SUPPLEMENT ANALYSIS FOR STORING PLUTONIUM IN THE ACTINIDE PACKAGING AND STORAGE FACILITY AND BUILDING 105-K AT THE SAVANNAH RIVER SITE

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INTRODUCTION and PURPOSE

In the January 1997 Record of Decision for the *Storage and Disposition of Weapons-Useable Fissile Materials Final Programmatic Environmental Impact Statement* (Storage and Disposition PEIS)(62 FR 3014), DOE decided to implement a program for storing weapons-usable fissile material (including plutonium) and identified a strategy for the disposition of surplus weapons-usable plutonium[1]. DOE is proposing to modify certain plutonium storage aspects of the January 1997 decision. Specifically, if SRS is selected as the site for a plutonium disposition immobilization facility, DOE is considering the shipment of all surplus weapons-usable plutonium from the Rocky Flats Environmental Technology Site (RFETS) to the Savannah River Site (SRS) for storage in advance of the potential movements provided for in DOE's 1997 decision. In addition, DOE is considering the shipment of all surplus weapons plutonium at the Hanford Site (Hanford) to SRS for storage pending disposition. This changed approach would allow acceleration of the closure of the RFETS from 2010 to 2006 and result in substantial cost savings for the Department due to the earlier termination of plutonium storage operations at RFETS and Hanford. To accommodate the early shipment of materials, if SRS is selected as the site for a plutonium disposition immobilization facility, DOE is considering the use of Building 105-K at the SRS for plutonium storage in addition to changes to the conditions established in the January 1997 Record of Decision.

The Council on Environmental Quality regulations for implementing the National Environmental Policy Act (NEPA), 40 CFR 1502.9(c), direct federal agencies to prepare a supplement to an environmental impact statement 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 impacts."

DOE regulations for compliance with NEPA, 10 CFR 1021.314, direct that, when it is unclear whether a supplement to an environmental impact statement is required, DOE is to prepare a supplement analysis to assist in making that determination. The purpose of this supplement analysis is to evaluate the potential environmental impacts of a proposed action that would change certain aspects of the current surplus plutonium storage program.

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[1] The Record of Decision was based on the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (DOE/EIS-0229) issued in December 1996.

If SRS is selected as the site for a plutonium disposition immobilization facility, the change would involve accelerating the movement of all surplus, non-pit, weapons-usable plutonium from RFETS and Hanford to the SRS, storing the plutonium in Building 105-K as well as the Actinide Packaging and Storage Facility (APSF) at the SRS, processing plutonium from RFETS in the F Area (FB Line) at SRS for declassification purposes, and packaging this declassified material at SRS to meet DOE's long term storage standard.

Prior to shipment to SRS, all RFETS plutonium would be stabilized. Although not proposed at this time, this Supplement Analysis also evaluates the change in impacts if the non-classified surplus plutonium at RFETS is not fully stabilized and repackaged to DOE's long-term storage standard prior to being shipped to SRS. In that case, further thermal stabilization (heating to 950° C) of non classified plutonium oxide and repackaging at SRS would be needed to meet DOE's storage standard (DOE–STD-3013-96). The material from Hanford would be stabilized prior to shipment and packaged in containers that meet DOE's storage standard. The Supplement Analysis includes impacts that would occur if some of the Hanford material (Fast Flux Test Facility fuel and other fuel) were shipped and stored in containers that differ from those considered in the Storage and Disposition PEIS, although DOE is not now proposing such an action. In any event, accomplishing the proposed action would require modifications to be made to Building 105-K. In addition, some of the RFETS oxide material would be less than 50% plutonium by weight, whereas the Storage and Disposition PEIS assumed that such materials would be greater than 50% plutonium by weight. As a result, there would be an increase of about 3% in RFETS material relative to what was considered in the Storage and Disposition PEIS, although the total amount of plutonium in the material would be the same. The Supplement Analysis examines whether the potential impacts from the new proposed action, and actions described above that DOE may need to propose in the future, are substantially different from the impacts considered in the Storage and Disposition PEIS .

BACKGROUND

At the end of the Cold War, the need for nuclear materials used in weapons in the United States was significantly reduced. As a result, some weapons-usable fissile material was declared excess to national security needs while other materials were retained for defense and defense-related programs. Substantial quantities of surplus weapons-usable nuclear material were located at various sites throughout the DOE complex, prompting DOE to develop an integrated strategy for storage and disposition of the surplus material.

In December 1996, DOE issued the Storage and Disposition PEIS. The purpose of this PEIS was to analyze the potential environmental consequences of various alternatives for the storage of surplus and non-surplus weapons-usable fissile material (i.e., plutonium and highly-enriched uranium) and the disposition of surplus weapons-usable plutonium.

CURRENT SURPLUS PLUTONIUM STORAGE PROGRAM

In a January 1997 Record of Decision, DOE essentially decided to implement the Preferred Alternative discussed in the Storage and Disposition PEIS. In regard to plutonium, DOE decided to phaseout storage of all weapons-usable plutonium at RFETS. The phaseout would involve shipping all RFETS pits to Pantex, and shipping all RFETS surplus, non-pit, stabilized, weapons-usable plutonium to the SRS starting in about 2001. DOE decided that surplus non-pit, weapons-usable plutonium would not be moved unless and until: expansion of the APSF [2] at the SRS had been completed; the RFETS material had been stabilized and packaged to meet the *Criteria for Safe Storage of Plutonium Metals and Oxides* under corrective actions in response to the Defense Nuclear Facilities Safety Board Recommendation 94-1; and DOE had decided to immobilize plutonium at the SRS. The Department also decided: to continue the current storage of surplus plutonium at Hanford, the Idaho National Engineering and Environmental Laboratory (INEEL), and Los Alamos National Laboratory (LANL) pending disposition (or movement to lag storage at the disposition site); and pursue a strategy for plutonium disposition that would immobilize surplus, weapons-usable plutonium in glass or ceramic forms and would allow the burning of some of the surplus plutonium (mostly from pits) as mixed oxide fuel in existing commercial light-water reactors.

The Storage and Disposition PEIS and Record of Decision assumed that the surplus non-pit, weapons-usable plutonium would be stabilized and packaged in compliance with DOE's plutonium storage standard, *Criteria for Safe Storage of Plutonium Metals and Oxides*, and that this material would be greater than 50% plutonium by weight. DOE's plutonium storage standard also assumes that plutonium-bearing material will be greater than 50% plutonium by weight after packaging. DOE has determined as much as 35% of the RFETS surplus, non-pit, weapons usable, plutonium could be less than 50% plutonium by weight[3].

NEED TO CHANGE THE PLUTONIUM STORAGE PROGRAM

Recently, DOE has estimated that accelerating the closure of RFETS from 2010 to 2006 could save as much as $1.3 billion (DOE 1998a). Integral to achieving an accelerated closure of the site would be removal of the surplus non-pit, weapons-usable plutonium to SRS two years earlier than the current plan. Removal of the surplus plutonium at RFETS is only one of several steps that must occur to realize the savings. Other steps are proposed or ongoing pursuant to

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[2] The APSF has been designed but not built. Construction is scheduled to start in October 1998 and the facility is scheduled to be in operation by October 2001. Expansion of the APSF refers to increasing the vault capacity of the facility to the current design of 5,000 storage positions (sufficient storage space for current SRS materials and RFETS materials).

[3] As a result, there would be an increase of about 3% in RFETS material above that which was considered in the Storage and Disposition PEIS and Record of Decision. The impacts discussed in this Supplement Analysis take into account this slight increase in the amount of RFETS material as well as the slight increase in the number of trips required to move the material to SRS.

appropriate NEPA review. DOE also expects that the transfer of non-pit weapons useable plutonium from Hanford to Savannah River could save as much as $150 million in upgrade and operating costs for plutonium storage facilities at the Hanford Site. As with the RFETS plutonium, the transfer would not be accomplished unless DOE decided to locate the plutonium immobilization facility at the Savannah River Site. The implementation cost for the proposed action is estimated to be approximately $93 million.

Closing RFETS by 2006 would, among other things, require the removal of surplus, non-pit, weapons-usable, stabilized plutonium metal and oxide from RFETS by 2002. In order to remove all the surplus non-pit weapons-usable plutonium from RFETS by 2002, DOE would have to begin transferring the material to the SRS by January 2000, prior to completing the construction of the APSF. The transfer would not occur unless DOE decides to immobilize plutonium at the SRS. DOE expects to decide where to immobilize plutonium in early 1999, in the Record of Decision for the Final Surplus Plutonium Disposition EIS. DOE also plans to complete all the corrective actions for the RFETS plutonium metal and oxide in response to the Defense Nuclear Facilities Safety Board Recommendation 94-1 prior to shipping the RFETS plutonium to the SRS. In the event that non-classified RFETS surplus non-pit weapons-usable plutonium metal and oxide is not repackaged and fully stabilized to meet the requirements of the DOE storage standard, *Criteria for Safe Storage of Plutonium Metals and Oxides* (DOE-STD-3013-96), in time to support removing all the material from RFETS by 2002, DOE would consider (and this Supplement Analysis analyzes) transferring the material to the SRS where the remaining repackaging and stabilization work would be completed. In that event, the actions that may remain to be completed at SRS would be to further thermally stabilize plutonium oxide by further heating the material to a higher temperature and to package plutonium oxide and metal in corrosion resistant leak-tight containers[4].

