

SUPPLEMENT ANALYSIS

STORAGE OF SURPLUS PLUTONIUM MATERIALS AT THE SAVANNAH RIVER SITE

INTRODUCTION AND PURPOSE

In April 2002, DOE decided to immediately consolidate long-term storage at the Savannah River Site (SRS) of surplus, non-pit weapons-usable plutonium then stored at the Rocky Flats Environmental Technology Site (RFETS) (DOE, 2002a). That 2002 decision did not affect an earlier DOE decision made in the January 21, 1997, Record of Decision (ROD, DOE, 1997) for the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (Storage and Disposition PEIS, DOE, 1996) to continue storage of non-pit surplus plutonium at Hanford, the Idaho National Laboratory (INL), and the Los Alamos National Laboratory (LANL), pending disposition (or movement to lag storage at the disposition facility). DOE has since transferred all surplus weapons-usable plutonium from RFETS to Pantex and SRS.

DOE now proposes to consolidate storage at the SRS of surplus, non-pit weapons-usable plutonium from the Hanford site (Hanford), the Los Alamos National Laboratory (LANL), or the Lawrence Livermore National Laboratory (LLNL).^{1,2} This Supplement Analysis (SA) evaluates the need for additional National Environmental Policy Act (NEPA) review regarding this proposal.

This proposal to consolidate storage of surplus non-pit weapons-usable plutonium at SRS would reduce the number of sites with special nuclear material; enhance the security of these materials; reduce the risk plutonium storage poses to the public and environment; reduce or avoid the costs associated with plutonium storage, surveillance and monitoring, and security at multiple sites; and relocate the material to DOE's planned site for surplus plutonium disposition. Plutonium consolidation has been encouraged by independent reviews of DOE's activities, including the Government Accountability Office (GAO) in its July 2005 report entitled *Securing U.S. Nuclear Materials: DOE Needs to Take Action to Safely Consolidate Plutonium* (GAO-05-665) and recently by the Defense Nuclear Facilities Safety Board (DNFSB). In its June 26, 2007, report to Congress, the DNFSB stated: "The Board believes consolidation of excess plutonium into a single, robust facility suitable for extended retrievable storage is logical from a *safety* perspective. DOE should aggressively pursue consolidation of its excess plutonium." Furthermore, transferring within the next two to three years the surplus, non-pit weapons-usable plutonium currently at Hanford to SRS would enhance security at the Hanford site and avoid the expenditure of about \$200 million for security upgrades to be compliant with the 2005 Design

¹ Based on DOE's current surplus plutonium disposition plans, DOE expects to disposition the surplus plutonium stored in KAMs in less than 20 years. DOE has analyzed the potential environmental impacts of storage of such plutonium in KAMs for up to 50 years.

² DOE indicated in the *Storage and Disposition PEIS* ROD (DOE, 1997) that 0.3 metric tons of plutonium stored at LLNL was primarily research and development and operational feedstock material not surplus to government needs, and that the material would continue to be stored for use at LLNL. DOE has since determined that there is no programmatic need for this material, and that transferring the material to SRS for storage would reduce surveillance costs at LLNL. In 1999, DOE determined that 3 to 4 metric tons of plutonium material will be retained at the Idaho National Laboratory for potential future use.

Basis Threat (DBT) guidance, as well as tens of millions of dollars more each year for security and monitoring to continue storing the material at Hanford.

At SRS, DOE would use the K-Area Material Storage (KAMS) facility and portions of the K-Area complex for consolidated storage and surveillance of this material. Consistent with previous decisions for such RFETS plutonium (DOE, 1998a), this surplus, non-pit weapons-usable plutonium would be transferred to and stored in KAMS in a form and in containers that meet the DOE Standard for storage of plutonium, DOE-STD-3013 (DOE, 2004a).³ In addition, the 3013 containers would remain inside Type B (e.g., a 9975) shipping packages, except for temporary storage necessary for surveillance activities to ensure safe storage. DOE would also transfer unirradiated fuel (consisting of fuel pins and fuel assemblies) primarily from the Fast Flux Test Facility (FFTF) currently stored at Hanford to SRS.⁴ The fuel pins and assemblies would be shipped to SRS and stored in Type B shipping packages (e.g., Hanford Un-irradiated Fuel Package) inside the K-Area complex.

The Council on Environmental Quality regulations for implementing NEPA, 40 CFR 1502.9(c), direct Federal agencies to prepare a supplement to an EIS when an agency “(i) makes substantial changes in the proposed action that are relevant to environmental concerns, or (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or impacts.” DOE regulations for compliance with NEPA, 10 CFR 1021.314(c), direct that when it is unclear whether a supplement to an EIS is required, DOE must prepare an SA to assist in making that determination.

