DOE/EIS-0244-FS/SA3

Supplement Analysis

Project W-460, Plutonium Finishing Plant Plutonium Stabilization and Packaging System, 200 West Area, Hanford Site, Richland, Washington

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INTRODUCTION

The U.S. Department of Energy (DOE) proposes to provide enhanced stabilization, packaging, and storage capabilities for plutonium oxides and metals at the Plutonium Finishing Plant (PFP) Facility at the Hanford Site. Predominantly, the capabilities would be provided under Project W-460, "Plutonium Finishing Plant Plutonium Stabilization and Packaging System." The environmental impacts for stabilization, packaging, and storage activities were analyzed previously in DOE/EIS-0244-F, *Plutonium Finishing Plant Stabilization Final Environmental Impact Statement* (PFP EIS, May 1996), and in DOE/EIS-0244-FS/SA2, *Increasing Batch Size for Thermal Stabilization of Plutonium Finishing Plant Metals, Oxides, and Process Residues, 200 West Area, Hanford Site, Richland, Washington* (SA2, August 1999). Activities analyzed in the PFP EIS and SA2 for various categories of plutonium-bearing materials were limited to existing radiologically contaminated locations within the PFP Facility's 234-5Z Building.

As stated in the PFP EIS, in *Recommendation 94-1*, the Defense Nuclear Facilities Safety Board (DNFSB) specifically advised: "that an integrated program be formulated on a high priority basis, to convert within two to three years the materials" (plutonium metal that is in contact with or in proximity to plastic) "to forms or conditions suitable for safe interim storage;" that the plan "will require attention to limiting worker exposure and minimizing generation of additional waste and emission of effluents to the environment;" and finally that the plan "should include a provision that, within a reasonable period of time (such as eight years), all storage of plutonium metal and oxide should be in conformance with the DOE standard on storage of plutonium."[1]

The proposed action would provide equipment and facility modifications to allow these activities to be conducted at the 2736-Z Buildings (within the PFP Facility and immediately adjacent to the 234-5Z Building; see Figures 1 and 2 for the relative locations of 2736-ZB, 2736-ZA and 2736-Z Buildings), as well as the 234-5Z Building.

PFP EIS RECORD OF DECISION

The presence of relatively large quantities of chemically reactive plutonium-bearing materials in their present form and location in DOE's PFP Facility poses unacceptable risks to workers, the public, and the environment. DOE is stabilizing approximately 3,600 kilograms (8,000 pounds) of plutonium-bearing materials presently stored at the PFP Facility, located at the Hanford Site near Richland, Washington. As stated above, the environmental impacts for stabilizing these materials were analyzed in the PFP EIS. In the Record of Decision (61 Federal Register 36352, July 10, 1996), DOE decided to implement a select group of stabilization alternatives to place plutonium-bearing materials into a form suitable for interim storage in existing vaults at the PFP Facility. Stabilization activities generally would result in plutonium oxide or mixed oxides of plutonium and uranium. The resultant plutonium oxides from the muffle furnace stabilization process will be tested in accordance with DOE Standard DOE-STD-3013 (3013).

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[1] See PFP EIS, Section 2.2, "Background," for additional details.

Stabilized plutonium oxides deemed acceptable may be packaged using existing capabilities at the Hanford Site, or the material may go directly to an organic-free container; once packaged, the material will be placed in the existing vault(s) at the PFP Facility for interim storage. Plutonium metal also would be packaged in an organic-free container and transferred to PFP Facility vaults for interim storage.

IMPLEMENTATION OF DNFSB 94-1 RECOMMENDATION

The 3013 contains technical guidelines for the stabilization and packaging of special nuclear material (SNM) containing greater than 50 weight percent plutonium to be placed in long-term storage. Although the PFP Facility has an active program for stabilizing plutonium-bearing materials, it does not have the capability to package stabilized material into welded containers called for in 3013. Further, the containers called for in 3013 are larger than those currently used at the PFP Facility and would not physically fit into existing storage fixtures in secure vault storage at the PFP Facility.

DOE proposes to stabilize, package and store material containing greater than 30 weight percent plutonium[2] in the 2736-Z Buildings, which are adjacent to 234-5Z Building (see Figures 1 and 2), as well as the 234-5Z Building. The 2736-Z Buildings are not addressed in the PFP EIS or Record of Decision as a location for stabilizing and packaging plutonium-bearing materials. The unit operations are the same as those described in the PFP EIS; the predominant differences are the specific location proposed for the activities (i.e., 2736-ZB Building), the furnace loading anticipated for thermal stabilization (5 kilograms of plutonium), and design enhancements for thermal stabilization (reducing the risks associated with potential accidents).

Section 1502.9(c) of the Council on Environmental Quality Regulation for Implementing the Procedural Provisions of NEPA, Title 40 Code of Federal Register (CFR) Parts 1500-1508, requires the preparation of a Supplemental Environmental Impact Statement (EIS) if: (1) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (2) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Section 1021.314(c) of the DOE NEPA Regulations (10 CFR 1021, 61 FR 36222, July 9, 1996) provides that, where it is unclear whether a supplemental EIS is required, DOE will prepare a Supplement Analysis to support a DOE determination with respect to the criteria of 40 CFR 1502.9(c). The purpose of this Supplement Analysis, prepared in accordance with Section 1021.314 of the DOE NEPA regulations, is to provide a basis for a determination of whether or not a Supplemental EIS is required prior to initiation of Project W-460.