DOE has also reevaluated plutonium storage operations at Hanford and determined that accelerating the transfer of all (about 4.6 metric tons) surplus non-pit weapons-usable plutonium from that site could save the Department as much as $150 million by avoiding upgrade and operational costs for plutonium storage facilities at the Hanford Site. DOE is considering the transfer of plutonium from Hanford to the SRS as a means of achieving those savings. This transfer would not occur unless DOE decides to immobilize plutonium at the SRS. The highest standards for safeguards and security will be employed for all transportation and storage activities.

PROPOSED ACTION

The Department of Energy is proposing to accelerate the movement of all (about 7 metric tons) surplus, non-pit, weapons-usable plutonium at the RFETS and all (about 4.6 metric tons)

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[4] The plutonium oxide would be ultimately packaged to meet the requirements of DOE-STD-3013-96, *Criteria for Safe Storage of Plutonium Metals and Oxides*. Before shipment, the RFETS plutonium oxide would be stabilized . Additional treatment (heating to 950 degrees Centigrade) and repackaging at SRS may be proposed if needed to meet this criterion. DOE has included this further thermal stabilization and repackaging of all RFETS plutonium metals and oxide activities at SRS in this supplement analysis.

surplus plutonium at Hanford to the SRS for storage pending disposition. The material would not be moved to SRS unless the Department decides to disposition (immobilize) the non-pit surplus plutonium at SRS, after completion of the final Surplus Plutonium Disposition Environmental Impact Statement. The RFETS material would be shipped to the SRS from about January 2000 through 2002. The Hanford material would be shipped to the SRS from about 2002 through 2005. This proposed action is consistent with DOE's objective, as explained in the Record of Decision for the Storage and Disposition PEIS, to reduce over time the number of locations where plutonium is stored in the DOE complex.

Starting in about 2000, all surplus, non-pit weapons-usable plutonium from RFETS would be shipped to Building 105-K. At Building 105-K[5], the shipping containers would be unloaded using a battery powered fork-lift truck. Material control and accountability measurements would be made at Building 105-K. The shipping containers would then be loaded onto metal pallets and transferred to a storage location. DOE would not open any of the shipping containers in Building 105-K. While in storage, the containers would be inspected on a regular basis to assure external container integrity. DOE has successfully used (and continues to use) shipping containers for plutonium storage at the SRS. No problems with a loss of material confinement have been experienced to date. A more thorough discussion of engineered features and controls to be utilized during plutonium storage operations is contained in the accident impacts evaluation section of this Supplement Analysis.

Portions of Building 105-K would be modified to enable safe, secure plutonium storage. Safeguards and security features would be upgraded, criticality monitoring devices would be installed, structural features would be inspected and repaired, and roof vents would be added and doors would be modified. Several areas in the facility would be decontaminated and excess equipment would be removed to provide additional floor space[6].

Modifications would include dismantling and removing unused process equipment in four building areas: Stack Area, Crane Maintenance Area, Crane Wash Area, and Process Room. These areas total approximately 30,000 square feet, are within the security areas that existed for reactor operations, and are adjacent to a currently active highly enriched uranium storage area. Security systems in the four building areas would be reactivated and upgraded to support using them for plutonium storage. Existing systems including the K-Area security perimeter, security control system and building water/power ventilation support systems would be used. Building modifications would provide for truck loading and unloading, material control and accountability actions, shipping accountability measurements, and storage. Figure 1. shows a representation of how the RFETS might be stored in Building 105-K.

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[5] To support the proposed action, DOE would purchase additional Type 9975 shipping containers which are Type B containers and would also be used for storage. This would be done so that storing the RFETS materials in shipping containers pending disposition would not impact the Department's supply of Type B shipping containers.

[6] A portion of these activities could be completed as part of maintenance, clean-up, and decontamination activities at SRS that DOE has determined are categorically excluded from further NEPA review.

Beginning in about 2002, SRS would begin to receive plutonium from Hanford into the APSF. Material from RFETS would continue to be received in Building 105-K (due to the capacity limits of the APSF). Once APSF is operating, DOE could transfer RFETS material from Building 105-K to the APSF to allow for operational flexibility. The plutonium from RFETS and Hanford would remain in storage at the APSF and Building 105-K pending disposition.

Before shipment, the material from RFETS would be thermally stabilized and packaged (except for classified metal and parts) to meet the requirements of the DOE standard for long-term plutonium storage, i.e., DOE-STD-3013-96. All material from Hanford would be stable and packaged in "3013" containers prior to shipment to the SRS [7]. The material would be transferred by truck using the Department of Energy's Safe Secure Transport System and the methods and routes described in the Storage and Disposition PEIS.

Some of the RFETS plutonium is in a classified form, which would restrict the International Atomic Energy Agency (IAEA) from access to the material. DOE intends to make the APSF vault, and potentially Building 105-K, available for IAEA inspection. As a result, the RFETS plutonium must be declassified. To accomplish this action, DOE would transfer the classified RFETS plutonium to F-Area for processing (declassifying) in the FB-Line facility at SRS. In the FB-Line the plutonium would be melted using existing facilities and equipment that are part of the plutonium metal production process for which FB-Line was designed. The RFETS plutonium would be fashioned into metal "buttons" that are the traditional FB-Line product. After the "buttons" were fabricated, the material would be transferred to APSF and packaged to meet the requirements of DOE's plutonium storage standard. Then, the material would be placed in type B shipping containers and returned to Building 105-K for storage. Alternatively, the material could be placed in the APSF vault if space is available.

A total of approximately 11.6 metric tons of plutonium from Hanford and RFETS (in addition to the onsite surplus plutonium at SRS, for a total of approximately 14 metric tons) would be stored in the APSF and Building 105-K pending disposition, provided that SRS is selected as the immobilization site in the SPD EIS Record of Decision.

If DOE decides to pursue the No Action alternative for the disposition of surplus plutonium in the SPD EIS Record of Decision, the SRS, RFETS, and Hanford materials would remain in storage at their current sites in accordance with the No Action alternative. If the DOE decides to immobilize surplus plutonium at Hanford, the SRS and RFETS materials would be shipped to Hanford in accordance with the decisions reached in the SPD EIS Record of Decision.

BUILDING 105-K

[7] The disassembly of the Hanford fuel assemblies, the removal of fuel pellets from the pins in those assemblies, and the placement of the pellets in "3013" containers at the Hanford site, will be the subject of appropriate NEPA review.

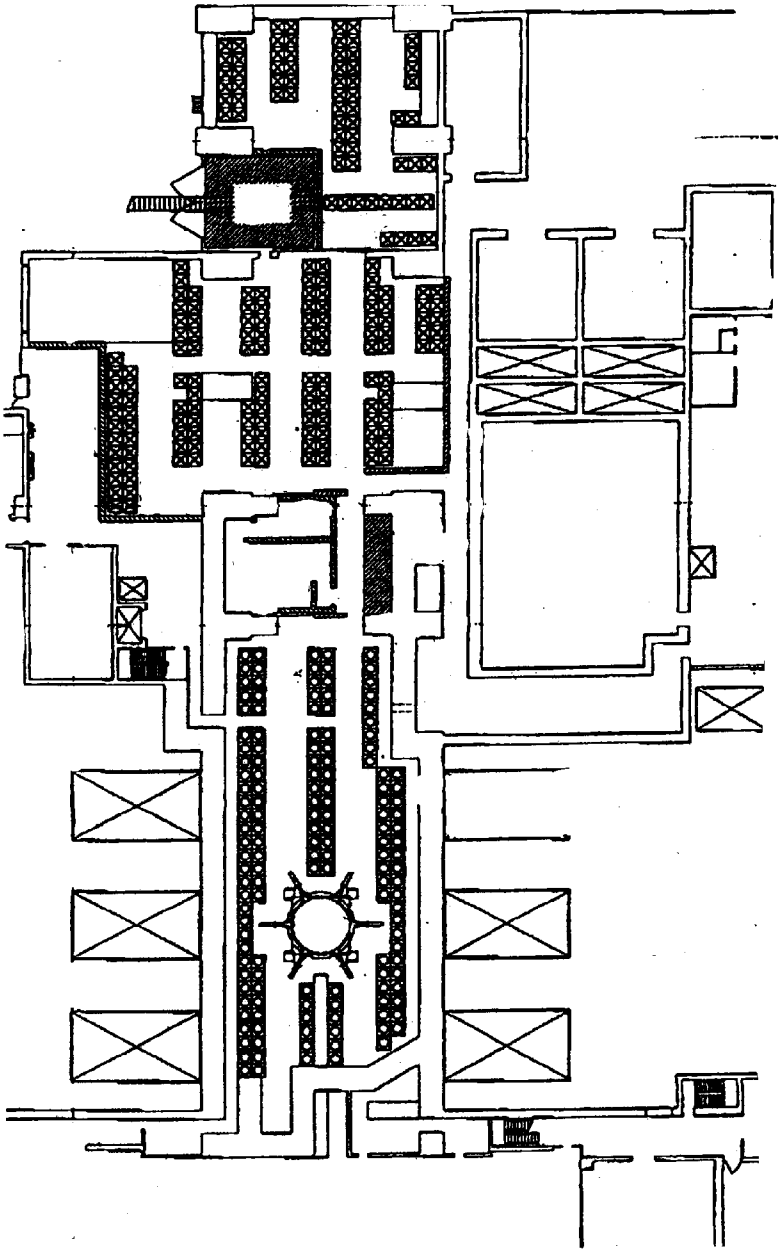

Figure 1. Storage of Plutonium in Building 105-K (Representative configuration)

There is insufficient storage capacity in the operating plutonium storage facilities at SRS to accommodate other than incidental quantities of plutonium pending completion of the APSF. DOE reviewed the potential for plutonium storage in other facilities at the SRS and concluded that Building 105-K was the best alternative. Building 105-K was originally designed and constructed to house a production reactor. However, K-Reactor has not produced nuclear material since 1988, and since 1996 the reactor has been de-fueled and placed in cold standby with no contingency for restart. Although the areas of the facility previously used for reactor operations have been maintained in a cold-standby condition, the spent nuclear fuel storage basin portion of the facility has been in continuous operation. Other areas of the facility are currently used to store highly-enriched uranium and heavy water. Maintenance for the entire facility has been performed to prevent degradation of systems, structures and components that are important for safety. The large open areas available in Building 105-K are suitable for storing the containers in which the plutonium would be shipped to the SRS.