Separately from the proposed consolidation and storage activities evaluated in this SA, DOE is preparing a *Supplemental Environmental Impact Statement for Surplus Plutonium Disposition at the Savannah River Site* to evaluate the potential environmental impacts of alternative methods to disposition surplus, non-pit plutonium materials. As stated in the Notice of Intent (72 FR 14543; March 28, 2007), “in addition to achieving the ultimate goal of permanent disposition of surplus plutonium materials, DOE independently needs to improve the configuration of the storage system for these materials, pending disposition” (quoting DOE, 2002a).⁵ The action alternatives in the Supplemental EIS involve: (1) a glass can-in-canister approach that would be installed in K-Area; (2) a ceramic can-in-canister approach that would be installed in K-Area; and (3) the Mixed Oxide (MOX) Fuel Fabrication Facility, currently under construction at SRS. In conjunction with any of these alternatives, DOE would utilize the existing H-Canyon and

³ In its 1998 Amended ROD (DOE, 1998a) for the *Storage and Disposition PEIS*, DOE indicated that all plutonium materials shipped to SRS would be stable and, except for classified metal parts, would be packaged to meet the requirements of DOE Standard 3013, Stabilization, Packaging, and Storage of Plutonium-Bearing Materials.

⁴ The use of FFTF and the unirradiated fuel currently at Hanford is being considered in conjunction with the evaluation of reasonable alternatives in the *Global Nuclear Energy Partnership (GNEP) Programmatic EIS*. The planned shipment of the FFTF unirradiated fuel to SRS is scheduled for the second half of Fiscal Year 2009. If FFTF is still being considered as part of GNEP following completion of the PEIS (expected in 2008), DOE may choose not to ship the unirradiated FFTF fuel to SRS.

⁵ The proposed action analyzed in this SA involves a different purpose and need, different facility (KAMS), different technologies, and potential environmental impacts, as well as a more imminent timing, than the alternatives being analyzed in the Supplemental EIS. The proposed consolidation analyzed in this SA would not trigger, prejudice or limit the alternatives analyzed in the Supplemental EIS, and DOE could select one or more of the alternatives analyzed in the Supplemental EIS regardless of whether DOE decides to consolidate storage of surplus plutonium pursuant to this SA.

Defense Waste Processing Facility (DWPF) for the disposition of up to about four metric tons of surplus, non-pit plutonium materials. DOE's selection of one or more of these alternatives would ensure that surplus, weapons-usable plutonium that is currently at SRS, or that would be shipped to SRS as a result of the action evaluated in this SA, would be placed in a form that would facilitate a disposition path out of South Carolina.

BACKGROUND

Through a series of decisions supported by appropriate NEPA analyses, DOE has decided to store certain of its surplus non-pit weapons-usable plutonium at SRS facilities. Existing facilities at SRS are being used for storage of SRS surplus plutonium materials as well as surplus plutonium received from RFETS. The relevant NEPA documents are listed and briefly described in Table 1. The documents and the decisions DOE made in regard to plutonium storage and disposition are described in greater detail following Table 1.

Table 1. NEPA Reviews and Decisions Related to Plutonium Storage and Disposition at the SRS

October 1995 - Interim Management of Nuclear Materials (IMNM) EIS - This document assessed the potential environmental impacts of actions necessary to manage nuclear materials then stored at SRS until decisions on their ultimate disposition were made and implemented. DOE did not evaluate actions for offsite materials in the IMNM EIS, but the analysis applies to types of nuclear materials regardless of origin. Construction of a new Actinide Packaging and Storage Facility (APSF) was included in the analysis. This EIS did not establish a limit to the period for which materials could be stored. In many cases (e.g., for existing plutonium metal stored in vaults at SRS and Pu-239 solutions), however, material was to be stored until DOE made "long-term storage or disposition decisions."

December 1995 - IMNM EIS ROD - The ROD identified the selected management (stabilization methods and storage) for the majority of SRS's "vulnerable" nuclear materials and announced the decision to build the APSF.

December 1996 - Storage and Disposition of Weapons-Usable Fissile Materials PEIS - This document analyzed the potential environmental consequences (over a 50-year storage period consistent with DOE-STD-3013) of alternatives for long-term storage, including storage pending disposition, and disposition of weapons-usable fissile materials from the dismantlement of U.S. nuclear weapons. The preferred alternative for storage of non-pit plutonium from RFETS and SRS was to store it in an expanded APSF at SRS, and to phase out storage at RFETS. The preferred alternative for disposition of plutonium involved a combination of immobilization for direct disposal and manufacture of MOX fuel for commercial reactors.

January 1997 - ROD for Storage and Disposition of Weapons-Usable Fissile Materials PEIS - This document selected weapons-usable fissile materials storage and surplus plutonium disposition strategies. For plutonium storage, DOE decided to

consolidate part of its weapons-usable plutonium storage by upgrading and expanding existing and planned facilities at Pantex (plutonium pits) and SRS (non-pit plutonium). At SRS, plutonium was to be stored in an expanded APSF. Plutonium currently stored at Hanford would remain there until disposition (or move to lag, *i.e.* temporary, storage at a disposition facility). Non-pit weapons-usable plutonium would be moved from RFETS to SRS after stabilization was performed at RFETS and after the material was packaged in DOE-approved containers pursuant to existing procedures. In addition, shipment of the non-pit plutonium from RFETS to SRS after stabilization would only be implemented if the subsequent ROD for a plutonium disposition site called for immobilization of plutonium at SRS.