[2] The 30 weight percent is considered in the pending revised DOE Standard DOE-STD-3013-99. This represents approximately 0.1 metric tonnes of additional plutonium to be stabilized.

BACKGROUND

In the PFP EIS, DOE evaluated the impacts on the human environment of stabilization of plutonium-bearing materials to a form suitable for interim storage at the PFP Facility. For analysis purposes, the PFP chemically reactive materials (containing a plutonium mass of approximately 3,600 kilograms [8,000 pounds]) were grouped into four inventory categories[3]. Each category (i.e., plutonium-bearing solutions; oxides, fluorides, and process residues; metals and alloys; and polycubes and combustibles) contains materials that are chemically and physically dissimilar to materials in the other groups.

Materials would undergo stabilization processes, as necessary, to convert them to a form suitable for packaging to 3013. As stated in the PFP EIS (Section 3.2.1.3), a packaging procedure meeting 3013 had not been developed for use at the PFP Facility. Existing procedures at the PFP Facility include placing stabilized plutonium-bearing materials into container(s) with lids which are crimped and/or taped, and subsequently transferred to storage using plastic bags for contamination control. The PFP EIS does address packaging as a bagless transfer system (BTS), which does not rely on the use of plastic bags or organic seals. The aforementioned process was described as a prototype bagless transfer system, under development at DOE's Savannah River Site (SRS)[4]. The proposed Hanford Site system (HNF-SD-W460-CDR-001, Rev. 1, *Conceptual Design Report – Plutonium Stabilization and Handling, Project W-460*) would be a third-generation BTS, based on development activities conducted at SRS since the aforementioned prototype. The Hanford Site system would be configured, per a Memorandum of Understanding[5], similar to the system presently in operation at SRS. Approximately 300 inner-welded containers have been produced at SRS since August, 1998. Additional information on the SRS BTS is provided in Appendix A.

The stabilization, packaging, and interim storage activities would be conducted at the PFP Facility (Figures 1 and 2). The PFP Facility is located in the 200 West Area of the Hanford Site. The PFP Facility is approximately 11 kilometers (7 miles) from the Columbia River, the nearest natural watercourse. The nearest population center is the city of Richland, about 51 kilometers (32 miles) away.

Project W-460 would provide additional stabilization, packaging, and storage capabilities to meet 3013 in the 2736-Z Buildings within the PFP Facility. This would allow eventual

[3]A summary of plutonium inventory categories at the PFP Facility may be found in the PFP EIS, Table 3-1.

[4]The prototype was incorporated by reference in the PFP EIS. The full citation is: "Bigler, R.M., R.H. Jones, and M. L. Rogers, 1994, Bagless Transfer System for Gloveboxes, Paper presented at the Uranium/Plutonium Recovery Operations Conference, Technical Presentations No. 8: Special Nuclear Material Storage, at Knoxville, Tennessee, October 17-20."

[5]"Memorandum of Understanding for Supply of a Bagless Transfer System for the Plutonium Finishing Plant, Revision 0, June 1999", transmitted via letter [L.J. Olguin, FDHI, to Dr. S. Wood, WSRC, "Contract No. DE-AC06-96RLL13200 – Repeat Transmittal of Memorandum of Understanding for Acquisition of Bagless Transfer System for Project W-460, Plutonium Stabilization and Handling," FDH-9951828.2 R1, dated June 14, 1999].

deactivation of other PFP Facility areas while maintaining the functions required for safe storage. The current cost estimate for Project W-460 is approximately $42,000,000.

Although PFP has an active program for stabilizing remaining inventories of plutonium-bearing materials, the Hanford Site presently does not have the capability to package stabilized special nuclear material into the welded containers specified by 3013. In addition, the container configuration designed and accepted to date is larger than that which is currently in use at the PFP and will not physically fit into the existing storage fixtures in secure vault storage at the PFP. Project W-460 would provide stabilization and packaging equipment, and vault modifications. In addition, support system and infrastructure modifications will be provided as part of this project.

Project W-460 is comprised of several elements that will fully implement the provisions of 3013 for special nuclear material inventories of plutonium and plutonium/uranium oxides and will assist in complying with the commitments of DNFSB Recommendation 94-1 to stabilize and package special nuclear material at PFP. The elements of Project W-460 are:

- Stabilization: provide confinement, and capability to heat special nuclear material to the temperatures specified in 3013, and provide initial containerization (i.e., primary convenience can[6]). Evolving initial containerization design would incorporate consideration of engineering specifications such as maximum capacity and heat transfer characteristics.

- Bagless Transfer System (BTS): provide confinement and add an inner welded container in accordance with the requirements of 3013.

- Inner Can Leak Test: verify the inner welded container meets or exceeds the leak tightness requirements of 3013.

- Outer Can Weld: add an outer welded container in accordance with the requirements of 3013.

[6]Existing procedures at the PFP Facility include placing stabilized plutonium-bearing materials into container(s) with lids that are crimped and/or taped, and subsequently transferred to storage using plastic bags for contamination control during removal from the glovebox. Procedures are being developed for the Hanford Convenience Can, which will provide redundant containerization providing additional radiological contamination control The Hanford Convenience Can is described as a nested arrangement of four foodpack type containers with a polyethylene bagout bag between the two pairs of cans. The inner two cans are sealed in a glovebox. The cans are removed from the glove box via standard bagout techniques using a polyethylene bag, and overpacked outside the glovebox with two contamination-free foodpack type containers. The innermost can is considered a 'primary convenience can.'