Several other facilities were considered for the interim plutonium storage mission. These facilities included reactor Building 105-L and inactive facilities previously associated with nuclear material processing activities (i.e., Building 247-F and the Plutonium Storage Facility [PSF]). One important consideration for selecting these facilities for evaluation was the existence of (or ability to cost-effectively establish, or re-establish) the required security features, e.g., hardened structures, security boundaries, and monitoring systems.

Building 247-F and PSF were eliminated from further consideration due to their very limited storage capacity, e.g., the facilities could hold only about 50% of the material that would be transferred from RFETS. Building 105-L was also eliminated from further review because it would require greater security upgrades than would be required for Building 105-K. Further, the seismic resistance of the portions of Building 105-L that would be required to be used for plutonium storage have not been sufficiently analyzed against the requirements for the level of hazard presented by plutonium storage. Additionally, reactor-area material consolidation efforts (e.g., moderator storage consolidation) and on-going Building 105-L missions (e.g., foreign and domestic research reactor spent nuclear fuel management) will take storage space in Building 105-L that would be needed for plutonium storage, so inadequate space is available in Building 105-L.

ENVIRONMENTAL REVIEW

Introduction

In this supplement analysis, DOE examines whether the new proposed action, as described above, is substantially different from actions considered in the storage alternatives evaluated for the Storage and Disposition PEIS. These alternatives are summarized in Appendix A. DOE also examines other activities that are not proposed at this time but which could be proposed in the future. DOE compares the potential impacts of the proposed action (and other activities not proposed at this time) to the impacts of the long-term plutonium storage alternatives in the Storage and Disposition PEIS using the following approaches.

Transportation: In the Storage and Disposition PEIS, impacts for transferring plutonium to the SRS were analyzed assuming the material was packaged in U.S. Department of Transportation certified shipping containers (Type B) that were typically the size of 30 to 55 gallon drums. In that PEIS, DOE assumed material would be disassembled as required to fit into these containers prior to packaging. The material at Hanford includes Fast Flux Test Facility (FFTF) and other fuel assemblies[8] that are too long to fit into the standard "3013" storage containers. DOE intends to package such fuel assemblies in "3013" containers at Hanford before shipment. However, although not proposed at this time, this Supplement Analysis also considers and analyzes the potential impacts that would result if some of the Hanford material were not packaged in "3013" containers. These analyses do not include any stabilization or disassembly work because the Hanford material would be sufficiently stable for storage and the fuel assemblies/pins would be transferred as stored to the immobilization disposition facility. In the event the FFTF and other assemblies were not packaged in "3013" containers, DOE would store the material in Building 105-K. As a result, the certified shipping containers would be sized differently than assumed in the Storage and Disposition PEIS transportation analysis. Impacts on a per container basis would not be greater than previously analyzed because the impacts would be bounded by the allowable material content requirements associated with certified shipping containers. However, the number of shipments from Hanford would increase from about 28 to about 200. In addition, there could be approximately a 3% increase in shipments from RFETS to SRS, to accommodate the less than 50% plutonium by weight material, as discussed previously. Therefore, in this Supplement Analysis, DOE compares the potential impact of an increased number of plutonium shipments by Safe Secure Transport (SST) to the SRS from Hanford and RFETS to the original analysis in the Storage and Disposition PEIS.

Storage: The potential impact from the proposed action would be the combined impact of APSF operations and Building 105-K modification and operations. To reflect the APSF storage impacts, DOE used the Upgrade at SRS With RFETS and LANL Material alternative in the Storage and Disposition PEIS. This alternative was selected because it includes storing amounts of material in the APSF that are comparable to the new proposed APSF and Building 105-K storage action. The storage impacts for the proposed action are estimated by summing the impacts from the Upgrade With RFETS and LANL Material alternative and the impacts estimated for modifying and operating Building 105-K.

In this Supplement Analysis, DOE assesses the potential environmental impacts from the storage aspects of the new proposed action and the activities that may be proposed if needed in the future (e.g., storing plutonium metal and oxide in non-3013 containers in Building 105-K). These impacts are compared to the impacts of storing surplus non-pit weapons-usable plutonium at SRS as described in the Upgrade and the Consolidation alternatives of the Storage and Disposition PEIS. The analysis approach is conservative in that it assumes Building 105-K and APSF would be operated at the maximum storage capacity for each facility, i.e., 15 metric tons in APSF and

[8] The other assemblies at Hanford include: plutonium/enriched uranium fuel, plutonium/uranium carbide fuel, and plutonium/enriched uranium/zirconium fuel.

15 metric tons in Building 105-K, which is greater than the actual amount of plutonium expected from RFETS and Hanford plus the existing SRS surplus plutonium (i.e., about 14 metric tons) that would be stored in both the APSF and Building 105-K.

Material stored within the APSF vault would be subject to IAEA inspection and safeguards. Material within Building 105-K may be subject to IAEA inspection and verification. To allow IAEA inspection, some of the RFETS plutonium would need to be converted into an unclassified form. However, the application of IAEA requirements would not otherwise affect environmental impacts associated with plutonium storage at the SRS.

Stabilization and Declassification: If in the future, DOE needed and proposed to ship RFETS plutonium metal or oxide to the SRS that was not already packaged to meet the requirements of the DOE storage standard, such RFETS material would be transferred to the APSF after that facility was operating. At the APSF, the RFETS plutonium metal would be placed in stainless steel "3013" containers. Plutonium oxide would be thermally stabilized (heated at a high temperature) and then packaged and placed in "3013" containers. After stabilization and packaging actions were complete, the metal and/or oxide would be placed in the APSF vault for storage, if space was available, or returned to Building 105-K. In the event that some of the plutonium at RFETS had not been fully thermally stabilized and/or packaged to meet the long term storage requirements of DOE-STD-3013-96 prior to shipment, the material would nevertheless be packaged at RFETS to meet applicable U.S. Department of Transportation, U.S. Nuclear Regulatory Commission and DOE requirements for shipment and then transferred to the SRS where any further thermal stabilization and/or repackaging operations would be conducted.

DOE estimates that if stabilization of RFETS material is performed at the SRS, stabilizing all the plutonium metal and oxide from RFETS could take about 2 years[9] using the plutonium stabilization and repackaging system in the APSF. In that event, any such RFETS plutonium would be transferred to the APSF, stabilized to meet DOE's storage standard requirements, and then placed in storage in the APSF or Building 105-K pending disposition. DOE estimates that the annual impacts from stabilizing/repackaging plutonium from RFETS in the APSF would be similar to the annual impacts of repackaging SRS plutonium in the APSF that DOE estimated as part of the Improving Storage alternative in the *Interim Management of Nuclear Materials Environmental Impact Statement* [10] (IMNM EIS). DOE believes this approach is reasonable because the two activities (repackaging RFETS plutonium and repackaging SRS plutonium) would utilize the same process in the APSF. In this Supplement Analysis, DOE compares the impacts of stabilizing/repackaging plutonium from RFETS in the APSF to the impacts from plutonium storage activities at the SRS that were evaluated in the Storage and Disposition PEIS.

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[9] The stabilization work would be not be done on a continuous basis but rather whenever processing capabilities are available.

[10] The Storage and Disposition PEIS references the *Interim Management of Nuclear Materials Final Environmental Impact Statement* (IMNM EIS). DOE incorporates by reference the IMNM EIS into this supplement analysis and has used the information in that EIS to estimate impacts.

DOE estimates that declassification operations would take about 4 years[11] to complete, using the FB-line. DOE estimates that the annual impacts of declassifying plutonium from RFETS (i.e., producing plutonium metal buttons) would be similar (except for waste generation which would be lower) to the annual impacts of plutonium metal conversion activities that DOE estimated as part of the Processing to Metal alternative in the IMNM EIS. DOE estimates that the amount of waste generated from declassification operations in the FB-line would be lower than those described in the IMNM EIS because the declassification operation (metal casting) is only one component of the activities analyzed in the IMNM EIS for the Processing to Metal Alternative. DOE believes this approach is reasonable because the two activities (declassification and plutonium metal stabilization) would utilize the same production process in FB-Line. In this Supplement Analysis, DOE compares impacts of the declassification work to the impacts that DOE estimated could occur from plutonium storage operations at SRS that were evaluated in the Storage and Disposition PEIS.