August 1998 - Amended ROD for Storage and Disposition of Weapons-Usable Fissile Materials PEIS - To support early closure of RFETS and early deactivation of plutonium storage facilities at Hanford, this amended decision allowed for accelerated shipment of non-pit surplus plutonium from RFETS to SRS before completion of the APSF, as well as the relocation of all Hanford surplus weapons-usable plutonium to the SRS, pending disposition. However, consistent with the January 1997 ROD, DOE decided to only implement the movement of RFETS and Hanford non-pit, surplus weapons-usable plutonium inventories to the SRS if the SRS were selected as the immobilization disposition site. To accommodate storage of the RFETS non-pit plutonium prior to completion of the APSF, space was to be provided in K-Area at the SRS. Prior to issuing an amended ROD (DOE, 1998a), DOE prepared an SA (DOE, 1998b) to evaluate storage in the KAMS facility (for 10 years), rather than in APSF, because APSF would not be complete in time to support early deinventory of RFETS.

November 1999 - Surplus Plutonium Disposition (SPD) EIS - This EIS identified the environmental impacts of reasonable alternatives for the proposed siting, construction, and operation of three facilities for the disposition of up to 50 metric tons of surplus plutonium, as well as a No Action alternative. The preferred alternative was a hybrid approach: immobilizing 17 metric tons of surplus plutonium and using the remaining 33 metric tons to fabricate mixed oxide fuel (to be “burned” in commercial nuclear reactors). SRS was the preferred site for all three disposition facilities (pit disassembly and conversion, MOX fabrication, and immobilization). The No Action alternative analyzed the impacts of continued storage of plutonium at sites across the DOE complex for a 50-year period.

January 2000 - SPD EIS ROD - Consistent with the January 1997 decision for the Storage and Disposition PEIS, DOE affirmed its decision to use a hybrid approach for the safe and secure disposition of up to 50 metric tons of surplus plutonium using both immobilization and MOX technologies. DOE also decided to construct and operate three new facilities (Pit Disassembly and Conversion Facility, Immobilization Facility, and MOX Fuel Fabrication Facility) at SRS.

January 2001 - Amended IMNM ROD - This ROD cancelled the APSF project and allowed for the installation of stabilization and packaging capability to meet DOE's plutonium storage standard within Building 235-F.

November 2001 - Amended IMNM ROD - This ROD cancelled the Building 235-F plutonium packaging and stabilization project, and DOE decided to modify existing or install new furnaces and an outer can welding capability within FB-Line in Building 221-F.

April 2002 - SA and Amended ROD for SPD EIS and Storage and Disposition PEIS - DOE modified its decisions on storage and disposition of surplus plutonium. DOE cancelled the immobilization portion of DOE's disposition strategy. DOE selected the alternative of consolidated long-term storage at SRS of non-pit surplus plutonium stored separately at RFETS and at SRS. DOE left unchanged its prior decision to continue storage of surplus non-pit weapons-usable plutonium at Hanford, INL, and LANL, pending disposition (or movement to lag, *i.e.* temporary, storage at the disposition facility). DOE decided to utilize the KAMS facility for consolidated long-term storage of non-pit plutonium from RFETS and SRS. Cancellation of the immobilization facility and selection of consolidated storage removed the basis for contingency contained in previous RODs (which conditioned transport of non-pit surplus plutonium from RFETS to SRS for storage on the selection of SRS as the site for the immobilization facilities), and, accordingly, DOE amended those RODS. DOE also stated that storage of plutonium and the ultimate disposition of that plutonium were separate actions addressed separately in the Storage and Disposition PEIS, and that while previous RODs combined these actions, such combination was not required to implement either decision, and served no programmatic purpose. The SA supporting the Amended ROD (DOE, 2002b) evaluated storage, in accordance with DOE-STD-3013, of surplus plutonium and plutonium materials from RFETS and other sites, as needed, in KAMS pending disposition.

April 2003 - SA and Amended ROD for SPD EIS - DOE amended its decision to allow for the disposition of up to 34 metric tons of plutonium (instead of 33 metric tons) and for preparing 6.5 metric tons of plutonium previously intended for immobilization for use as feed material for MOX fuel fabrication. The majority of the 6.5 metric tons of plutonium is located at Hanford, LLNL, and LANL, but DOE did not change the storage location for that material.

November 2003 - SA and Amended ROD for SPD EIS - DOE amended the 2000 ROD to allow for the fabrication of MOX fuel lead assemblies in France instead of at LANL.

December 2005 - Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Safeguards and Security Upgrades for Storage of Plutonium Materials at the SRS - DOE evaluated installation and operation of interim and permanent capability for plutonium surveillance and stabilization in K-Area at SRS, including deinventory of plutonium from F-Area for storage in K-Area, storage of plutonium in 3013 containers (rather than 3013s in 9975 shipping containers) to accommodate surveillance and stabilization, and installation of safeguards and security upgrades in K-Area and the Advanced Tactical Training Area.

