,000 square meters). Changes to the project scope consistent with this approach were identified and the functional requirements for WSB were authorized in Revision 1 to the Facility Design Description (G-FDD-F-00007) dated April 2006 (Cantey 2008).

DESCRIPTION OF THE WASTE SOLIDIFCATION BUILDING

The WSB is proposed to be built next to PDCF and near MFFF in F-Area at SRS and would process liquid waste streams from both MFFF and PDCF. The WSB would occupy about 9 acres (3.6 hectares). The WSB design includes a Process Building, covered staging area for interim storage of waste containers,[9] an exhaust stack, and additional support facilities including office trailers, a truck unloading area, a caustic and acid tank area, a process sewer system with lift station, and a diesel generator. The Process Building would be a two-story reinforced concrete structure with the first level covering about 33,000 square feet (3,000 square meters) and a total floor space of about 38,000 square feet (3,500 square meters). The Process Building would be located at grade and contain waste concentration and cementation equipment for processing both low-activity and high-activity liquid waste, an analytical laboratory, control room, and some plant services. Liquid wastes would be solidified directly in drums inside dedicated enclosures. Secondary containment features such as dikes, tanks, sumps, and jackets with associated leak detection or monitoring equipment would be provided for areas with the potential for spills. Nonshielded areas would be dedicated to cold chemical feeds, steam generation, administration, electrical feeds, diesel electrical generation, the exhaust stack, floor drain collection, and drum receipt and storage (WSRC 2008a, 2008b).

The WSB process flow and maximum annual processing volumes are shown in **Figure 1**. This figure represents the activities that would be performed in WSB and the identified inputs and outputs are only representative of the volumes that would be treated or produced. This figure is not a mass balance. The WSB would receive three waste streams transferred from MFFF and PDCF through underground, double-walled stainless steel lines: a high-activity (high-alpha) waste stream from MFFF, a low-activity stripped-uranium waste stream from MFFF, and a low-activity PDCF laboratory waste stream. Waste streams would be stored at WSB in tanks pending subsequent treatment, including neutralization, volume reduction by evaporation, and cementation. Condensed overheads from the evaporators would either be transferred through a lift station and piping to the existing SRS ETP if the overheads meet the acceptance criteria for that facility or routed back through WSB processes for further treatment prior to discharge through a permitted outfall (WSRC 2008a, 2008b).

Waste acceptance criteria are being developed for incoming waste from MFFF and PDCF, including strict requirements on tritium and beryllium content to ensure that these contaminants would not pose a hazard to WSB workers or necessitate additional treatment processes in WSB to meet waste acceptance criteria of subsequent treatment or disposal facilities. Liquid waste streams would be processed in WSB into solid LLW and TRU waste forms acceptable for disposal. Solid TRU wastes would be shipped to the Waste Isolation Pilot Plant (WIPP). Solid LLW would be sent to onsite disposal facilities such as the E-Area burial grounds or to offsite disposal facilities such as the Nevada Test Site or commercial facilities. Sanitary wastewater produced at WSB would be transferred to the SRS Central Sanitary Waste

[9] This storage area would have the capacity for up to 48 containers of solidified TRU waste and 4 containers of TRU job control waste pending transfer to E-Area for further processing and storage pending shipment to WIPP. The number of containers is limited by the *Waste Solidification Building Preliminary Documented Safety Analysis* (WSRC 2008b).

Water Treatment System (WSRC 2008b). Waste management and other SRS infrastructure needed to support WSB operation are expected to be available for the operational lifetime of WSB.[10]

The MFFF and PDCF operations would also generate other liquid waste streams that either contain very low levels of radioactive contamination, or because of their origin, would have the potential to be contaminated. Consistent with the optimized waste management alternative included by DOE/NNSA in the April 2006 Revision 1 to the WSB Facility Design Description, these liquid waste streams would be transferred from their respective facilities to ETP using the same lift station and piping as for transfer of liquid wastes from WSB. In addition to the liquid wastes that would be sent to WSB or ETP, solid job control LLW and TRU waste (such as personal protective equipment, filters, empty containers, and wipes generated by everyday operations) would also be generated at MFFF and PDCF. These wastes would be packaged for disposal at the facility of origin then sent to E-Area for interim storage, as necessary, and onsite or offsite disposal.