The RFETS plutonium to be declassified (and possibly stabilized at SRS) is similar to the material analyzed in the IMNM EIS because it is weapons-grade plutonium consisting of plutonium-239, plutonium-240, and less than 1% of other transuranic isotopes. Thus, the potential annual impacts of declassifying plutonium metal (and possibly stabilizing plutonium oxide) portrayed in the IMNM EIS are representative of declassification and stabilization actions for similar material.

Land Resources, Site Infrastructure, Geology and Soils, Biology Resources and Cultural and Paleontological Resources

The facilities involved (i.e., Building 105-K and the APSF) are or will be located in existing industrial areas at the SRS. These previously disturbed areas have been in continual use for industrial applications since the 1950s, making the presence of any important cultural resources highly unlikely. The APSF will be located in F-Area and Building 105-K is located in K-Area. Both areas are surrounded by security fences and cleared of natural vegetation. There are some grassed areas used for equipment lay-down and storage and there is some grass around administration buildings, however, these areas have little value as wildlife habitat. There are no aquatic habitats or wetlands in these areas nor are there any threatened or endangered species. None of the affected facilities have been nominated for inclusion in the National Register of Historic Places, and there are no plans for such nominations.

Existing environmental evaluations (DOE 1995 and DOE 1996) have concluded there would be little or no impact to land resources, site infrastructure, geology and soils, biology resources and cultural and paleontological resources by the construction and operation or

[11] The declassification work would be done in the FB-line. This work would not be done on a continuous basis, but rather whenever processing capabilities were available. The declassification work spread over four years of other FB-line operations would not extend the operation of FB-line.

expansion of the APSF. This is equally true for Building 105-K since all storage operations would occur within the existing Building 105-K structure.

It is expected that declassification of the RFETS material would require 400 MW-hrs of electricity. This is an increase over the Preferred and other alternatives analyzed in the Storage and Disposition PEIS. However, this work would not require modification to the FB-lines electrical system and the 400 MW-hrs is well within the capacity of the facility and the site.

Packaging and Transportation

The packaging and transportation aspects of transferring surplus plutonium from RFETS and Hanford to the SRS would not be significantly different than those described in the Storage and Disposition PEIS. Plutonium metal or oxide would be packaged for transportation to the SRS by SST in accordance with applicable U.S. Department of Transportation, U.S. Nuclear Regulatory Commission, and DOE requirements. Shipments would be made using a combination of 30- to 55-gallon drums and potentially DOT MO-1(B) or equivalent Type-B shipping containers (for FFTF fuel and other fuel from Hanford). The transportation routes to the SRS would be the same as those assumed in the Storage and Disposition PEIS (i.e., overland truck routes on interstate highways and state roads). Transportation operations would not change.

DOE estimates that the total inter-site transportation impact associated with transferring plutonium from the RFETS and Hanford to the SRS would be 0.07 potential fatalities [12]. This estimate includes impacts from traffic accidents and the radiation doses that could be received by the public and transportation crew from accidents involving potential exposure to radioactive material and from incident free conditions. Therefore, the impact of transferring plutonium from the RFETS and Hanford to the SRS would be essentially the same as the transportation impact of 0.06 potential fatalities estimated for the preferred alternative and would be essentially the same as the impact of 0.087 potential fatalities that DOE estimated for the Upgrade at SRS With RFETS and LANL Material alternative in the Storage and Disposition PEIS. Transportation accidents, involving a release of radioactive material from the Type B shipping containers that would be used to move the plutonium from RFETS and Hanford to the SRS, would be extremely unlikely events since the shipping containers are designed to retain their contents under all credible transportation accident conditions. Additionally, DOE employs a closed, government-owned and -operated Transportation Safeguards System for the inter-site transport of nuclear weapons components, including plutonium. Specially designed SSTs are utilized to ensure high levels of safety and physical protection.

Any plutonium stored in Building 105-K that has not been stabilized to meet the requirements of the DOE standard for long-term plutonium storage would be transferred to the

[12] The impact is essentially the sum of the impact of transportation of RFETS non-pit plutonium from the preferred alternative in the Storage and Disposition PEIS (increased by about 3%) and the incremental impact for shipping the Hanford plutonium (DOE 1998b). The numbers given in the text of this Supplement Analysis have been rounded.

APSF for thermal stabilization/repackaging. The processed material would be returned to Building 105-K for storage pending disposition. Some of this material may be stored in APSF if space is available to allow for operational flexibility. DOE estimates that the intra-site transportation activities could add 0.01 cancer fatalities to the worker population. This impact would be in addition to the total transportation fatalities discussed above for storage [13].

Air Quality and Noise

Storage: The non-radiological air emissions presented in the Upgrade at SRS With RFETS and LANL Material alternative of the Storage and Disposition PEIS are representative of operating the APSF at maximum plutonium storage capacity. In that PEIS, construction and operation of the APSF for plutonium storage was estimated to generate criteria and toxic/hazardous air pollutants. Specifically, concentrations of carbon monoxide, lead, nitrogen dioxide, particulate matter, sulfur dioxide, gaseous fluoride, and total suspended particles were estimated over various averaging times. Gaseous fluorides were conservatively included in the Storage and Disposition PEIS to show that storage in APSF would not measurably contribute to the total SRS gaseous fluoride emissions. The sampling points at the SRS that were used to establish the emissions from existing facilities encompassed more than just plutonium storage areas and included emissions from processing operations and chemical storage tanks that will not actually be present in the APSF. In the Storage and Disposition PEIS, DOE estimated that all air emissions associated with APSF construction and operation were low and well within the most stringent regulation or guideline. Noise impacts were estimated to be negligible during facility construction and operation. The consequence of radiological air emissions from the APSF are discussed in the Public and Occupational Safety and Health impacts section of this Supplement Analysis.

Although K-Reactor is no longer operating, utilities and services for the facility (e.g., electrical power, steam, etc.) have been in continuous operation. DOE estimates the criteria and toxic air pollutants for current Building 105-K operations to be sulfur dioxide, nitrogen oxide, carbon dioxide, particulate matter, and volatile organic compounds. These emissions are generated by the existing emergency diesel generators, oil-fired boilers, and an emergency water pump that currently serves Building 105-K. The existing non-radiological emissions from Building 105-K were included as part of the Site baseline emissions for the No Action alternative in the Storage and Disposition PEIS. To accommodate plutonium storage, there would be no significant increase above the pollutants generated by existing operations since no new pollutant generating systems would be added. Noise impacts would be minimal and not significantly different than existing operations. The consequence of radiological air emissions from Building 105-K are also included as part of the No Action alternative in the Storage and Disposition PEIS. DOE estimates

[13] In inter-site transportation analyses, non-radiological accidents would be the greatest contributor to fatalities. In the case of intra-site transportation, impacts would be due primarily to radiation doses received from normal transportation operations. Effects from intra-site accidents, if any, would likely be negligible. Historically, radioactive material movements have not experienced accidents involving significant releases of radioactive material, and certified containers are expected to maintain their integrity in accident situations.

there would be no significant increase above the existing Building 105-K radiological air emissions from Building 105-K modifications or from Building 105-K operations since, during normal operations, plutonium would always remain confined inside a Type B shipping container to prevent a release to the air.

Accomplishing the proposed action, including the modifications to Building 105-K, would add no significant air quality or noise impacts above the existing Site baseline. Therefore, air quality and noise impacts from the plutonium storage aspects of the proposed action of this Supplement Analysis would be essentially the same as the air quality and noise impacts from the preferred alternative of the Storage and Disposition PEIS (i.e., the Upgrade With RFETS Non-Pit Material alternative).

Stabilization: Thermal stabilization (if proposed later) and repackaging activities for RFETS material in the APSF are not expected to significantly increase criteria and toxic/hazardous air pollutants beyond levels previously estimated for storage activities in the Upgrade alternative of the Storage and Disposition PEIS. This is because the source of the pollutants from APSF would be non-process specific industrial activities such as the operation of diesel generators. Stabilization activities are not expected to involve the use of chemicals, beyond a very small amount of decontamination liquid. The impacts of radiological air emissions associated with APSF stabilization/repackaging operations are presented in Tables 1 and 2 and are discussed in the Public and Occupational Health and Safety section of this Supplement Analysis.

Declassification: DOE estimates there would be a small increase in non-radiological air emissions for declassification operations (i.e., metal conversion operations in FB-Line) above the non-radiological air emissions estimated for the No Action and the Upgrade alternatives in the Storage and Disposition PEIS, see Table 3. Non-radiological air emissions would all be within State and Federal regulatory limits. The impacts of radiological air emissions associated with declassification operations are presented in Tables 1 and 2 and are discussed in the Public and Occupational Health and Safety section of this Supplement Analysis.

Water Resources

Storage: In the preferred alternative (i.e., Upgrade With RFETS Non-Pit Material) of the Storage and Disposition PEIS, waste water discharges for operating the APSF were estimated to be about 1.5 million liters per year, resulting in a 0.2% increase to the F-Area waste water treatment facilities. Ground water requirements were estimated to be 5.7 million liters per year, resulting in a 0.04% increase in F-Area ground water use. All waste water discharges would be monitored and routed for treatment or discharge to sanitary waste as required. The APSF was determined to be outside the 100-year flood plain and DOE estimated it was unlikely that the facility would be affected by a 500-year flood.