At the end of the Cold War, the United States declared large quantities of plutonium and uranium surplus to the defense needs of the nation. At that time, materials were in various forms and various stages of the material manufacturing and weapons fabrication processes and located at several weapons complex sites that DOE had operated in the preceding decades. DOE began the process of placing these materials in safe, stable configurations suitable for storage until disposition strategies could be developed and implemented. The following is a summary of the NEPA documentation relevant to the storage and disposition of surplus plutonium materials for which DOE is now proposing actions.

In 1995, DOE prepared the *IMNM EIS* and evaluated a suite of alternatives for ensuring the continued safe management and storage of nuclear materials at SRS (DOE, 1995a). A part of the preferred alternative was the construction of the APSF to prepare, package, and store plutonium oxide and metal in accordance with DOE's standard for long-term storage of plutonium, DOE-STD-3013 (DOE, 2004a)⁶. The APSF also was intended to provide space for consolidated storage of plutonium and special actinide materials at the SRS. DOE's ROD for the *IMNM EIS* (DOE, 1995b) included the decision to construct the APSF. DOE ensures safe storage and processing operations through conformance to Technical Safety Requirements (TSRs) based on the Safety Analysis Reports (SARs) for the facilities and processes. The SARs and TSRs address issues such as criticality safety and material concentrations, as mentioned in the RODs cited above.

The *Storage and Disposition PEIS* (DOE, 1996) analyzed the potential impacts of various alternatives for the long-term storage (up to 50 years) of approximately 50 metric tons of surplus, weapons-usable plutonium (including weapons pits and non-pit material consisting of metals, oxides, alloys, and unirradiated fuels) throughout the DOE complex. The Storage and Disposition PEIS addressed several alternatives including consolidated storage at SRS and the preferred alternative that involved the shipment of RFETS non-pit plutonium to SRS and storage in an expanded APSF. DOE's decision (DOE, 1997) was consistent with the preferred alternative. DOE decided to reduce over time the number of locations where the various forms of plutonium are stored, through a combination of storage alternatives in conjunction with a combination of disposition alternatives. DOE also decided to expand the planned APSF at SRS to store those surplus, non-pit plutonium materials currently at SRS and surplus non-pit plutonium materials from RFETS, pending disposition. In the ROD, DOE also stated that transfer of plutonium materials to the SRS would be contingent upon, among other things, stabilization of the materials to comply with DOE-STD-3013 and selection of SRS as the immobilization disposition site in the ROD for the SPD EIS (then in preparation). DOE stated that placement of surplus, non-pit plutonium materials in a new storage facility at SRS, pending disposition at SRS, would allow utilization of existing expertise and plutonium handling

⁶ DOE-STD-3013 has been modified a number of times since its original issue. DOE-STD-3013 specifies criteria for safe, long-term storage of plutonium materials, and requires implementation of a surveillance program to assure that the storage criteria are met over time. The surveillance program requires that DOE have the capability to restabilize stored plutonium if it is found to be outside the safe storage specifications. In addition, the surveillance program assures the integrity of the Type B shipping containers used in storage through an inspection and maintenance program. The most notable change in the standard is a reduced frequency for surveillance of plutonium metal. No changes to the standard have been made that would invalidate any assumptions or analysis concerning the impacts of transporting or storing plutonium in compliance with the standard.

capabilities at a location where disposition activities could occur. DOE said that the decision to store non-pit plutonium from RFETS at SRS places most non-pit material at a plutonium-competent site with the most modern, state-of-the-art storage and processing facilities and at a site with the only remaining large-scale chemical separation and processing capability in the DOE complex.

To accelerate the closure of RFETS from 2010 to 2006, DOE decided to prepare additional suitable storage space in K-Area at SRS, later designated as KAMS (DOE, 1998a). The KAMS storage space would be used to store surplus, non-pit plutonium from RFETS. Prior to this decision, an SA was prepared to analyze storage for up to 15 metric tons (including plutonium from SRS, RFETS, and Hanford) of surplus plutonium materials in KAMS for a period of up to 10 years (DOE, 1998b). The SA demonstrated that this action would not result in a substantial change in the proposed action relevant to the environmental concerns evaluated in the Storage and Disposition PEIS and that the action did not present significant new circumstances or information relevant to the environmental concerns evaluated in the Storage and Disposition PEIS (DOE, 1996). DOE issued the SA, along with the amended ROD that announced the decision to construct and operate KAMS to facilitate early closure of the RFETS (DOE, 1998a). In this amended ROD, DOE also stated that it would relocate all Hanford surplus weapons-usable plutonium to the SRS between 2002 and 2005, pending disposition. However, consistent with the Storage and Disposition PEIS ROD, DOE would only implement the movement of RFETS and Hanford non-pit, surplus weapons-usable plutonium inventories to SRS if SRS were selected as the immobilization disposition site.