Major WSB process equipment includes tanks, pipes, evaporators, cementation equipment, agitators, and pumps. The WSB design includes a ventilation system to maintain lower pressure in rooms that have the potential for higher levels of contamination. Air exhausted from different process areas, gloveboxes, and certain process vessels would be routed through high-efficiency particulate air (HEPA) filters before discharge from the WSB stack. The 50-foot- (15-meter-) high stack would have an internal diameter of about 5 feet (1.5 meters) and would carry an exhaust flow of about 60,000 cubic feet per minute (1,700 cubic meters per minute) (WSRC 2008a). The WSB facilities are being designed to provide radiation shielding for workers and confinement of airborne contamination, and in accordance with appropriate natural phenomena and other hazard criteria. For example, high-activity process piping and vessels would be isolated by automatic values should a seismic event be detected. The process facility would include fire detection and alarm systems, as well as an automatic fire suppression system. A standby diesel generator would provide backup power if needed (WSRC 2008a, 2008b).

[10] Should at some later date it become necessary for WSB operations to extend beyond the proposed closure of ETP, DOE would discuss this issue with regulators, as appropriate, and determine how to continue to treat the waste streams for which ETP provided treatment.

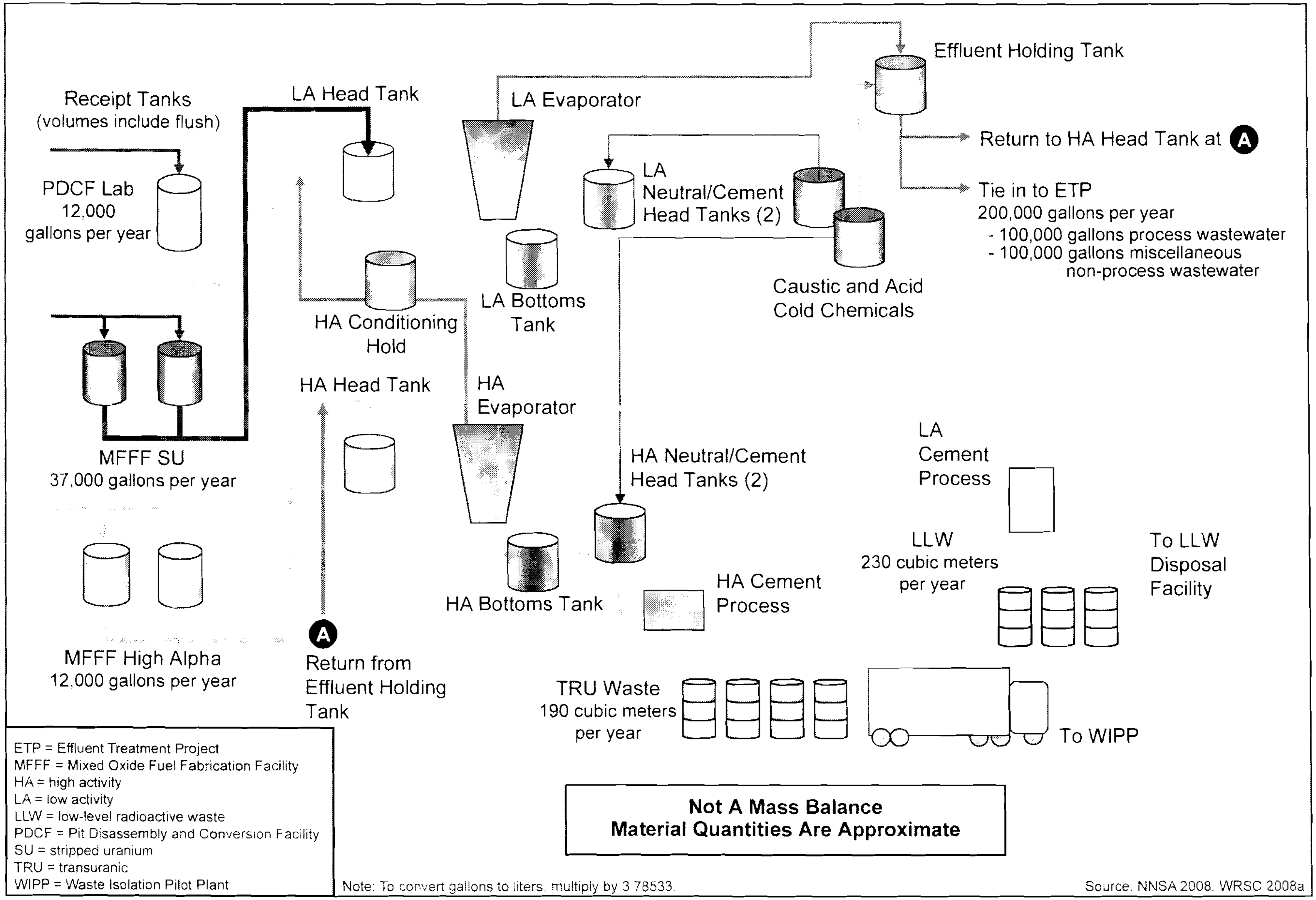

Figure 1. Waste Solidification Facility Process Flow Diagram

IMPACTS ANALYSIS

As previously discussed in this SA, the U.S. Surplus Plutonium Disposition Program and the design of facilities needed to implement the Program have evolved over time. Impacts of construction and operation of the needed facilities have been evaluated in several NEPA documents. The impact analysis presented in **Table 1** compares the potential impacts of constructing and operating the standalone WSB to the impacts identified in the SPD EIS for constructing and operating MFFF and PDCF. The treatment and solidification of liquid LLW and TRU waste proposed for a standalone WSB were included as part of MFFF and PDCF analyzed in the SPD EIS.