Figure 1. PFP Facility Layout

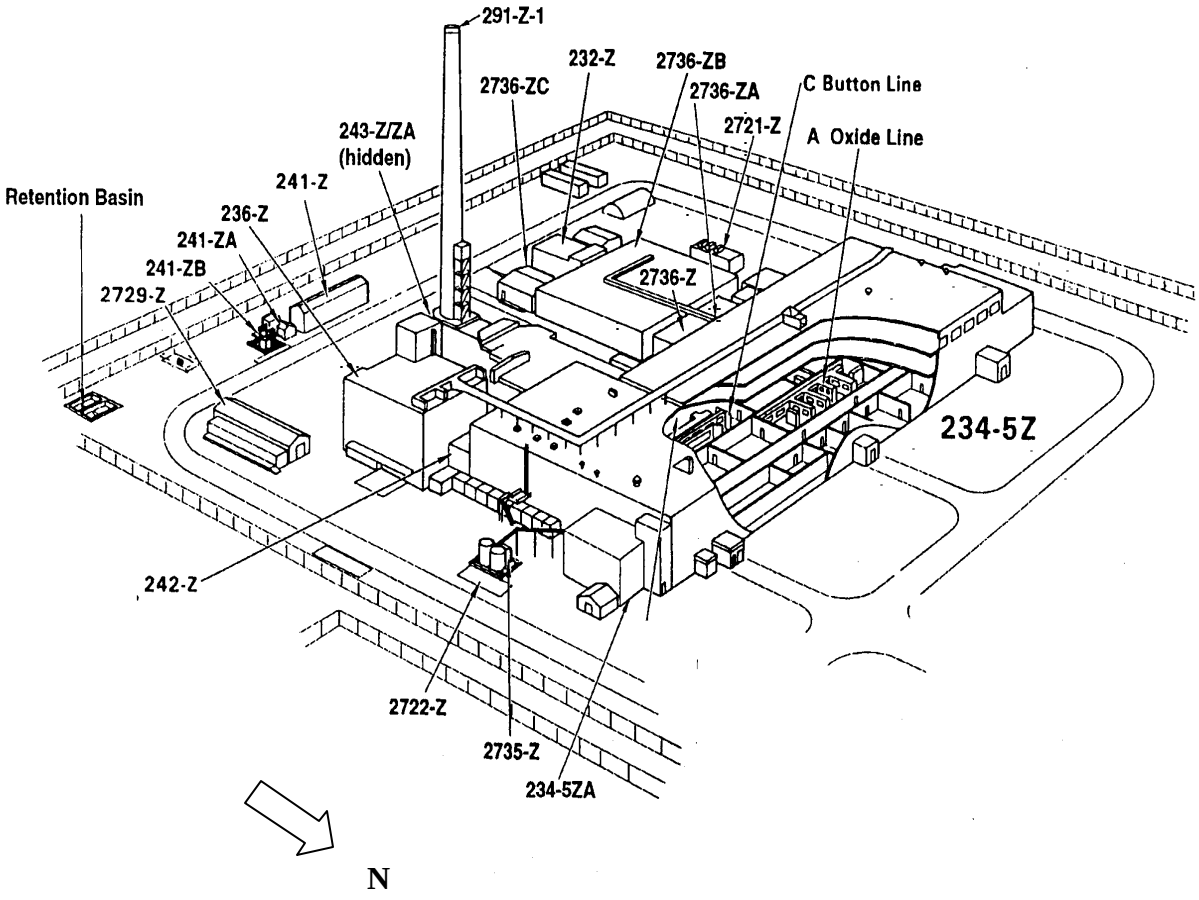
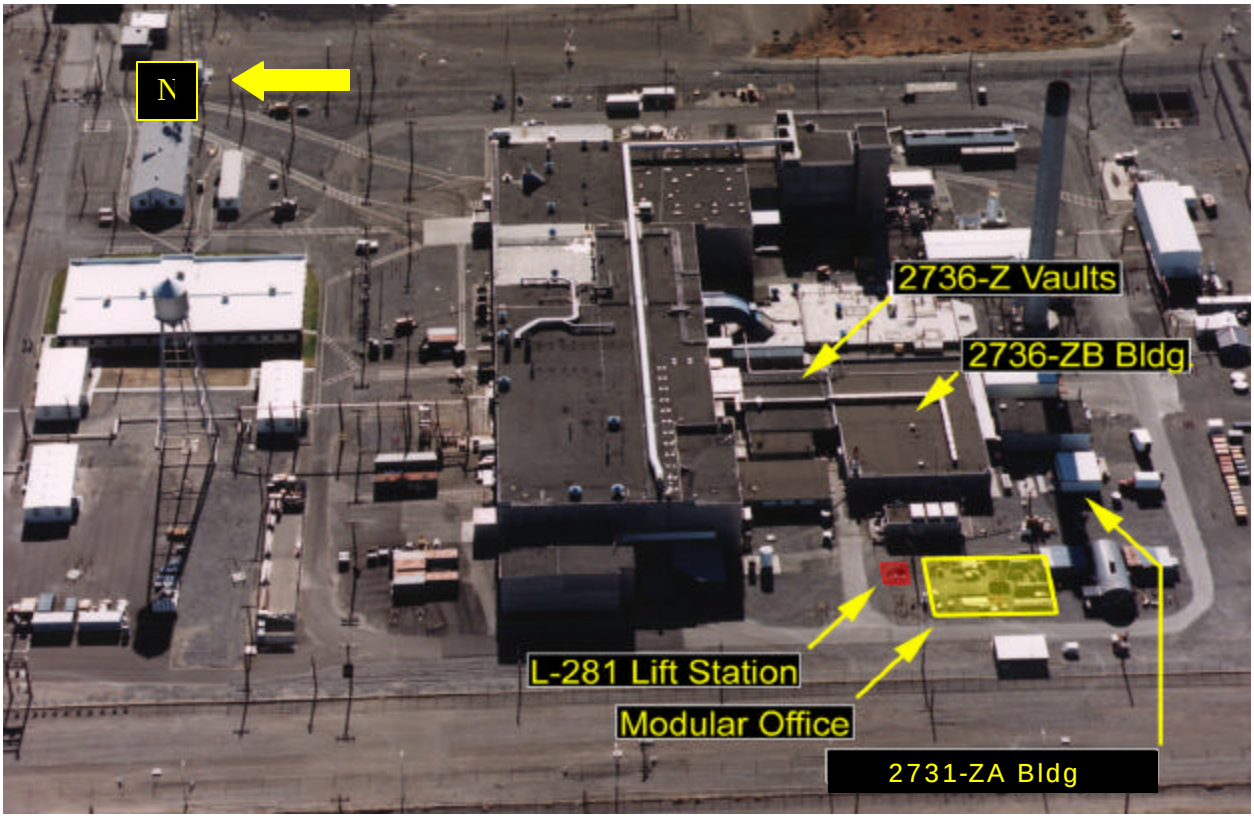