In 1999, DOE completed the *SPD EIS* (DOE, 1999) and in January 2000, issued a ROD (DOE, 2000a). Consistent with the January 1997 decision on the Storage and Disposition PEIS, DOE affirmed its decision to use a hybrid approach for the safe and secure disposition of up to 50 metric tons of surplus plutonium using both immobilization and MOX fuel technologies. DOE also decided to construct and operate three new facilities (Pit Disassembly and Conversion Facility, Immobilization Facility, and MOX Fuel Fabrication Facility) at SRS for surplus plutonium disposition.

Because of APSF cost growth, resource limitations, and the potential for integrating its plutonium storage activities, DOE evaluated alternative stabilization and storage options (DOE, 2000b). DOE decided in a January 2001 Amended ROD for the *IMNM EIS* (DOE, 2001), to cancel the APSF project and initiate a project to install monitoring, stabilization, and packaging equipment required to comply with DOE-STD-3013, in the F-Area Material Storage Facility at SRS. DOE determined that the impacts of this action had been evaluated in the *IMNM EIS* and stated its decision to continue to use existing vault space in F-Area at SRS for interim storage pending final disposition. The previous decision (DOE, 1998a) to store surplus, non-pit plutonium from RFETS in KAMS was reaffirmed.

However, following the events of September 11, 2001, DOE reassessed the threat criteria relative to the protection of plutonium and other nuclear materials. As a result of this reassessment, DOE revised the criteria and the postulated capabilities of those who might perpetrate acts of violence against DOE assets. As a result of this new threat guidance, DOE determined that the consolidation of plutonium at SRS into one location - KAMS - and enhancement of the security

of that location would provide the most advantageous means to meet this challenge and ensure the safety and security of the stored material. Therefore, DOE cancelled the project to install surveillance and stabilization capability in F-Area and proposed to construct the K-Area Interim Surveillance (KIS) project and the Container Surveillance and Storage Capability (CSSC) project in the K-Area complex. DOE prepared an EA, *Safeguards and Security Upgrades for Storage of Plutonium Materials at the Savannah River Site* (DOE, 2005a), and issued a FONSI (DOE, 2005b), to address the impacts of these and related security projects. The EA addressed surplus plutonium materials in the SRS inventory as of December 2005. The KIS project, which became operational in June 2007, and the CSSC project, currently planned to be operational in 2010, will provide surveillance and stabilization capability and capacity for storage of 3013 containers outside of KAMS (but in the K-Area complex) adequate to support the surveillance program required by DOE-STD-3013. KIS is operational and will allow DOE to comply with quarterly sampling requirements for stored plutonium materials, either material currently in the SRS inventory, or material that would be received as a result of the proposed action described in this SA.

In April 2002 (DOE, 2002a), DOE amended its previous storage and disposition decisions and decided to immediately consolidate long-term storage at the SRS of surplus, non-pit weapons-usable plutonium then stored at RFETS. Prior to issuing the Amended ROD, DOE prepared an SA (DOE, 2002b) to evaluate the potential impacts of storage of up to 15 metric tons of plutonium materials in 9975 shipping containers in KAMS for up to 50 years. DOE decided to store the plutonium in 9975 shipping containers to provide an additional margin of safety due to the lack of HEPA filtration for potential emissions from accidents in KAMS. DOE noted that cancellation of the immobilization facility and selection of the long-term storage alternative removed the basis for the contingency contained in previous RODs (which conditioned transport of surplus, non-pit plutonium from RFETS to SRS on the selection of SRS as the site for the immobilization facilities), and amended those RODs accordingly. DOE also noted that long-term storage of surplus plutonium and the ultimate disposition of that plutonium are separate actions, and that combining long-term storage and disposition was not required to implement either decision, and served no significant programmatic objective. Transfer of plutonium materials from RFETS to SRS was completed in 2003 and these materials are stored in 3013 containers inside 9975 shipping packages in the KAMS facility.

PROPOSED ACTION

Consistent with DOE's prior decision to reduce over time the number of locations where the various forms of surplus, weapons-usable plutonium are stored, DOE now proposes to consolidate storage of surplus, non-pit weapons-usable plutonium from Hanford, LANL, and LLNL at SRS, pending disposition. DOE proposes to transfer non-pit plutonium currently stored at Hanford, LLNL⁷, and LANL to SRS. This action would result in the relocation of surplus, non-pit plutonium (suitable for disposition) to the SRS, where the H-Canyon processing facility is in operation, the MOX facility is under construction, and a small-scale plutonium vitrification facility is proposed. Under the proposed action addressed in this SA, DOE would transfer, over

⁷ The LLNL materials were not identified as surplus in the Storage and Disposition PEIS (DOE, 1996), but were included in the inventory evaluated in the storage alternatives, including the consolidated storage alternative.