Table 1. Comparison of Impacts

Impacts Indicator		***MFFF and PDCF as Analyzed in the SPD EIS*** [a]			***Waste Management Functions in a Standalone WSB*** [b]
Air Quality (micrograms/cubic meter)					
Construction	***Standard***	***MFFF***	***PDCF***	***Total***	***WSB***
Carbon monoxide	8 hour - 10,000	0.547	0.911	**1.458**	0.205
Nitrogen dioxide	Annual - 100	0.0207	0.0601	**0.0808**	0.008
PM_{10}	24 hour - 150	1.8	1.03	**2.83**	0.793
Sulfur dioxide	3 hour - 1,300	0.31	0.578	**0.888**	0.526
Total suspended particulates	Annual - 75	0.0321	0.0977	**0.1298**	0.014
Operation	***Standard***	***MFFF***	***PDCF***	***Total***	***WSB***
Carbon monoxide	8 hour - 10,000	0.123	0.0942	**0.217**	NA [c]
Nitrogen dioxide	Annual - 100	0.0105	0.0287	**0.0392**	NA [c]
PM_{10}	24 hour - 150	0.0108	0.026	**0.0368**	0.000061
Sulfur dioxide	3 hour - 1,300	1.39	1.46	**2.85**	NA [c]
Total suspended particulates	Annual - 75	0.00059	0.00182	**0.00241**	0.00013
Comparison to the SPD EIS: Construction and operations air pollutant concentrations from the standalone WSB are generally small percentages of the concentrations predicted for MFFF and PDCF in the SPD EIS, and would be very small percentages of applicable standards.					
Human Health – Workers					
Construction		***MFFF***	***PDCF***	***Total***	***WSB***
Total worker dose (person-rem/yr)		1.2 [e]	1.4 [e]	**2.6** [e]	0.96 [e]
Annual LCFs (SPD EIS value/updated value) [d]		0 (0.00048/0.00072)	0 (0.00056/0.00084)	**0 (0.00104/0.00156)**	0 (0.00058)
Operations		***MFFF***	***PDCF***	***Total***	***WSB***
Total worker dose (person-rem/yr)		22	192	**214**	25
Annual LCFs (SPD EIS value/updated value) [d]		0 (0.0088/0.0132)	0 (0.077/0.1152)	**0 (0.086/0.128)**	0 (0.015)
Comparison to the SPD EIS: Worker dose and expected LCFs from construction and operation of a standalone WSB would be less than those estimated for the MFFF and PDCF in the SPD EIS. No LCFs would be expected from construction or operation of the WSB.					