Building 105-K is an existing facility with an existing ground water supply and waste water treatment capability. Modifications to Building 105-K and plutonium storage activities would

Table 1

Annual Impacts from Declassification/Stabilization/Repackaging Operations for Plutonium Metal and Oxide

Factor	APSF Stabilization/Repackaging [1]	FB-Line Declassification [2]
Atmospheric MEI Dose (rem/yr)	6.6×10^{-9}	8.3×10^{-4}
Liquid MEI dose (rem/yr)	6.4×10^{-10}	1.2×10^{-5}
Total MEI dose (rem/year)	7.3×10^{-9}	8.4×10^{-4}
Atmos. Population dose (rem/yr)	2.9×10^{-4}	34
Liquid population dose (rem/yr)	6.4×10^{-6}	4.2×10^{-2}
Total Population Dose (person-rem/year)	3.0×10^{-4}	34
Average number radiation workers	157	508
Worker dose (person-rem/year)	31	49
Water Usage (Million l/yr)	500	347[3]
Electricity usage (Mw-hr/yr)	6,620	100
Fuel usage (thousands l/yr)	21	907[3]
High Level Waste (million l/yr)	0	0
DWPF canisters	0	0
Saltstone generation (m^3/yr)	0	0
TRU waste (m^3/yr)	1	22
Hazardous/mixed waste (m^3/yr)	1	< 1
Low-level waste (m^3/yr)	7	11

[1] Source: Table D-28, Interim Management of Nuclear Materials EIS.

[2] Source: Table D-29, Interim Management of Nuclear Materials EIS and reference 7 of Supplement Analysis.

[3] Total usage for FB-line. Actual use of water, steam, and fuel would be a small fraction of these amounts (less than 1 percent).

Table 2

Impacts from Declassification/Stabilization/Repackaging Operations for RFETS Plutonium Metal and Oxide[1]

Factor	Other Onsite Operations		APSF Stabilization/Repackaging	FB-Line Declassification
	2 years	4 years	(2 years operation)	(4 years operation)
Atmospheric MEI Dose (rem)	(incl. in total)	(incl. in total)	1.3×10^{-8}	3.3×10^{-3}
Liquid MEI dose (rem)	(incl. in total)	(incl. in total)	1.3×10^{-9}	4.8×10^{-5}
Total MEI dose (rem)	7.6×10^{-3}	1.5×10^{-2}	1.5×10^{-8}	3.4×10^{-3}
Atmos. population dose (rem)	(incl. in total)	(incl. in total)	3.0×10^{-4}	136
Liquid population dose (rem)	(incl. in total)	(incl. in total)	1.3×10^{-5}	0.168
Total Population Dose (person-rem)	548	1,096	3.0×10^{-4}	136
Collective worker dose (person-rem)	1,346	2,782	62	196
Water Usage (millions of liters)	291,766	583,532	1,000	1,388[2]
Electricity usage (megawatt hours)	9,562	19,124	13,240	400
Fuel usage (thousands of liters)	64,272	128,544	42	3,628[2]
High Level Waste (millions of liters)	(not estimated)	(not estimated)	0	0
DWPF canisters	290	580	0	0
Saltstone generation (m^3)	(not estimated)	(not estimated)	0	0
TRU waste (m^3)	1,868	3,736	2	88
Hazardous/mixed waste (m^3)	30,600	61,200	2	< 4
Low-level waste (m^3)	92,300	184,600	14	44

[1] Based on annual operations provided in Table 2.

[2] Total usage for FB-line. Actual use of water, steam and fuel would be a small fraction off these amounts (less than 1 percent).

Table 3

Non-radiological Air Impacts

Factor	Most Stringent Regulation or Guideline[1] (ug/m^3)	No Action (ug/m^3)	Upgrade Alternative (ug/m^3)	FB-Line Metal Conversion[2] (ug/m^3)
Offsite CO concentration 1-hour average	40,000	171	171.58	13.3
Offsite CO concentration 8-hour average	10,000	22	22.12	3.18
Offsite NO_x concentration annual average	100	5.7	5.77	0.103
Offsite SO_2 concentration 3-hour average	1,300	823	849.46	7.75×10^{-3}
Offsite SO_2 concentration 24-hour average	365	196	200.1	1.74×10^{-3}
Offsite SO_2 concentration annual average	80	14.5	14.71	1.10×10^{-4}
Offsite gaseous fluorides (ug/m^3) 12-hour average	3.7	1.99	1.99	1.5×10^{-5}
Offsite gaseous fluorides 24-hour average	2.9	1.04	1.04	5.95×10^{-6}
Offsite gaseous fluorides 1 week average	1.6	0.39	0.39	3.16×10^{-6}
Offsite gaseous fluorides 1 month average	0.8	0.09	0.09	8.92×10^{-7}

Table 3

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[1] State or Federal requirements. See Table 4.7.6.3-1, Storage and Disposition PEIS.

[2] Data represents the incremental increase above the No Action or Upgrade alternatives. Source: Table D-29, IMNM EIS.

result in negligible increases of ground water use and waste water and would not exceed waste water treatment capacity. This is because, other than a small increase in water use from the additional personnel, there would be no operations associated with plutonium storage that require water. All waste water discharges would be monitored and routed for treatment or discharged to sanitary waste. Building 105-K is outside the 100 year flood plain and is also outside the SRS areas that could be affected by the Probable Maximum Flood as derived using Nuclear Regulatory Commission Guide 1.59.

The maximum impact to water resources, above existing Site baseline usage and discharges, expected from plutonium storage aspects of DOE's proposed action in this Supplement Analysis would be about the same as presented in the Upgrade With RFETS and LANL Material alternative of the Storage and Disposition PEIS [14], i.e., there would be a 0.01% increase in water use and a 0.1% increase in waste water discharges. The water impacts from the proposed action would have a negligible affect on Site water or waste treatment capacity.

The impacts of radiological liquid discharges from Building 105-K are included as part of the No Action alternative in the Storage and Disposition PEIS. DOE expects there would be no significant increase above the No Action discharge levels since, during normal operations, water is not in contact with plutonium storage containers.

Stabilization and Declassification: Potential thermal stabilization/repackaging activities in the APSF are expected to have essentially no impact to water resources beyond the Site base-line operations presented in the No Action alternative of the Storage and Disposition PEIS [15]. Stabilization operations would not significantly increase the use of water resources beyond that required to operate the industrial systems associated with the APSF, e.g., chillers for air conditioning, sanitary sewer, potable water, etc., because additional water is not used in stabilization/repackaging operations.

DOE estimates declassification operations would not increase water use beyond the water requirement estimated for the Consolidation alternative in the Storage and Disposition PEIS (i.e., 13,247 million liters per year). The water requirements for full operation of the FB-line are included in the No Action alternative of the Storage and Disposition PEIS.

DOE would treat sanitary waste associated with personnel necessary to perform declassification operations using existing sewage treatment plants; discharges from these plants would continue to meet National Pollutant Discharge Elimination System permit limits. Non-radiological water emissions from declassification operations in FB-Line would be a component of F-Area non-radiological water emissions because discharges from the FB-Line facility are combined with discharges from F-Canyon that are then combined with F-Area discharges before the F-Area effluent is discharged to Upper Three Runs Creek at the SRS. The contribution from

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[14] Table 4.2.6.4-1 of the Storage and Disposition PEIS.
[15] Table 4.2.6.4-1 of the Storage and Disposition PEIS.

declassification operations in the FB-Line are minimal. The total F-Area non-radiological water impacts are expected to be as follows[16]. DOE expects that discharges would meet Federal and State standards.

- Nitrate – 40 micrograms per liter
- Ammonia – 30 micrograms per liter
- Manganese- 10 micrograms per liter
- Uranium – 20 micrograms per liter
- Lead – 6 micrograms per liter
- Nickel – 50 micrograms per liter
- Chromium – 20 micrograms per liter
- Aluminum – 200 micrograms per liter
- Copper – 10 micrograms per liter
- Zinc – 70 micrograms per liter

Data on the impact of radiological liquid emissions associated with stabilization/repackaging and declassification operations are presented in Tables 1 and 2 and the impacts are discussed in the Public Occupational Health and Safety section of this Supplement Analysis.

Socioeconomics

Storage: In the preferred alternative of the Storage and Disposition PEIS, DOE estimated a maximum of 346 jobs (193 direct and 153 indirect) would be generated during construction of the upgraded APSF and 160 workers would be employed during facility operations. Total employment, unemployment, and per capita income effects were estimated to be less than 1% in relation to No Action. DOE predicted any newly created jobs would be filled by the resident labor force. In summary, the socioeconomic impact of building and operating the upgraded APSF was estimated to be minimal.

DOE has estimated that about 65 people from the existing Site workforce would be used to modify Building 105-K for plutonium storage and about 64 people from the existing Site workforce would be required to perform plutonium storage operations. The effect on total employment, unemployment and per capita income from Building 105-K operations would remain less than 1% in relation to these same socioeconomic factors in the Storage and Disposition PEIS.

Therefore, the socioeconomic impact of operating the APSF and Building 105-K for plutonium storage would be essentially the same as the impact described for the preferred alternative of the Storage and Disposition PEIS. The socioeconomic impact of constructing the APSF and modifying Building 105-K and operating both facilities would be well within the impacts described for the Consolidation alternative of the Storage and Disposition PEIS.