Figure 2. 2736-ZB BUILDING, 2731-ZA BUILDING AND 2736-Z VAULTS



- Outer Can Leak Test: verify the outer welded container meets or exceeds the leak tightness requirements of 3013.

- Nondestructive Assay (NDA) Laboratory Modification: provide enhanced post-packaging capabilities for 3013 containers. Such capabilities could include the installation of calorimeters and a radiography machine. Calorimetry provides thermal content measurements, while radiography is being considered as a post-packaging activity to establish a baseline for subsequent surveillance of container integrity (i.e., bulging).

- Vault Modifications: provide safe, secure vault storage locations in the 2736-Z Building to accommodate 3013 containers.

- Infrastructure Modification: provide support systems to accommodate elements of Project W-460.

- Operations Trailer: house Operations and Operations Support personnel for the duration of operations.

Additional details regarding Project W-460 may be found in HNF-SD-W460-FDC-001, Rev. 1, *Functional Design Criteria - Plutonium Stabilization and Handling (PuSH) Project W-460*, and HNF-SD-W460-CDR-001, Rev. 1, *Conceptual Design Report – Plutonium Stabilization and Handling, Project W-460.*

The proposed action also includes installation of a BTS in the 234-5Z Building as well as the BTS proposed as part of Project W-460. The 234-5Z Building would be modified by installing a BTS in an existing plutonium processing area. Appropriate utility tie-ins would be provided. The 234-5Z Building BTS would produce a welded stainless steel container that is designed to be the inner container in accordance with the requirements of 3013. The 234-5 Z Building BTS would replace the current process that involves placing the plutonium in a series of nested foodpack cans.

COMPARISON OF PROPOSED ACTION TO PLUTONIUM FINISHING PLANT ENVIRONMENTAL IMPACT STATEMENT

Estimates of the potential environmental impacts associated with stabilization, packaging and storage of the PFP Facility's plutonium-bearing materials are included in Chapter 5 of the PFP EIS ("Environmental Impacts") and are based upon the total quantity of material to be stabilized and packaged at the PFP Facility. There is no change in the total quantity of material to be stabilized, packaged and stored at the PFP Facility (i.e., the aforementioned 3,600 kilograms [8,000 pounds]). The stabilization, packaging, and interim storage activities that are described in the PFP EIS and the proposed action would be conducted within the protected area at the PFP Facility. The proposed activity is not expected to impact flora, fauna, air quality, geology, hydrology/water quality, or land use plans in any substantially different manner than that previously described in the PFP EIS.

The processes described and analyzed in the PFP EIS and Record of Decision were based on activities conducted in the 234-5Z Building. Health impacts considered existing background radiation levels, and radioactive air emissions from the existing PFP main stack (291-Z-1). The proposed action would result in reduced radiological impacts, due to the proposed change in location of the unit operations (i.e., the PFP EIS addressed proposed activities in the 234-5Z Building, while the proposed action would conduct

many of those operations in the 2736-ZB Building). The proposed action would provide structural modifications to facilities which, although not expected to result in substantial environmental impacts, were not analyzed or discussed in the PFP EIS or associated Record of Decision.

Construction

The proposed action would provide equipment and modifications at the PFP Facility (see PFP EIS, Appendix A, *Description of the Plutonium Finishing Plant*) allowing for the enhanced capability to stabilize, package, and store plutonium-bearing materials at the Hanford Site. Details regarding proposed construction activities for Project W-460 may be found in HNF-SD-W460-FDC-001, Rev. 1, *Functional Design Criteria - Plutonium Stabilization and Handling (PuSH) Project W-460*, and HNF-SD-W460-CDR-001, Rev. 1, *Conceptual Design Report – Plutonium Stabilization and Handling, Project W-460.*

In general, the proposed construction activities are not expected to impact the flora and fauna, air or water quality, or have socioeconomic effects. Noise levels would be comparable to existing conditions at the PFP Facility. The amount/type of equipment and materials to be used would be typical of private sector industrial activities, and would not provide unique environmental impacts nor represent a substantial long-term commitment of nonrenewable resources.