a period of about two to three years approximately 2,511 additional 3013-compliant packages⁸ containing plutonium metals and oxides to SRS. Approximately 2,300 containers would be transferred from Hanford; 115 containers would be transferred from LLNL; and 96 containers would be transferred from LANL. All 3013 containers would be shipped inside Type B shipping packages (e.g., 9975 packages) in Safe Secure Transports (SSTs). All containers would be certified as compliant with DOE-STD-3013 and Department of Transportation requirements prior to shipment, and DOE would acquire additional shipping containers if needed. In addition, DOE would transfer the equivalent of about 1,000 3013 containers, in the form of unirradiated fuel assemblies originally intended for the FFTF at Hanford, and miscellaneous fuel pins that were not put into fuel assemblies, to the SRS.⁹ This material would be shipped in Type B shipping packages, in SSTs, and stored in the K-Area complex in the Type B shipping packages, pending disposition. DOE would monitor the condition of the fuel casks while in storage to ensure their integrity, including inspection of seals to monitor for corrosion or leakage. DOE will continue to store RFETS and SRS surplus, non-pit plutonium in approximately 2,800 3013 containers inside Type B shipping packages at SRS. Storage would be in compliance with applicable TSRs and SARs, and the total mass of stored plutonium would be significantly less than 15 metric tons.

In addition, DOE would transfer approximately 500 3013 containers from LLNL and LANL to remove surplus inventory, provide operational flexibility, and to alleviate the demands there on storage capacity needed to support nuclear weapons research missions. This transfer would take place only if storage space were available in KAMS. Space is limited by the number of storage positions allowed in recognition of the spacing requirements dictated by the TSRs and SARs. DOE could increase the number of storage spaces by modifying the storage configuration after review, and revision as necessary, of the safety authorization basis.

The proposed action involves using the KAMS facility for consolidated storage. Nearby areas of the K-Area complex, where the KIS is and CSSC will be located, will be used for surveillance and restabilization activities. Storage spaces necessary to support surveillance activities are available in the K-Area complex. Unirradiated FFTF fuel will also be stored in the K-Area complex.

DOE's Nuclear Material Consolidation and Disposition Coordinating Committee (NMDCCC) considered storage and consolidation alternatives that may be used to provide enhanced security and yield a potential cost savings pending disposition. The proposed action described in this SA for consolidation is the same as the alternative recommended by the NMDCCC.

⁸ A 3013 container has a maximum capacity of about 4.4 kilograms of plutonium. However, few containers have the maximum amount of plutonium.

⁹ See footnote 3.

ENVIRONMENTAL IMPACTS

Transportation

DOE would ship plutonium materials compliant with the DOE-STD-3013 in 3013 packages inside Type B shipping containers (e.g., 9975 containers) from Hanford, LLNL, and LANL to KAMS at SRS using Safe Secure Transports. DOE would ship unirradiated FFTF fuel from Hanford to SRS in Type B shipping packages (e.g., the Hanford Un-irradiated Fuel Package) in SSTs. At KAMS, the shipping containers would be received and stored; the 3013 packages would not be removed from the shipping containers. The Type B shipping packages containing the unirradiated FFTF fuel would be stored in the K-Area complex at SRS.

DOE evaluated the impacts of transporting 17 metric tons of surplus, non-pit, plutonium to SRS in the *SPD EIS* (DOE, 1999), which addresses alternatives for disposition and is tiered from the Storage and Disposition PEIS (DOE, 1996). In the *SPD EIS* Alternative 3, DOE surplus pit and non-pit plutonium would be transported to SRS, where disposition facilities for immobilization and fabrication of MOX fuel would be constructed. Table L-1 of the *SPD EIS* summarizes the material shipments; included are non-pit materials from Hanford, LLNL, LANL, RFETS, and INL (Argonne National Laboratory – West). The Hanford material includes FFTF fuel pins and assemblies and miscellaneous fuel pins. Alternative 3 includes shipment of a greater quantity of surplus, non-pit plutonium materials to SRS than does the proposal considered in this SA.

In the *SPD EIS*, DOE estimated that normal (incident-free) transportation operations could result in 0.024 latent cancer fatalities (LCF) among transportation workers and 0.034 LCF in the total affected population over the duration of the transportation activities. In preparing the *SPD EIS*, DOE used a dose conversion factor of 5×10^{-4} deaths per rem of dose to the affected population. Currently, DOE recommends (DOE, 2004b) a dose conversion factor of 6×10^{-4} deaths per rem. Using the currently recommended dose conversion factor the data cited in this paragraph would be about 0.029 LCF among transportation workers and about 0.041 LCF in the total affected population. In addition, DOE (DOE, 1999) estimated that 0.019 nonradiological fatalities could occur as a result of vehicular emissions. DOE also estimated the impacts of accident scenarios, and in all cases the risk of a fatality is less than one (DOE, 1999). No accidents occurred during shipment of the RFETS surplus plutonium to SRS.

DOE has analyzed the impacts of transporting plutonium from Hanford, LLNL, and LANL (as well as INL and RFETS) to SRS in the *SPD EIS*. That analysis assumed surplus, non-pit plutonium would be transported in Type B containers in SSTs, just as DOE is proposing for the action described in this SA. The transportation DOE proposes in this SA is a subset of the transportation activities evaluated in the *SPD EIS*. DOE would make all shipments in shipping packages with current certificates, consistent with Department of Transportation requirements and DOE's prior NEPA reviews.