Impacts Indicator	***MFFF and PDCF as Analyzed in the SPD EIS*** [a]			***Waste Management Functions in a Standalone WSB*** [b]
Human Health – Public				
Construction	No radiological risk would be incurred by members of the public from construction activities.			Because no ground surface contamination is present in the area where WSB would be constructed or piping would be installed between buildings, there would be no additional radiological releases to the environment or impacts on the general population.
Operations	***MFFF***	***PDCF***	***Total***	***WSB***
Annual population dose (person-rem/yr)	0.18	1.6	**1.8**	0.0026
Annual population LCFs (SPD EIS value/updated value) [d]	0 (0.00009/0.0001)	0 (0.0008/0.001)	**0 (0.0009/0.0011)**	0 (1.6×10^{-6})
Annual MEI dose (millirem)	0.0037	0.0037	**0.0074**	0.000068
Annual MEI LCF Risk SPD EIS value/ Updated value [d]	1.9×10^{-9}/ 2.2×10^{-9}	1.9×10^{-9}/ 2.2×10^{-9}	**3.8×10^{-9}/ 4.4×10^{-9}**	4.1×10^{-11}
Comparison to the SPD EIS: There would be no impact on public health from construction of a standalone WSB. Impacts on public health from operation of a standalone WSB would be a small percentage of those estimated in the SPD EIS for the MFFF and PDCF. The potential for emissions from WSB operations is less than from either MFFF or PDCF, hence the potential for offsite impacts is less. No LCFs would be expected from operation of the WSB.				

Facility Accidents			
		WSB	
Beyond-Design Basis Earthquake Scenario	***MFFF and PDCF***	***Dose (rem or person-rem)***	***Lifetime LCF Risk*** [f]
Noninvolved worker	NA	100	1.6×10^{-6}
Person at site boundary	NA	4.0	3.1×10^{-8}
Population within 50 miles (80 kilometers)	NA	1,900	1.5×10^{-5}
Comparison to the SPD EIS: There is not a basis of comparison with the SPD EIS because none of the accidents in the SPD EIS accident analysis involve waste management activities. Seven bounding accident scenarios were analyzed for WSB: high activity waste process vessel hydrogen explosion; high activity process room fire; leak or spill; design-basis earthquake; aircraft crash; beyond-design-basis red oil explosion; and beyond-design-basis earthquake (WSRC 2008b). Only the risks for the beyond-design-basis earthquake scenario are presented, because this scenario dominates the overall risk. The assumed frequency for a beyond-design-basis earthquake is 1.0×10^{-6} per year, and the potential number of LCFs were such an event to occur is 1 (1.1) in the entire offsite population of approximately 790,000. Considering the frequencies of the seven accident scenarios, no LCFs would be expected in any of the affected populations from postulated design basis or beyond-design-basis WSB accidents.			

Socioeconomics				
Total SRS employees	15,032 (1997)			8,391 (2006)
Employees	***MFFF***	***PDCF***	***Total***	***WSB***
Construction (peak year)	772	451	**1,223**	210
Operations (annual)	385	400	**785**	60
Comparison to the SPD EIS: Employment for construction and operation of a standalone WSB would be small percentages of those estimated for the MFFF and PDCF in the SPD EIS, and even smaller percentages of total site employment.				