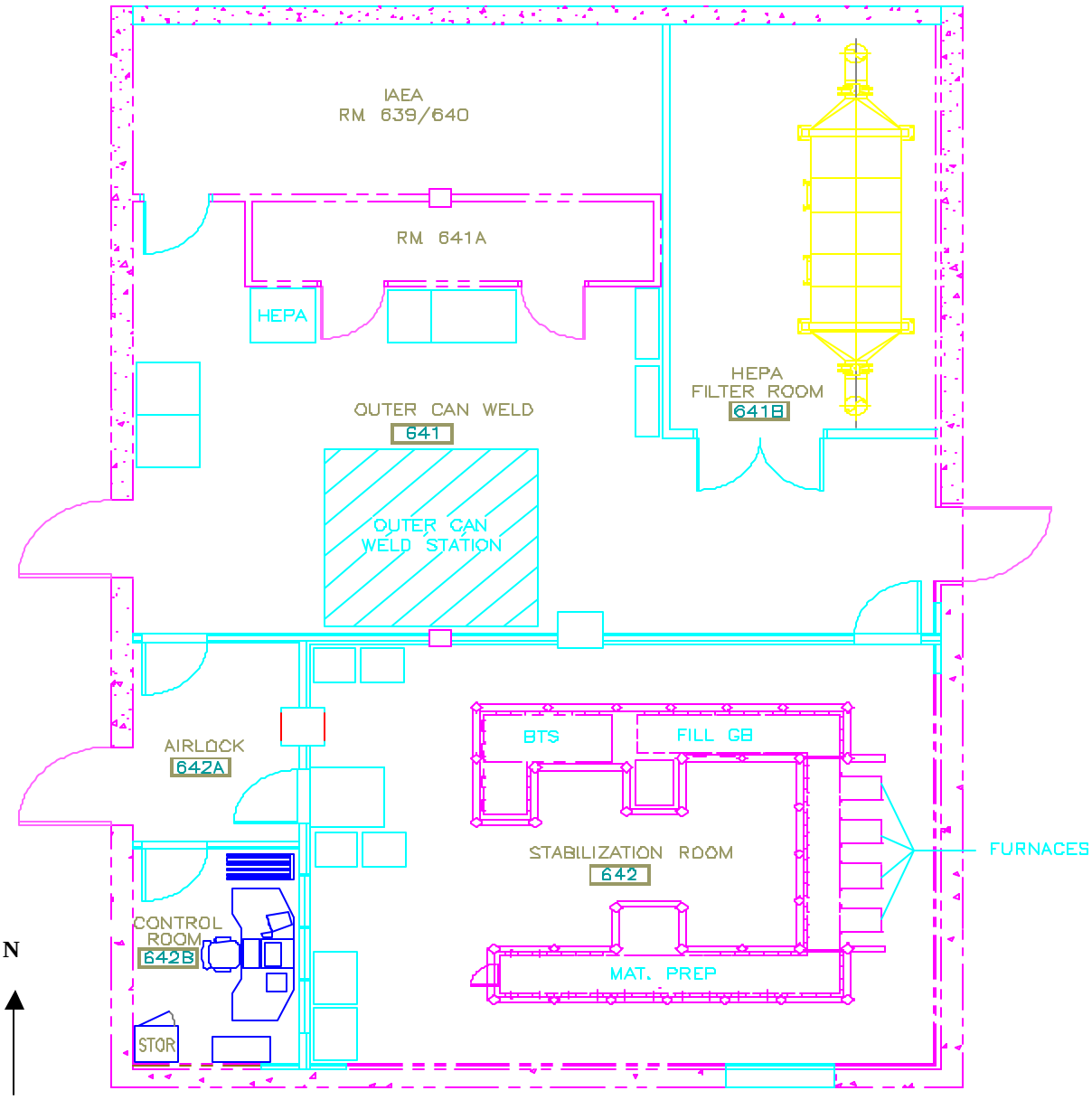
The proposed action would add an additional location (i.e., the 2736-ZB Building) for the thermal stabilization of plutonium oxides (and mixed oxides of plutonium and uranium), complementing the stabilization capability in the 234-5Z Building (which was discussed and analyzed in the PFP EIS). A simplified proposed 2736-ZB Building floor plan for Project W-460 is shown in Figure 3.

The proposed action also would provide packaging and storage capabilities for stabilized plutonium oxides (and mixed oxides of plutonium and uranium), and plutonium metal to 3013. This would allow eventual deactivation of other PFP facility areas no longer needed, while maintaining all functions required for storage of special nuclear material. The BTS described in the PFP EIS was based on a prototype (PFP EIS, Section 3.2.1.3). The design of that system has progressed, and is being incorporated into PFP materials stabilization planning.

Facility modifications would be required for Project W-460. Current design concepts (and potential specific impacts) include:

- The 2736-ZB Building (Figures 1, 2 and 3) would be modified to provide space for gloveboxes that would house seismically qualified stabilization and packaging equipment. Architectural modifications would be conducted, as appropriate; e.g., removing walls, installing airlocks, installation of safety equipment, and moving/installing support media (e.g., post-packaging non-destructive testing equipment, bottle docks for argon and helium gases used in packaging). A new process

Figure 3. Project W-460: Proposed 2736-ZB Building Floor Plan (partial)



exhaust system with high-efficiency particulate air filtration, full instrumentation, and a new separate exhaust stack would be installed. The new stack height would be approximately 11 meters (35 feet), and would require a Notice of Construction, which would be submitted to the State of Washington Department of Health and the U.S. Environmental Protection Agency (Region 10). Small amounts of radioactive materials in the facility would not be expected to result in measurable radiological doses to workers or the public during construction operations.