Storage

The KAMS facility requires no physical modification to accommodate the proposed storage of surplus, weapons-usable, non-pit surplus plutonium from Hanford, LLNL, and LANL. DOE has

evaluated storage of surplus plutonium materials from RFETS and other sites, as needed, in 3013 containers inside Type B shipping containers in KAMS (DOE, 1998b; DOE, 2002b). The forms of the surplus plutonium, and the shipping and storage containers (which would be certified Type B containers), would be the same as DOE has previously analyzed.

DOE has initiated two projects to provide the stored plutonium surveillance and restabilization capability required as part of the monitoring program that is an integral part of DOE-STD-3013. The KIS project, which began operating in June 2007, provides limited, temporary surveillance capability until the CSSC project is completed. Current plans call for CSSC to be operational in 2010. DOE completed an EA (DOE, 2005a) evaluating the impacts of construction and operation of KIS and CSSC in the K-Area complex (near but not in KAMS), and related security upgrades in K-Area. Storage space adequate for the needs of the KIS and CSSC surveillance activities are provided outside of KAMS, and a limited number of 3013 containers will be temporarily stored without 9975 shipping containers when CSSC becomes operational. DOE evaluated the impacts of these actions in the EA, and determined the impacts would not be significant (DOE, 2005b). While the inventory in KAMS would increase as a result of the transfer and storage of surplus, non-pit weapons-usable plutonium from Hanford, LLNL, and LANL, the number of 3013 containers stored outside of KAMS, or undergoing surveillance activities requiring opening of the cans, would not increase. The number of cans undergoing surveillance activities is limited by the facility safety analysis and technical safety requirements, and neither would change as a result of storing more material in KAMS. Therefore, the proposal described in this SA is not different in regard to surveillance actions than those DOE has previously evaluated and found to be insignificant.

DOE has found no anomalous conditions in either the 3013 containers or the stored plutonium material in the DOE-STD-3013 surveillance program. Similarly, performance of the Type B shipping containers has been as expected, with no instances of unacceptable performance. The K-Area Structural Assessment Program, mentioned in the 2002 ROD (DOE, 2002a), has not revealed any condition or degradation that would affect the structural integrity of the facility.

Unirradiated fuel from the FFTF facility at Hanford would be stored in Type B shipping containers in the K-Area transfer bay in the K-Area complex. Storage of FFTF fuel in Type B shipping containers in the K-Area transfer bay would provide a level of safety equivalent to that resulting from storage of plutonium in 3013 containers in 9975 shipping packages in KAMS because of the integrity of the storage form and containers. In addition, DOE evaluated the storage of irradiated tritium-producing burnable absorber rods in Type B shipping containers (the same configuration for the proposed storage of FFTF fuel) in the K-Area transfer bay (DOE, 2005c) and found the environmental impacts to be insignificant (DOE, 2005d).

Intentional Destructive Acts

DOE provides substantial safeguards and security measures for both transportation and storage of plutonium. Safeguards and security are designed to prevent theft or diversion of materials, and to prevent exposure of workers and the public to radiation from the material during transportation and storage. DOE recognizes that an attack against surplus plutonium cargo may cause very undesirable consequences, such as release of radionuclides into the environment.

Following the events of September 11, 2001, DOE is continuing to consider and implement measures to minimize the risk and consequences of potential terrorist attacks on DOE facilities. DOE conducts vulnerability assessments and risk analyses in accordance with DOE Order 470.3A, *Design Basis Threat Policy* and DOE Order 470.4A, *Safeguards and Security Program*. The safeguards applied to protecting the K-Area complex involve a dynamic process of enhancement to meet threats (i.e., safeguards will evolve over time). It is not possible to predict whether intentional destructive acts would occur at these locations, or the nature or types of attacks. Nevertheless, DOE has evaluated security scenarios involving malevolent or terrorist acts in an effort to assess potential vulnerabilities and identify improvements to security procedures and response measures. The physical security protection strategy is based on a graded and layered approach supported by a guard force trained to detect, deter, and neutralize adversary activities. Facilities are protected by staffed and automated access control systems, barriers, surveillance systems and intrusion detection systems.

Plutonium materials intended for consolidated storage under the proposal described in this SA would be received and stored in the K-Area Complex. DOE evaluated accident scenarios during storage and processing of plutonium materials in the *IMNM EIS* (DOE, 1995a) and during storage in the K-Area Complex in a subsequent EA (DOE 2005a). The accident impact analyses in the *IMNM EIS* and the EA are representative of the potential impacts of intentional destructive acts against the facilities proposed for consolidated storage, particularly in light of the robust nature of the facilities themselves and the improved security and response measures that have been put in place in recent years.

In the *SPD EIS* (DOE 1999), DOE evaluated the impacts of a severe accident while transporting plutonium oxide material in Type B shipping containers in Safe Secure Transports (SSTs). The hypothetical accidents modeled for the impact assessment involve either a long-term fire or tremendous impact or crushing forces. In the case of crushing forces, a fire would have to be burning in order to spread the plutonium as modeled. These accidents were assumed to cause a ground-level release of 10 percent of the radioactive material in the SST. These accidents fall within the Nuclear Regulatory Commission (NRC, 1977) severity Category VIII, with an accident frequency in rural areas of about 1×10^{-7} per year (once in 10 million years). DOE estimated that if such an accident were to occur in an urban area as many as 114 cancer fatalities could result. In addition, the accident itself would cause a number of non-radiological fatalities, depending upon the specific circumstances.