Impacts Indicator	***MFFF and PDCF as Analyzed in the SPD EIS*** [a]			***Waste Management Functions in a Standalone WSB*** [b]
Waste Management				
Construction (cubic meters per year)	***MFFF***	***PDCF***	***Total***	***WSB***
Nonhazardous	8,600	120	**8,720**	280
Hazardous	19	50	**69**	1
Operations (cubic meters per year)	***MFFF***	***PDCF***	***Total***	***WSB***
Nonhazardous	440	1,800	**2,240**	250
Hazardous	3	2	**5**	0.2
LLW - liquid	NR [g]	NR [g]	**NR** [g]	760
LLW - solid	94	60	**154** [h]	90 [i]
Mixed LLW	3	1	**4**	0
TRU waste	68	18	**86** [h]	12 [i]
Comparison to the SPD EIS: Wastes generated during WSB construction would be small percentages of those estimated for MFFF and PDCF in the SPD EIS. Nonhazardous and hazardous waste, and mixed LLW generated during WSB operations would be small percentages of those estimated for MFFF and PDCF in the SPD EIS. The solid LLW and TRU waste quantities reported for WSB are job control wastes (such as personal protective equipment, filters, empty containers, and wipes generated by everyday operations) generated incidental to treating and solidifying wastes from MFFF and PDCF; these quantities are in addition to those presented in Figure 1. The LLW would be within the SRS waste management capabilities. The TRU waste would be a small percentage of the 130 cubic meters (170 cubic yards) of TRU waste generated at SRS in 2007 (WSRC 2008a), and about 1 percent of the 12,000 cubic meters (15,700 cubic yards) analyzed in the WIPP SEIS (DOE 1997a) as coming from SRS. In addition, TRU waste generation for the standalone WSB would be a small percentage of the 19,900 cubic meters (26,000 cubic yards) of additional WIPP capacity remaining between the current estimated baseline of 148,560 cubic meters (194,302 cubic yards) and the 168,485 cubic meters (220,378 cubic yards) of the contact-handled TRU waste capacity limit (DOE 2008). SRS has sufficient onsite storage capacity for approximately 500 cubic meters (654 cubic yards) of TRU waste from surplus plutonium disposition operations pending shipment to WIPP. Only solid LLW was estimated in the SPD EIS because liquid radioactive wastes were to be solidified before leaving MFFF and PDCF. Operations at the standalone WSB would generate 760 cubic meters (200,000 gallons) of liquid LLW annually from evaporation of liquid radioactive wastes generated at MFFF and PDCF prior to solidification. This liquid waste stream would be sent to the SRS ETP for treatment (WSRC 2008a) prior to discharge through a permitted outfall. This waste stream would increase the amount of liquid waste received at ETP by 5 cubic meters (1,300 gallons) per day. The maximum permitted capacity of ETP is 1,600 cubic meters (430,000 gallons) per day, and actual processing is approximately 210 cubic meters (55,000 gallons) per day. Therefore, the liquid LLW contributed by WSB would increase the total waste processed at ETP by approximately 2 percent, which would be well within the excess permitted capacity of the facility.				
Transportation				
Shipments of TRU waste to WIPP	Shipments of TRU waste to WIPP would not represent any additional risks beyond the ordinary waste shipments at these sites as analyzed in the WM PEIS (DOE 1997b).			Approximately 1 shipment per year
Comparison to the SPD EIS: Approximately 1 shipment per year would be required to dispose of job control TRU waste generated at WSB incident to processing waste from MFFF and PDCF. This one shipment per year of TRU waste from WSB would be a small percentage of the 1,225 to 1,960 expected future shipments of TRU waste from SRS to WIPP (WSRC 2008a).				
Environmental Justice				
Minority population in the ROI [j]	274,985 (1997) 336,549 (2010)			298,375 (2000)
Low-income population in the ROI	107,057 (1990)			115,710 (2000)
Comparison to the SPD EIS: The SPD EIS reported that construction and operation of the MFFF and PDCF would have no disproportionately high and adverse effects on minority or low-income populations. This conclusion remains valid for construction and operation of the WSB.				

Impacts Indicator	***MFFF and PDCF as Analyzed in the SPD EIS*** [a]			***Waste Management Functions in a Standalone WSB*** [b]
Land Resources				
Land Disturbed/Occupied	***MFFF***	***PDCF***	***Total***	***WSB***
Construction disturbance (acres)	30.6	13.5	**44.1**	9
Operations land occupied (acres)	15.4	7.4	**22.8**	6.1
Comparison to the SPD EIS: The land areas disturbed to construct the WSB (9 acres) and occupied by the completed facility (6.1 acres) would be within the land area assumed in the SPD EIS for MFFF, PDCF, and an immobilization facility (DOE 1999). This area has been cleared during site preparation for MFFF. Therefore, no additional land use impacts would result from construction of the standalone WSB.				
Visual Resources				
Change in Visual Resource Management Classification	The appearance of new facilities in F-Area would remain consistent with this area's industrialized character and a Visual Resource Management Class IV designation.			Similar to SPD EIS.
Comparison to the SPD EIS: Impacts on visual resources from construction and operation of a standalone WSB would be similar to those described for the MFFF and PDCF in the SPD EIS and would not meaningfully increase impacts on visual resources.				
Geology and Soils				
Construction	Construction of facilities would have a negligible impact on geologic and soil resources.			The total quantities of geologic materials used for construction would be small percentages of regionally plentiful resources. Minimal impacts on geology and soils are expected.
Comparison to the SPD EIS: Impacts on geology and soils from construction and operation of a standalone WSB would generally be proportional to the land area disturbed and the size of the building constructed. Therefore, impacts on geology and soils from construction and operation of a standalone WSB would be minimal and would be less than those described for the MFFF and PDCF in the SPD EIS.				
Water Resources				
Construction	Surface water would not be utilized to supply construction activities. No direct releases of contaminated effluents would occur. Thus, there would be minimal impact on surface water flows and quality. Although groundwater would be used to supply construction requirements, no impacts on groundwater availability are expected. Because wastewater would not be directly discharged to the groundwater, no adverse impacts on groundwater quality are expected.			Surface water would not be utilized to supply construction activities. Sanitary wastewater would be treated prior to release. Indirect releases such as runoff would be subject to sediment and runoff controls. Thus, there would be minimal impact on surface water flows and quality. Although groundwater would be used to supply construction requirements, no impacts on groundwater availability are expected. Because wastewater would not be directly discharged to the groundwater, no adverse impacts on groundwater quality are expected.