The socioeconomic impacts at RFETS and Hanford of moving surplus plutonium to SRS were analyzed in the Storage and Disposition PEIS. The analysis concluded that this action would phase out plutonium storage at RFETS. Approximately 200 direct job losses at Hanford, in addition to the 2000 at RFETS would result. Compared to the total employment in the areas, the

[16] Source: Section 4.1.3.2, IMNM EIS.

loss of these jobs and the impacts to the regional economies would not be significant. The impacts of the proposed action would not change these impacts but cause them to occur sooner.

Stabilization and Declassification: DOE estimates there would be negligible additional socioeconomic effects to operate the APSF for stabilization of RFETS plutonium or to operate FB-Line for declassification purposes. The stabilization and metal conversion (declassification) capability would already exist in the APSF and FB-Line to deal with plutonium at the SRS. The existing APSF and FB-Line workforce would be used to repackage, stabilize and declassify any additional material.

Public and Occupational Health and Safety

Radiological Impacts from Normal Storage Operations: In the Storage and Disposition PEIS, DOE estimated impacts to the public and non-involved workers from plutonium storage operations in the APSF based on estimates of potential emissions to the air and water. Impacts to workers were estimated based on estimates of direct radiation exposure.

Public and Non-Involved Workers: Plutonium storage operations in Building 105-K would not result in any additional air or water radiological impacts (beyond those currently associated with other operations[17] in Building 105-K) because no shipping containers or storage containers would be opened in Building 105-K. Since air and water emissions create impacts that affect the non-involved workers and the public, there would be no significant additional radiological impact to the public or non-involved workers from normal operations in Building 105-K. The impact from the proposed action to the public and non-involved workers would be essentially the same as the impact from the Upgrade alternative in the Storage and Disposition PEIS[18].

Involved Workers: In the preferred alternative of the Storage and Disposition PEIS, DOE estimated the average annual radiation dose to individual involved workers in the APSF would be 250 mrem/yr and that the annual dose to all involved workers in the APSF would be 7.5 person-rem/yr. DOE estimates that the annual average radiation exposure to an involved worker in Building 105-K would be 367 mrem/yr and the total annual dose to all involved workers associated with plutonium storage in Building 105-K would be 6.6 person-rem/yr. The estimate for annual dose to individual workers in Building 105-K is higher than for workers in the APSF because the APSF storage vault will be monitored remotely and routine worker entry is not necessary, whereas the Building 105-K storage areas would be toured on a regular basis by operators and security personnel. The Building 105-K is estimated to have a storage capacity of 15 metric tons of plutonium. However, DOE does not expect to store more than 7 metric tons of plutonium in Building 105-K. The total worker dose estimate for Building 105-K storage operations, however, is lower than the total worker dose estimate for the preferred alternative in the Storage and

[17] These other operations include storage of highly enriched uranium and heavy water.

[18] In Table 4.2.6.9-1 of the Storage and Disposition PEIS , the impacts of the Upgrade alternative were based on the use of all storage spaces in the expanded APSF that would not be used for existing SRS material.

Disposition PEIS because there are more workers associated with APSF storage operations. Annual radiation doses to workers in either facility (APSF or Building 105-K) would be well within the DOE limit of 5,000 mrem/yr and the Site's administrative control level of 2,000 mrem/yr.

The combination of the worker doses from storing plutonium in the APSF and in Building 105-K would be about 14 person-rem/yr. This would be greater than the dose estimate of 7.5 person-rem/yr in the Upgrade alternative of the Storage and Disposition PEIS but would be less than the dose of 24 person-rem/yr that DOE estimated in the Consolidation alternative of the Storage and Disposition PEIS. DOE also estimated that the total dose to the Site workforce (involved and non-involved workers) from all operations at the SRS, including the operation of the APSF, would be 266 person-rem[19]. The additional worker dose for Building 105-K operations would increase the total estimated Site dose from 266 person-rem/yr to 273 person-rem/yr. The increase in total Site dose would be less than the total Site dose of 283 person-rem/yr that was estimated for the Consolidation alternative in the Storage and Disposition PEIS.

DOE estimated that the potential health impact from 50 years of APSF storage[20] to involved workers for the preferred alternative in the Storage and Disposition PEIS was a fatal cancer risk of 5×10^{-3} and that 0.15 fatal cancers could occur in the involved worker population[21]. DOE estimates that the potential health impacts from 10 years[22] of operating Building 105-K to store plutonium could result in a risk of fatal cancer for the average Building 105-K involved worker of 1.5×10^{-3} and 0.026 fatal cancers in the Building 105-K involved worker population. Since the Storage and Disposition PEIS bases health impacts on 50 years of storage[23], this Supplement Analysis assumes for comparison purposes, that impacts from 50 years of storage in APSF would be added to impacts from 10 years of storage in Building 105-K. Using this approach, the health impacts from storing plutonium in the APSF and in Building 105-K would be 0.18 fatal cancers in the involved worker population of both facilities, although impacts from 10 years of storage in both facilities would be less.

Health impacts to involved workers for the plutonium storage aspects of the proposed action in this Supplement Analysis (0.18 fatal cancers) would be essentially the same as the health impacts estimated in the preferred alternative of the Storage and Disposition PEIS (0.15 fatal cancers).

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[19] Table 4.2.6.9-2 of the Storage and Disposition PEIS.

[20] This is the estimated life of the storage facility and the time materials could be stored in the facility if a decision is made not to disposition surplus plutonium.

[21] Table 4.2.6.9-2 of the Storage and Disposition PEIS.

[22] A conservative estimate of the time required for an immobilization facility to be designed and constructed to complete disposition of RFETS and Hanford plutonium should DOE decide to construct that facility.

[23] This was done in case DOE decided to select the No Action alternative for disposition in the Storage and Disposition PEIS Record of Decision.

Chemical Impacts from Normal Storage Operations: There would be no significant impact to the public or workers from hazardous chemicals due to plutonium storage operations in Building 105-K. There are no industrial systems or other operations involved in the plutonium storage operations that would add to existing Building 105-K chemical impacts. Chemical impacts from current Building 105-K operations are included as part of the No Action alternative reported in section 4.2.6.9 of the Storage and Disposition PEIS.

Radiological Impacts from Normal Stabilization and Declassification Operations: Radiological impacts from normal operations are based on emissions to the air and water that are summed to determine total dose, see Table 1.

In this Supplement Analysis, DOE compares the incremental impacts from stabilizing RFETS plutonium in the APSF (2 years of operation, see Table 2) and the incremental impacts from declassifying RFETS plutonium in FB-Line (4 years of operation, see Table 2) with the impacts for 50 years of plutonium storage operations that DOE estimated in the Storage and Disposition PEIS. The comparison is provided in the Summary of Radiological Impacts discussion at the end of this section on Public and Occupational Health and Safety.

DOE estimates that stabilizing and repackaging the plutonium from the RFETS in the APSF for 2 years would result in a dose of 1.5×10^{-5} mrem to the maximally exposed individual member of the public at the Site boundary, a dose of 3.0×10^{-4} person-rem to the population surrounding the SRS, and a dose of 62 person-rem to workers, see Table 2. The potential health effect from the postulated radiation dose to the maximally exposed member of the public at the Site boundary would result in an increased risk of 7.5×10^{-12} cancer fatalities. The potential health effect from the postulated radiation dose to the population surrounding the SRS and to workers would be an increase of 1.5×10^{-7} cancer fatalities and 0.025 cancer fatalities, respectively, above those predicted in the Preferred Alternative in the Storage and Disposition PEIS. The impacts from repackaging only that RFETS plutonium that would be declassified in the FB-Line would be less.

DOE estimates that declassifying the plutonium from the RFETS in the FB-Line for 4 years would result in a dose of 3.4 mrem to the maximally exposed individual member of the public at the Site boundary, a dose of 136 person-rem to the population surrounding the SRS, and a dose of 196 person-rem to workers, see Table 2. The potential health effect from the postulated radiation dose to the maximally exposed member of the public at the Site boundary would result in an increased risk of 1.7×10^{-6} cancer fatalities. The potential health effect from the postulated radiation dose to the population surrounding the SRS and to workers would be an increase of 0.068 cancer fatalities and 0.078 cancer fatalities, respectively, above those predicted in the Preferred Alternative in the Storage and Disposition PEIS.

Chemical Impacts from Normal Stabilization/Declassification Operations: DOE estimates that under the current proposed action, chemical emissions from stabilizing/declassifying RFETS plutonium would not exceed the permissible exposure limits (PEL) for workers that have been

established by the Occupational Safety and Health Administration (OSHA). On-site chemical emission concentrations[24] and the permissible exposure limits are as follows. The on-site emissions are a small fraction of the PELs.