- A modular office structure would be located adjacent to the 2736-ZB Building to provide for relocation of displaced offices, lunchroom, and changerooms (Figure 2). Appropriate equipment would be provided to allow for disposition of sanitary wastes. Security systems would be modified, as necessary, to ensure appropriate safeguards. No measurable radiological consequences to workers or the public would be anticipated.

- The 2736-Z Building (Figures 1 and 2) would be modified to provide storage for a new container that complies with 3013.

  The 2736-Z Building consists of four vaults for the storage of special nuclear material, divided by a corridor running the width of the building (see PFP EIS, Appendix A, Section A.2.5 for a description of the 2736-Z Building). The proposed action would involve timing construction activities with empty vault cubicles as material is removed for stabilization. Construction workers would receive a radiological dose from background radiation in other cubicles. Shielding blankets would be installed to reduce the background if needed.

  PFP Facility worker doses associated with Project W-460 vault modifications would be in addition to those projected with the total vault handling activities described in the PFP EIS preferred alternative for various categories of plutonium-bearing materials. Doses to PFP Facility workers resulting from proposed vault modifications have been estimated in *Anticipated Radiological Dose to Workers for Plutonium Stabilization and Handling at PFP - Project W-460* (HNF-5398). For analysis, it was assumed that all material in a vault cubicle would be removed prior to construction entry. Appropriate personnel, including construction crafts and radiological control technicians, would support the activity. The resultant total PFP Facility worker dose for vault modifications was conservatively estimated to be approximately 64 person-rem, which corresponds to 0.03 latent cancer fatalities. The maximum annual exposure to a facility worker from all sources must not exceed the cumulative limits set forth in 10 CFR 835, *Occupational Radiation Protection*, and in HSRCM-1, *Hanford Site Radiological Control Manual*, summed over all controlled access areas. Appropriate procedures would be developed to minimize worker exposure, in keeping with As Low As Reasonably Achievable (ALARA) principles. Additional details are provided in Appendix B.

- The 2731-ZA Building (Figure 2) would be modified to house the nitrogen atmosphere system (nitrogen would be used in glovebox operations). The modifications would

include structural changes (e.g., moving/installing walls) as well as providing insulation and utility services (e.g., electrical panels and fire alarms). No measurable radiological consequences to workers or the public would be anticipated.

The 234-5Z Building would be modified by installing a BTS in an existing plutonium processing area. Appropriate utility tie-ins would be provided.

There is some dose associated with installation of the 234-5Z Building BTS since the work area where it would be installed is about 0.5 mrem per hour. A rough estimate of the effort to install this system is 7 people (e.g., operators, craft personnel, etc.) for 12 weeks. Assuming 0.5 mrem per hour background (where the proposed 234-5Z Building BTS would be installed), the construction workers would receive a total cumulative dose of approximately 2 person-rem.

Routine Operations

As stated earlier, the total inventory of plutonium-bearing materials to be managed would not change. As discussed in the PFP EIS, minimal releases to the environment of radiological constituents are anticipated due to the extensive filtration systems used at the PFP Facility. From a health effects standpoint, there would be no meaningful effect on Hanford Site workers, the public, or the environment. It would be expected that this conclusion would hold true for similar operations conducted in a newer facility (i.e., the 2736-ZB Building with state-of-the-art air filtration).

DOE acknowledged in the PFP EIS [PFP EIS, Chapter 3] that stabilized plutonium products could be retrieved from storage and repackaged to meet 3013 "…when a bagless transfer system has been developed." As conceptualized in Figure 4, stabilized material in the 234-5Z Building would be packaged directly in the proposed 234-5Z Building BTS. That inner welded container then would be transferred to the 2736-ZB Building for outer can welding.

Also, as shown in Figure 4, it is anticipated that a limited inventory of plutonium oxides would require thermal stabilization in the 2736-ZB Building. Those oxides would be transferred from vault storage to the 2736-ZB Building and thermally stabilized prior to the aforementioned packaging in 3013 containers. Thermal stabilization would be conducted in a nitrogen atmosphere with a small air stream bleed. The furnaces (four furnaces, each with a maximum capacity of 5 kilograms of plutonium, are considered in the design) could accommodate a maximum of 20 kilograms of plutonium at any one time.

Thermal stabilization unit operations for plutonium oxides addressed in the PFP EIS were analyzed for a furnace load of 600 grams plutonium. A recently completed Supplement Analysis to the PFP EIS (SA2) provided an evaluation of potential environmental impacts associated with an increase in furnace loading to 2.5 kilograms of plutonium. It was determined that the increase in furnace loading did not substantially change matters relevant to environmental concerns analyzed in the PFP EIS and therefore did not require additional NEPA review.

Radiological doses to PFP Facility workers resulting from proposed operational activities have been estimated in HNF-5398. Estimated doses are based on current planning, which involves thermal stabilization activities in both the 2736-ZB Building (5 kilograms plutonium furnace capacity) and the 234-5Z Building (2.5 kilograms plutonium furnace capacity). That is, it is anticipated that no more than 50 percent (by plutonium weight) of the projected oxide inventory would be thermally stabilized in the 2736-ZB Building furnaces. Project W-460 capabilities would be available to accommodate transfer of stabilized plutonium-bearing materials from the 234-5Z Building to the 2736-ZB Building for packaging directly into 3013 containers (see Figure 4). Those materials from the 234-5Z Building include oxides resulting from stabilization of polycubes and liquids, as well as brushed metals. Additionally, some oxides currently stored in PFP Facility vaults require thermal stabilization in the 234-5Z Building.[7] Some materials would be suitable for thermal stabilization in the 2736-ZB Building, but could be thermally stabilized in either the 2736-ZB Building or the 234-5Z Building. For analysis, the 50-weight percent plutonium value was used.