Impacts Indicator	***MFFF and PDCF as Analyzed in the SPD EIS*** [a]	***Waste Management Functions in a Standalone WSB*** [b]
Operations	Surface water would not be utilized to supply operations. No direct releases of contaminated effluents would occur. Thus, there would be minimal impact on surface water flow and quality. Although groundwater would be used to supply operations requirements, no impacts on groundwater availability are expected. Because wastewater would not be directly discharged to the groundwater, no adverse impacts on groundwater quality are expected.	Surface water would not be utilized to supply operations. Contaminated effluents would be treated prior to discharge through permitted outfalls. Thus, there would be minimal impact on surface water flow and quality. Although groundwater would be used to supply operations requirements, no impacts on groundwater availability are expected. Liquid releases would be discharged to ETP and the CSWT Facility. Because wastewater would not be directly discharged to the groundwater, no adverse impacts on groundwater quality are expected.
Comparison to the SPD EIS: Impacts on water resources from construction and operation of a standalone WSB would be minimal and similar to those described for the MFFF and PDCF in the SPD EIS.		
Biotic Resources		
Aquatic resources, wetlands, and threatened and endangered species	Up to 29 acres of terrestrial habitat would be lost. There would be no impact on aquatic habitat. Wetlands should not be directly impacted. No critical habitat for threatened and endangered species would be disturbed.	Land disturbed during construction or operation would not include any aquatic habitat, wetlands, or threatened and endangered species habitat.
Comparison to the SPD EIS: Land to be used for WSB is within the area disturbed for construction of the surplus plutonium disposition facilities analyzed in the SPD EIS (DOE 1999). This area has been cleared during site preparation for MFFF. Therefore, impacts on biotic resources from construction and operation of a standalone WSB would be minimal and less than those described for the MFFF and PDCF in the SPD EIS.		
Cultural Resources		
Prehistoric, historic, Native American, and paleontological resources	Five archaeological sites could be impacted including two NRHP-eligible sites. Disturbance of the NRHP-eligible sites would be mitigated by data recovery. [k] No additional historic, Native American, or paleontological resources are known to exist within the construction area.	Construction would not disturb additional NRHP-eligible sites, and would not disturb any additional historic sites since data recovery was completed prior to land-clearing activities in F-Area. No additional Native American or paleontological resources are known to exist within the construction area.
Comparison to the SPD EIS: Impacts on cultural resources from construction and operation of a standalone WSB would be minimal and within those described for the MFFF and PDCF in the SPD EIS.		

Impacts Indicator	***MFFF and PDCF as Analyzed in the SPD EIS*** [a]			***Waste Management Functions in a Standalone WSB*** [b]
Infrastructure				
Construction	***MFFF***	***PDCF***	***Total***	***WSB***
Electricity (megawatt-hours/year)	2,000	1,700	**3,700**	4,160
Fuel oil (gallons per year)	88,057	87,176	**175,233**	34,300
Water (M gallons per year)	6.08	3.17	**9.25**	1.15
Operations	***MFFF***	***PDCF***	***Total***	***WSB***
Electricity (megawatt-hours/year)	30,000	16,000	**46,000**	35,040
Fuel oil (gallons per year)	16,643	10,038	**26,681**	2,500
Water (M gallons per year)	18.0	12.7	**30.7**	12.3
Comparison to the SPD EIS: Infrastructure requirements during construction and operation of a standalone WSB would be comparable to or less than those described for the MFFF and PDCF in the SPD EIS. Although electricity requirements for construction (4,200 megawatt-hours per year) and operations (35,040 megawatt-hours per year) of the standalone WSB would be similar to those estimated for the combined MFFF and PDCF, these requirements would be a small percentage of the 4,030,000 megawatt-hours per year of available capacity, and therefore would have little impact on the utility infrastructure. Capacity also exists at SRS to meet additional needs for other resource areas.				