Pollutant	Averaging Time (hours)	Stabilization (mg/ m^3)	Declass (mg/ m^3)	PEL (mg/m^3)[25]
Carbon monoxide	8	0	0.021	55
Nitrogen oxides	1	0	0.055	9
Sulfur dioxide	8	0	3.08×10^{-5}	13
Carbon dioxide	8	0	4.88×10^{-4}	9,000
Nitric acid	8	0	1.52×10^{-5}	5

Radiological Impacts During Modification of Building 105-K: Preparing Building 105-K for use as a plutonium storage facility would require some decontamination work, facility modifications, removal of equipment to provide floor space for storage purposes and some construction activities (e.g., addition of roof vents and doors). DOE estimates that such work would take about 18 months. The average radiation dose to workers for the decontamination, modification, removal and construction activities would be 590 mrem/yr and the annual dose to this worker population would be 32 person-rem/yr. The potential health impact to workers, in the form of the risk of fatal cancer to a worker, would be 4×10^{-4} for 18 months of decontamination and construction work and the number of fatal cancers that could be expected in the worker population would be approximately 0.02. No impacts to non-involved workers or the public would be expected from the decontamination, modification, removal, and construction work because this work is not expected to generate significant air or water emissions. Work activities are confined to the interior of Building 105-K and airborne radioactivity levels are routinely monitored during work. Liquid sources would not be released from the building during normal decontamination, removal, or construction work.

Summary of Radiological Impacts From Routine Operations:

Workers: In the Storage and Disposition PEIS, DOE estimated that the potential health impact to the Site workforce (involved and non-involved workers) over 50 years was 5.3 fatal cancers [26] for the Preferred Alternative. Accomplishing all the activities discussed in this Supplement Analysis would increase the potential health impact to the Site workforce slightly to 5.6 fatal cancers. This new estimate in total Site workforce health impact is slightly greater than the health impact of 5.3 fatal cancers estimated for the Preferred Alternative in the Storage and Disposition PEIS and is slightly lower than the health impact of 5.7 fatal cancers that DOE estimated for the Consolidation Alternative in the Storage and Disposition PEIS.

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[24] Source: Tables D-28 and D-29, IMNM EIS.
[25] Source: Section 4.1.1.2 of the IMNM EIS.
[26] Table 4.2.6.9-2 of the Storage and Disposition PEIS.

Public: In the Storage and Disposition PEIS, DOE estimated the potential health impact to the population surrounding the SRS from existing site operations over 50 years was 1.1 fatal cancers [27]. Accomplishing all activities discussed in this Supplement Analysis would increase that potential health impact to about 1.2 fatal cancers. This impact is slightly greater than the impact of 1.1 fatal cancers DOE estimated in the No Action and Upgrade alternatives of the Storage and Disposition PEIS. Emissions would remain within the limits of the National Emission Standards for Hazardous Air Pollutants permits for the APSF and Building 105-K.

Waste Management

Modifications to Building 105-K: DOE estimates that decontamination and removal activities which would make Building 105-K available for storage operations could generate about 750 cubic meters (m^3) of low-level radioactive waste. This amount of low-level waste would be greater than the amount of waste estimated (essentially zero) in the Upgrade and other Preferred Alternatives in the Storage and Disposition PEIS. However, this amount, 750 cubic meters (m^3), would be less than 1% of the low-level waste DOE expects to be generated by current SRS activities as described in the No Action alternative of the Storage and Disposition PEIS [28]. DOE does not expect to generate any significant quantities of other wastes (e.g., less than 1 m^3 of mixed, hazardous, and transuranic waste) to modify Building 105-K. No high-level radioactive waste would be generated.

Storage: DOE estimated that storing plutonium in the APSF, as described in the preferred alternative of the Storage and Disposition PEIS, would not generate any of the following radioactive wastes: high-level, transuranic, mixed transuranic, low-level, mixed low-level or hazardous (other than minor quantities) [29]. DOE estimates that storing plutonium in Building 105-K would not significantly change the estimate for the preferred alternative because plutonium storage operations in Building 105-K would not involve opening the shipping containers or otherwise exposing facility areas or personnel (in protective clothing) to radioactive contamination.

Stabilization and Declassification: DOE used data from the IMNM EIS to estimate the annual waste generation impacts of stabilizing/repackaging RFETS plutonium in the APSF and FB-line operational data for declassifying RFETS plutonium using metal conversion operations in FB-Line. DOE believes this approach is reasonable because the impacts presented in the IMNM EIS are based on the same processes that would be used for stabilizing and declassifying plutonium from RFETS. Based on that data, DOE estimates that stabilizing the RFETS plutonium in the APSF would generate annually 14 m^3 of low-level radioactive waste, 2 m^3 of mixed waste, and 2 m^3 of transuranic waste (see Table 2). These impacts would be even smaller if DOE does not need to stabilize any RFETS materials at SRS.

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[27] Table 4.2.6.9-1 of the Storage and Disposition PEIS.
[28] Table 4.2.6.10-2 of the Storage and Disposition PEIS.
[29] Table 4.2.6.10-2 of the Storage and Disposition PEIS.

DOE estimates that declassifying RFETS plutonium in FB-Line (a 4 year operation) would generate about: 88 m^3 of transuranic waste; 4 m^3 of mixed waste; and 44 m^3 of low-level radioactive waste (see Table 2). No high-level waste is expected because the metal casting operation is not an aqueous process. Radioactive waste estimates for declassification operations are incremental to the waste expected from ongoing FB-line operations.

The radioactive waste generated from stabilization and declassification operations would be greater than the amount of waste DOE estimated in the Upgrade Alternatives of the Storage and Disposition PEIS. The Site has sufficient capacity to accommodate this increase in waste volume and the increase is a small percent of the waste that DOE estimated would be generated at the SRS.

Accidents

Storage: In the Upgrade alternative of the Storage and Disposition PEIS, DOE evaluated a range of "within design basis" and "beyond design basis" accidents related to APSF storage operations that could result in a release of radioactive material affecting workers and the public. The accidents included events related to natural phenomena (e.g., earthquakes), nuclear criticality and operator errors. In each case, the potential health effect was the result of a series of postulated failures associated with the equipment and systems that would normally be relied upon to contain the radioactive material. The risk of potential health impacts associated with these postulated accidents is discussed in section 4.2.6.9 of the Storage and Disposition PEIS and presented in Table 4 of this Supplement Analysis.

DOE estimated that the maximum impact to the population surrounding the SRS for the within design basis accidents of the Upgrade alternative in the Storage and Disposition PEIS was 3.4×10^{-4} fatal cancers. The greatest impact to the maximally exposed member of the public from these within design basis accidents was estimated to be a fatal cancer risk of 7.0×10^{-8} and the maximum impact to a non-involved worker was estimated to be risk of 2.9×10^{-6} latent cancer fatalities.

The design basis events evaluated for APSF were a breach of a primary containment vessel (PCV, the steel container in which the plutonium would be stored) due to puncture by forklift, firearm discharge, or failure due to corrosion. In Building 105-K, the PCVs will remain packaged inside shipping containers and DOE expects that the shipping packages will maintain their confinement function under all normal operation and accident conditions. However, in the unlikely event a loss of confinement occurred, the effects could be greater than DOE estimated for the APSF due primarily to an unfiltered release. Current analyses indicate the proposed storage configuration will be acceptable for criticality control. DOE will implement administrative controls to limit actions or conditions that might lead to a release of radioactive material under accident conditions. These controls will take into account the performance of plutonium shipping containers as storage containers and include container spacing, limits on combustible loading, restrictions to preclude opening the shipping containers during storage and necessary surveillance

Table 4

Accident Risk

Accident	Non-Involved Worker (Risk of latent Cancer Fatalities)		Maximum Off-Site Individual (Risk of latent Cancer Fatalities)		Population (Risk of latent Cancer Fatalities)		
	Upgrade Alt.[1]	105-K Storage	Upgrade Alt.[1]	105-K Storage	Upgrade Alt.[1]	105-K Storage	Frequency
PCV puncture by forklift[2]	8.6×10^{-8}	8.6×10^{-4}	2.1×10^{-9}	2.1×10^{-6}	1.0×10^{-5}	0.01	6.0×10^{-4}
PVC breach by firearm discharger[2]	5.0×10^{-9}	5.0×10^{-6}	1.2×10^{-10}	1.2×10^{-7}	6.0×10^{-7}	6.0×10^{-4}	3.5×10^{-4}
PCV penetration by corrosion[2]	2.9×10^{-6}	2.9×10^{-3}	7.0×10^{-8}	7.0×10^{-5}	3.4×10^{-4}	0.34	4.8×10^{-3}
Vault fire/storage area fire[3]	2.6×10^{-9}	2.6×10^{-6}	5.6×10^{-11}	5.6×10^{-8}	2.7×10^{-7}	2.7×10^{-4}	1.0×10^{-7}
Truck bay fire[4]	2.0×10^{-9}	N/A	4.9×10^{-11}	N/A	2.4×10^{-7}	N/A	1.0×10^{-7}
Explosion in vault/storage area[3]	2.0×10^{-11}	2.0×10^{-8}	5.0×10^{-13}	5.0×10^{-10}	2.4×10^{-9}	2.4×10^{-6}	7.0×10^{-7}
Explosion outside of a vault[5]	3.5×10^{-10}	3.5×10^{-7}	9.0×10^{-12}	9.0×10^{-9}	4.2×10^{-8}	4.2×10^{-5}	1.0×10^{-7}

[1] Table 4.2.6.9-4 Storage and Disposition PEIS.

[2] In this event, DOE expects to reduce the frequency of the release of radioactive material to $< 1 \times 10^{-6}$ through the application of engineered and administrative controls. At this reduced frequency, DOE estimates rusks from the worst credible accident (for PVC penetration by corrosion) would be 6.0×10^{-10} latent cancer fatalities over 50 years to non-involved workers, 1.5×10^{-11} latent cancer fatalities over 50 years to the maximally exposed off-site individual, and 7.0×10^{-8} latent cancer fatalities over 50 years.