The projected Facility worker dose associated with the 2736-ZB Building stabilization/packaging and vault placement activities is approximately 101 person-rem (equating to 0.04 latent cancer fatalities; also see Appendix B, Table B.3). The projected Facility worker dose associated with the 234-5Z Building stabilization activities is approximately 161 person-rem (equating to 0.06 latent cancer fatalities; also see Appendix B, Table B.3). Therefore, as shown in Table 1 below, the total projected Facility worker dose associated with routine operational activities is 262 person-rem.[8] The projected schedule associated with Project W-460 operational activities is approximately 42 calendar months. Specific details regarding Facility worker dose are documented in HNF-5398. Additional information is provided in Appendix B.

The proposed action includes installation of a BTS in the 234-5Z Building as well as the BTS proposed as part of Project W-460. The system would produce a welded stainless steel container that is designed to be the inner container in accordance with the requirements of 3013. The BTS would replace the current process that involves placing the plutonium in a series of nested foodpack cans. In the current process, the primary convenience can is filled and closed in an unshielded glovebox. It is then manually sealed out and placed in two additional foodpack cans outside the glovebox. The only radiation shielding provided is by the foodpack cans.

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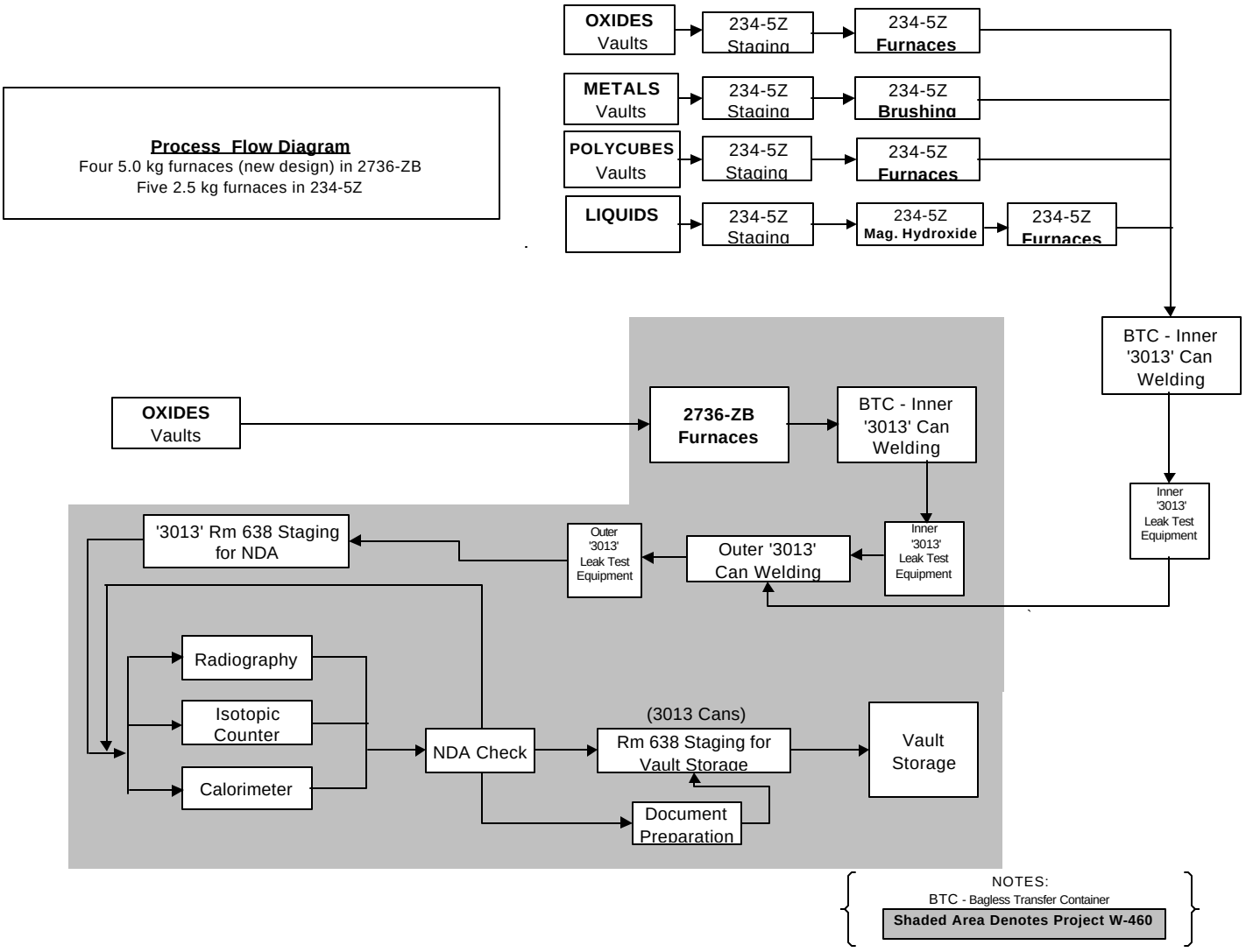
[7] Offgas systems in the 234-5Z Building are designed to accommodate many unique aspects of plutonium bearing materials during thermal stabilization.