CSWTF = Central Sanitary Wastewater Treatment Facility; ETP = Effluent Treatment Project; LCF = latent cancer fatality; LLW = low-level radioactive waste; M = million; MFFF = Mixed Oxide Fuel Fabrication Facility; NA = not applicable; NR = Not reported; NRHP = National Register of Historic Places; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; $PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 microns; PDCF = Pit Disassembly and Conversion Facility; ROI = Region of Influence; SPD EIS = *Surplus Plutonium Disposition Environmental Impact Statement*; SRS = Savannah River Site; TRU = transuranic; WM PEIS = *Waste Management Programmatic Environmental Impact Statement*; WSB = Waste Solidification Building.

[a] Source: *Surplus Plutonium Disposition Environmental Impact Statement* (DOE 1999).

[b] Source: Waste Solidification Building Data Call Response (WSRC 2008a).

[c] WSB operations would produce very small quantities of carbon monoxide, nitrogen dioxide, or sulfur dioxide.

[d] The number of LCFs in a population is presented as an integer; where the value is 0, the calculated value is presented in parentheses. Two values are provided for LCF estimates from the SPD EIS. The first LCF value is the one presented in the SPD EIS and is based on a dose-to-LCF-risk factor of 0.0004 per rem for workers and 0.0005 per rem for the public, consistent with DOE guidance at the time the SPD EIS was issued. The second value for each SPD EIS LCF and for the WSB LCFs is based on a dose-to-LCF-risk factor of 0.0006 per rem for both workers and the public, consistent with current DOE guidance.

[e] MFFF and PDCF doses are based on a dose of 4 mrem/year above background to each construction worker as reported in the SPD EIS (DOE 1999:4-54), and for WSB, on a dose of 7.1 mrem/year above background as estimated from data reported in the SRS Environmental Report for 2007 (WSRC 2008c).

[f] Lifetime LCF risk is estimated using the following formula: dose (in rem or person-rem) × the dose conversion factor (0.0006 LCFs per person-rem) × the frequency of the accident (1.0 x 10^{-6}per year) × the operating duration (13 years). For individual doses greater than 20 rem, the probability of an LCF is doubled

[g] Comparable liquid waste volumes were not provided in the SPD EIS because most liquid waste streams were to be processed to solid waste within the MFFF and PDCF.

[h] In the MOX SA, DOE/NNSA evaluated the annual generation of 330 cubic meters (430 cubic yards) of LLW and 518 cubic meters (677 cubic yards) of TRU waste by MFFF and PDCF. In the MOX SA, DOE/NNSA concluded that the management of these wastes is well within the capabilities and capacities of the SRS waste management infrastructure, and for TRU waste, included in and bounded by the WIPP SEIS (DOE 1997a).

[i] These solid LLW and TRU wastes are job control wastes that would be generated in WSB incidental to treating and solidifying the liquid wastes from MFFF and PDCF. The liquid LLW and TRU waste generated by MFFF and PDCF that would be solidified in WSB are not included in the WSB waste generation values in this table. Solidification of this liquid waste would result in the generation of 230 cubic meters (300 cubic yards) of LLW and 190 cubic meters (250 cubic yards) of TRU waste annually.

[j] The SPD EIS includes projections for minority populations for the years 1997 and 2010. These projections were calculated using the 1990 census as a baseline and assumed that state-level population projections prepared by the U.S. Bureau of the Census would apply to the block groups within the 50-mile (80-kilometer) ROI.

[k] Data recovery at the NRHP-eligible sites has been completed.

Note: Totals may not equal the sum of the contributions due to rounding.