In reviewing the nature and consequences of the accident scenarios described in the *SPD EIS*, DOE finds that the consequences bound the consequences of a hypothetical terrorist attack on an SST carrying surplus non-pit plutonium. Because of the robust nature of the Type B containers and the SSTs, and because shipments are protected, DOE finds it unlikely that an attack could generate the forces required to release as much material as postulated for a severe accident. Therefore, DOE expects the potential consequences of a terrorist attack on a shipment of surplus, non-pit plutonium to be equal to or less than those of a severe accident.

Defense Nuclear Facilities Safety Board Report to Congress

In December 2003, the Defense Nuclear Facilities Safety Board (DNFSB) issued a Report to Congress on Plutonium Storage at the DOE's Savannah River Site (DNFSB, 2003). The DNFSB is an independent Federal agency created by Congress to provide recommendations to DOE on the safety of defense nuclear facilities. The Board's report contains proposals for enhancing the safety, reliability, and functionality of plutonium storage at SRS; one proposal concerns KAMS and four concern F-Area. However, subsequent to issuance of the Board's report, DOE decided to utilize only KAMS and the K-Area complex for storage of plutonium and for future stabilization and packaging operation, and to deinventory F-Area of all plutonium prior to the end of 2006.

With respect to KAMS, the Board proposed that fire protection systems be installed and that unnecessary combustibles be eliminated. In response to this proposal, DOE determined that fire suppression equipment would be installed in the Neutron Multiplicity Counting Room of KAMS, fire detection equipment would be installed throughout KAMS, and the cable combustible load in the actuator tower above KAMS would be removed. DOE completed removal of the actuator tower cables in August 2006. DOE plans to begin installation of a fire detection system in KAMS in 2007 and complete installation in 2008. DOE also plans to begin installation of a fire suppression system in the Neutron Multiplicity Counting Room in 2008 and complete the installation in 2009.

In addition, the fire protection posture designed into KAMS was to minimize both transient and fixed combustibles within the facility such that the remaining worst possible fire could not cause a release of plutonium. The walls separating the KAMS facility from the remainder of the K-Reactor building were fabricated into a two-hour fire boundary. Combustibles outside the facility fire boundaries were minimized, contained, or mitigated to ensure the KAMS facility fire boundaries were rated longer than any credible fire would burn.

Specifically with respect to the cable combustible load in the actuator tower above the KAMS facility, the tower was modified to prevent a fire in the tower from propagating into the material storage area by creating a passive 40-square-foot vent in the tower to release hot gases. The structural steel supporting the hoist motor and cable reel in the tower was coated with fire proofing to provide a 90-minute fire-rated enclosure. Additionally, the floor penetrations from the tower to the material storage area were sealed with grout to a thickness equivalent to a three-hour fire rating.

CONCLUSION

DOE has fully evaluated transportation of surplus, non-pit plutonium materials to SRS and consolidated storage at SRS of such materials from Hanford and LANL in the *Storage and Disposition PEIS* (DOE, 1996a) and the *SPD EIS* (DOE, 1999). Transfer to and consolidated storage at SRS of LLNL plutonium materials is addressed in the *SPD EIS* (DOE, 1999). Thus, the current proposed action of consolidated storage of surplus, non-pit plutonium materials at SRS, including transportation of the materials to SRS, is addressed in the *Storage and Disposition PEIS* and the *SPD EIS*. DOE evaluated the potential impacts of conducting plutonium surveillance and stabilization activities required by DOE-STD-3013 in the

Environmental Assessment for the Safeguards and Security Upgrades for Storage of Plutonium Materials at the Savannah River Site (DOE, 2005a), and found the impacts to be insignificant (DOE, 2005b). Some of these documents are now 10 or more years old. However, DOE has reviewed the analyses and assumptions relevant to the potential environmental impacts of the proposal described in this SA and found any changes to be insignificant. The impacts of the proposed consolidation of surplus, non-pit plutonium material at SRS are the same in kind and in degree as the impacts DOE has evaluated in the *Storage and Disposition PEIS*, *SPD EIS*, and related NEPA analyses.

DETERMINATION

This SA shows that the potential environmental impacts associated with the consolidation at SRS of surplus, non-pit, weapons-usable plutonium from Hanford, LLNL and LANL would not be a significant change from the potential environmental impacts associated with the alternatives analyzed in previous NEPA reviews. DOE is not proposing a substantial change that is relevant to environmental concerns. No significant new circumstances or information bearing on the proposed action and relevant to environmental concerns are presented by the proposed consolidation of plutonium storage. Therefore, DOE does not need to conduct additional NEPA review prior to transferring surplus non-pit weapons-usable plutonium materials from Hanford, LLNL, and LANL to SRS for consolidated storage.

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