[3] "vault"refers to storage in the APSF vault. "Storage Area" refers to storage in Building 105-K.

[4] Building 105-K does not have a truck bay, thus, a severe confined fire from a burning SST is not applicable.

[5] An explosion outside of a vault was postulated to occur in the APSF repackaging area. Building 105-K does not have such an area and repackaging work would not be done in Building 105-K.

Nuclear Criticality	2.2×10^{-11}	N/A	5.3×10^{-13}	N/A	2.6×10^{-9}	N/A	1.0×10^{-7}

and maintenance to assure continued integrity of the shipping containers during storage. The protection provided by the shipping containers along with the robust construction of the PCVs and appropriate engineered and/or administrative controls should be sufficient to prevent a release of radioactive material during the design basis accidents postulated in the Storage and Disposition PEIS.

For the Building 105-K design basis accidents, DOE estimates that the risk of latent cancer fatalities to the population surrounding SRS would be 0.34 in the event that plutonium were released as a result of a corrosion in a storage container. This risk is greater than the risk estimated for storage in the Upgrade alternative of the Storage and Disposition PEIS. However, the risk would be comparable to the risk of the same type of accident when storing plutonium in existing storage vaults at SRS as analyzed in the Continuing Storage alternative for the Storage of Plutonium and Uranium in the IMNM EIS. The IMNM EIS accident analysis showed a 0.31 latent cancer fatalities for the population surrounding SRS. The risk to the maximally exposed member of the public and the non-involved worker would be greater than the risk for storage estimated in the Upgrade alternative of the Storage and Disposition PEIS but would be low (less than 3×10^{-3} latent cancer fatalities).

DOE has also evaluated the impact of beyond design basis events for storing plutonium in Building 105-K. The Storage and Disposition PEIS postulated beyond design basis events involving fire, explosion, inadvertent criticality and earthquakes. Under the assumption that each accident could occur in Building 105-K, DOE has reevaluated the impact of each event that was postulated in the Storage and Disposition PEIS. DOE assumes the same amount of radioactive material would be released as was estimated in the Storage and Disposition PEIS; however, the release would be unfiltered. The results of this evaluation are included in Table 4 for uninvolved workers, the maximum off site individual, and the public population. As in the PEIS, involved workers may be subject to injury and, in some cases, fatality as a result of potential beyond design basis accidents such as fires, explosions and inadvertent criticality.

For the postulated beyond design basis accidents, DOE estimated that the maximum impact to the population would be 2.7×10^{-4} latent cancer fatalities in the event of a vault fire. This risk is greater than the risk estimated for storage in the Upgrade alternative in the Storage and Disposition PEIS, but still small. The risk to the maximally exposed public and the non-involved worker would also be greater that the risks for storage estimated in the Storage and Disposition PEIS but would be small (less than 2.0×10^{-8} latent cancer fatalities). DOE estimated that the involved worker may be subject to injury and in some cases, fatality as a result of potential beyond design basis accidents.

Stabilization and Declassification: DOE used the data in the IMNM EIS as the basis for accidents associated with stabilizing RFETS site plutonium in the APSF and declassifying RFETS plutonium in FB-Line. DOE believes this approach is reasonable because the accident scenarios and resulting impacts presented in the IMNM EIS are based on the same processes that would be used for stabilizing and declassifying plutonium from RFETS. The accident with the greatest

impacts for both APSF and FB-Line was postulated to be a design basis earthquake. Potential health impacts were estimated for the population surrounding SRS, for the maximally exposed individual at the Site boundary, and for the non-involved worker. Based on this information, DOE estimates the risk of fatal cancers to the public is 2.0×10^{-4} latent cancer fatalities for stabilization operations in the APSF and 1.2×10^{-3} latent cancer fatalities for declassification operations using the FB-Line. The impact to the maximally exposed off-site individual is 4.0×10^{-8} latent cancer fatalities for stabilization operations in the APSF and 2.6×10^{-4} latent cancer fatalities for declassification operations in the FB-Line. The impact to the non-involved worker is 7.2×10^{-7} latent cancer fatalities for stabilization operations in the APSF and 4.5×10^{-3} latent cancer fatalities for declassification operations in the FB-Line. This risk is not significantly greater than the Upgrade alternative in the Storage and Disposition PEIS (less than 2.0×10^{-4} latent cancer fatalities); the risk and consequence is similar to the impacts presented for design basis accidents in the Upgrade alternative of the Storage and Disposition PEIS.

Environmental Justice

For environmental justice impacts to occur, there must be significant and adverse human health or environmental impacts that disproportionately affect minority populations or low-income populations. This Supplement Analysis shows that accomplishing the proposed action would be within regulatory limits and the impacts to the public would be low during routine operations.

This Supplement Analysis also shows that accidents would not result in a significant risk of adverse human health or environmental impacts to the population who reside within 80 kilometers of the SRS. Therefore, such accidents would not have disproportionately high or adverse risk of impacts on minority or low-income populations.

Based on the analysis in this supplement analysis, no disproportionate, high and adverse impact would be expected on minority or low-income populations.

CONCLUSION

The impacts of the proposed action on many resource areas are comparable to the impacts identified in the Storage and Disposition PEIS's Preferred Alternative. The proposed action would result in a higher level of waste generation and electrical usage than was shown for the Preferred Alternative. However, these increases are well within the SRS's waste treatment capabilities and electrical capacity. If the Hanford materials are shipped in their current form[30], there would be an increase in the number of trips required to move the material to SRS, but the impacts from transportation would be about the same as for the Storage and Disposition PEIS's Preferred Alternative. Also, because some of the RFETS materials would be shipped as less than 50% by weight plutonium, there would be a small increase in the number of trips required to move all of the RFETS non-pit surplus plutonium to SRS, although impacts from transportation would

[30] Some of the Hanford surplus plutonium is in the form of fuel assemblies and fuel rods.

be comparable to transportation impacts for the Preferred Alternative of the Storage and Disposition PEIS.

The Supplement Analysis shows that the proposed action does not make a substantial change to environmental concerns evaluated in the Storage and Disposition PEIS. Also, the proposed action does not present significant new circumstances or information relevant to the environmental concerns evaluated in the Storage and Disposition PEIS.

REFERENCES

1. DOE 1998a. DOE letter dated February 25, 1998, Acting Assistant Secretary Owendoff to Honorable Pete Domenici.

2. DOE 1998b. DOE electronic mail message dated May 14, 1998, B. Stevenson to K. Waltzer.

3. DOE 1996. *Storage and Disposition of Weapons-Usable Fissile Materials Final Environmental Impact Environmental Impact Statement*, DOE/EIS-0229, December 1996.

4. DOE 1995. Interim Management of Nuclear Materials Final Environmental Impact Statement, DOE/EIS-0220, October 1995.

5. Tetra Tech NUS, Inc. 1998a. Tetra Tech NUS, Inc. letter, AIK-98-0220, J.L. Oliver to A.R. Grainger, May 5, 1998.

6. Tetra Tech NUS, Inc. 1998b. Tetra Tech NUS, Inc. letter, AIK-98-0223, J.L. Oliver to A.R. Grainger, May 6, 1998.

7. WSRC 1998. DOE electronic mail message, dated July 13, 1998, R. Claxton to K. Waltzer.

APPENDIX A

STORAGE ALTERNATIVES ANALYZED IN THE STORAGE AND DISPOSITION OF WEAPONS-USABLE FISSILE MATERIAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

In the Storage and Disposition PEIS, DOE evaluated the environmental impact of several alternatives for long-term storage of surplus non-pit weapons-usable plutonium at the SRS pending disposition. These alternatives were:

Upgrade: The Upgrade alternative environmental impact analysis for SRS included two sub-alternatives. The first sub-alternative (and the preferred alternative in the Storage and Disposition PEIS) was Upgrade with RFETS Non-Pit Plutonium. This sub-alternative involved expanding the APSF to store those plutonium materials currently at the SRS and about 7 metric tons of surplus non-pit weapons-usable plutonium materials from RFETS after stabilization is performed at RFETS. The second sub-alternative was Upgrade With All or Some RFETS Plutonium or LANL Plutonium. This sub-alternative involved expanding the APSF to store those plutonium materials currently at the SRS and about 13 metric tons of surplus non-pit weapons-usable plutonium materials from RFETS (after stabilization was performed at RFETS) and about 1.5 metric tons of LANL surplus plutonium.

Consolidation: Under this alternative DOE would have constructed a new facility at the SRS to store the plutonium currently at the SRS and all plutonium considered in the scope of the Storage and Disposition PEIS.

Collocation: Under this alternative DOE would have constructed a new facility at the SRS to store the plutonium currently at the SRS and all plutonium and highly enriched uranium considered in the scope of the Storage and Disposition PEIS.

No Action: DOE would continue to store SRS, RFETS, and Hanford surplus plutonium materials in accordance with the No Action alternative in the Storage and Disposition PEIS. The material would be placed in a stabilized form pursuant to the Defense Nuclear Facilities Safety Board Recommendation 94-1.

Under each of the above alternatives, DOE assumed the plutonium would be stabilized to meet DOE plutonium storage standard requirements prior to shipping the material to the SRS and that transportation would be accomplished by Safe Secure Transport (SST) in accordance with all applicable U.S. Department of Transportation, U.S. Nuclear Regulatory Commission, and U.S. Department of Energy requirements.