The WSB impacts in Table 1 are estimated based on processing 34 metric tons (37 tons) of surplus weapons-usable plutonium at MFFF over 13 years. If either more plutonium were fabricated into MOX fuel or the actual annual fabrication rate were less than assumed, WSB would operate longer.[11] If more plutonium were fabricated into MOX fuel, WSB construction impacts would remain the same, and the identified annual impacts would be essentially the same, but would occur for a longer period of time. Hence the total impact of WSB operation would be greater than estimated in this SA for treating and solidifying LLW and TRU waste resulting from fabricating 34 metric tons (37 tons) of surplus weapons-usable plutonium into MOX fuel. If the MOX fuel fabrication rate were less than assumed, the annual impacts from WSB operations would be less than identified, but the total impact of WSB operations associated with fabricating MOX fuel from the 34 metric tons (37 tons) would be the same. Likewise, delays in MFFF or PDCF startup could also shift or extend the timeframe for WSB operation.

This paragraph qualitatively compares the impacts of a standalone WSB shown in Table 1 to the impacts of the relevant waste processing, treatment and solidification operations discussed as part of both the MFFF and the PDCF in the SPD EIS. Irrespective of whether LLW and TRU waste would be treated in a standalone building or separately in MFFF and PDCF, the same amount of waste would be treated. Waste treatment and solidification activities and disposal facilities for the solidified LLW and TRU waste would also be the same. Construction activities for a standalone WSB, including installation of underground piping between MFFF, PDCF, and WSB, would result in impacts different from those identified in the SPD EIS. As can be seen in Table 1, the potential impacts of WSB construction and operation are small and would occur in a previously disturbed operational area within SRS.

In the aftermath of September 11, 2001, DOE has re-evaluated security scenarios involving malevolent, terrorist, or other intentional destructive acts to assess potential vulnerabilities and identify improvements to security procedures and response measures. A fundamental principle of DOE's safeguards and security program is a graded approach to the protection of its employees and assets. This approach is embodied in the relevant threat considerations and designations of facilities. The DOE intends that the highest level of protection be given to security interests where loss, theft, compromise, or unauthorized use would adversely affect national security, the health and safety of employees and the public, or the environment.

This graded approach categorizes all DOE assets into one of five "Security Protection Levels" based on the general consequences of loss, destruction, or impact on public health and safety at a facility or the program, project, or activity conducted. In accordance with DOE's Graded Security Protection (GSP) Policy (DOE Order 470.3B), the proposed WSB is designated a Security Protection Level 4 (SPL 4) facility. This is the level assigned to a facility which has a low risk based on the general consequence of loss destruction or impact on security, public health and safety. In assigning the SPL 4 designation, DOE has evaluated the security, health and safety impact of the facility and has determined the potential impact to be low. Scenarios for intentional destructive acts at the proposed new facility (e.g. terrorism, internal sabotage) have been evaluated and were determined to have a low impact on security, public health and safety (WSMS 2008).

[11] The DOE/NNSA has made no decision to fabricate additional surplus plutonium into MOX fuel. Such a decision, if made, would be set forth in an amended ROD for the SPD EIS following appropriate NEPA analysis. In this regard, DOE is preparing the *Surplus Plutonium Disposition Supplemental EIS*, which, among other alternatives, will analyze the impacts of fabricating an additional 9 metric tons (9.9 tons) of (weapons-grade) pit plutonium declared surplus in September 2007 and certain previously declared surplus weapons-usable non-pit plutonium into MOX fuel.

CONCLUSION

Construction and operation of a standalone building near MFFF on the PDCF site in F-Area at SRS to treat and solidify into LLW and TRU waste high-activity (high-alpha) liquid waste from operation of MFFF and low-activity liquid wastes from operation of MFFF and PDCF does not involve environmental impacts that are significantly different from those identified in previous NEPA analyses, in particular, the SPD EIS. Activities proposed for this standalone building, the WSB, would be similar to those identified in the SPD EIS to occur separately in both MFFF and PDCF. Although the proposed facilities, and the quantity and composition of weapons-usable plutonium to be dispositioned have evolved since the SPD EIS, NEPA evaluations have been performed to analyze changes in potential impacts resulting from these changes, including the proposed standalone WSB.

DETERMINATION

This SA demonstrates that construction and operation of a standalone WSB represent neither substantial changes relevant to environmental concerns nor significant new circumstances or information relevant to environmental concerns. Therefore, pursuant to 10 CFR 1021.314(c), no additional NEPA analyses are required for the WSB.

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