[8] Any thermal stabilization of plutonium oxide inventory in the 2736-ZB Building would result in lower total dose to Facility workers, due to lower background radiation levels in the 2736-ZB Building versus activities conducted in the 234-5Z Building. However, the offgas design features of the 234-5Z Building equipment and ventilation system support processing selected plutonium-bearing oxides in the 234-5Z Building.

Figure 4. Project W-460 Process Flow



The proposed BTS in the 234-5Z Building would be located in a shielded enclosure below an unshielded glovebox. Once the primary convenience can is placed in the bagless transfer container (BTC), the exposure from the can is reduced by the shielded BTS enclosure. Also, the BTC itself provides additional shielding when compared to the current foodpack configuration. The entire welding and cutting process inside the BTS would be controlled remotely. As a result of the shielded BTS enclosure, additional shielding from the BTC and remote operations, the proposed BTS offers an opportunity to substantially reduce PFP Facility worker exposure from handling the material to be packaged in the 234-5Z Building.

If PFP continues to use the nested foodpack can arrangement, every can would have to be removed from the vault and processed through the Project W-460 system so it could be placed into a BTC. The use of the 234-5Z Building BTS eliminates the need to handle the material a second time, as well as eliminating waste generated by repackaging from nested foodpack cans. This change would reduce PFP Facility worker dose.

Therefore, as shown in Table 1, the total projected Facility worker dose is 328 person-rem. This dose includes construction (i.e. the aforementioned 234-5Z Building BTS installation and 2736-Z Building vault modifications), routine stabilization/packaging activities in the 2736-ZB Building (101 person-rem), and concurrent stabilization activities in the 234-5Z Building (161 person-rem). As stated above, the radiation protection elements provided by the proposed 234-5Z Building BTS would further reduce PFP Facility worker dose.

For perspective, the calculated total dose to PFP Facility workers for stabilization of plutonium-bearing materials as presented in the PFP EIS (approximately 921 person-rem [PFP EIS, Appendix D, Table D-3]) also is shown in Table 1. These potential maximum Facility worker doses were estimated assuming vault retrieval, material stabilization and existing packaging capabilities, and transfer to vault storage pending final disposition of the entire inventory of plutonium-bearing materials (i.e., the aforementioned 3,600 kilograms [8,000 pounds]). A caveat in the PFP EIS was provided in that "Total exposure does not include exposure associated with future repackaging to meet the DOE storage standard." The availability of Project W-460 would preclude the necessity for repackaging. Thus, it would be expected that doses associated with packaging in the new 3013 container would be no greater than those associated with storage containers in accordance with existing procedures (as stated in the PFP EIS). In fact, since the 2736-ZB Building has a lower background radiation level than the 234-5Z Building, Facility worker doses would be less for a given operational duration for the proposed action.

Further, during storage, the resulting 3013 containers would be more robust than the current configuration, offering less likelihood of container failure. It would be expected that the frequency of material surveillance activities could be minimized, reducing radiation exposure to Facility workers.

Therefore, as shown in Table 1, current projected potential Facility worker doses are bounded by projections presented in the PFP EIS. See Appendix B for additional details regarding potential Facility worker dose.

Table 1.
Summary of Personnel Dose Estimates
Stabilization/Packaging Activities (person-rem)

PFP Pu Material Category	PFP EIS	Current Dose Projections
Oxides, Fluorides, Process Residues	640	144
Metals	180	31
Solutions	86	32
Polycubes/Combustibles	15	28
Sludges*	*	27*
Subtotal (operations)	921	262
Vault Construction	Not Applicable	64
234-5Z BTS Installation	Not Specifically Analyzed	2
Total	921	328

*Sludges were considered in the PFP EIS as "Plutonium-Bearing Hold-up Materials Potentially Suitable for Removal" [PFP EIS, Section 3.1.2] and are included in the dose for oxides, fluorides, process residues.

Potential doses to the Hanford Site worker and maximum site boundary individual also have been estimated for routine operations (Appendix B), based on preliminary radiological dose calculations supporting Clean Air Act permitting for the proposed new stack for Project W-460. Those calculations used a very conservative source term for plutonium, uranium, and americium releases to the environment from the 2736-ZB Building stack. That is, for analysis, it was assumed that all plutonium-bearing metals and oxides entering the 2736-ZB Building were considered in the source term.[9] Consequences to the Hanford Site workers were evaluated based on this source term, with the total dose calculated to be approximately 1×10^{-8} person-rem (4×10^{-12} latent cancer fatalities). Additionally, the preliminary results indicate that a total dose to the maximum site boundary individual would be approximately 1×10^{-10} rem (5×10^{-14} latent cancer fatalities). This is well below the national standard limitation of 10 millirem (Environmental Protection Agency criterion for air emissions in 40 CFR 61).

The proposed actions also would involve the use of nitrogen, argon and helium gases. Nitrogen would be used in glovebox operations; argon and helium would be used for welding and testing operations. Estimated approximate daily usage requirements for nitrogen, argon and helium are: 1,200 cubic meters (43,300 cubic feet); 3.5 cubic meters (120 cubic feet); and 1.1 cubic meters (38 cubic feet), respectively. These

[9] The calculation is based on an annual throughput of 1,600 kilograms plutonium-239; 1,100 kilograms uranium-233; and 13 kilograms americium-241.

nonradiological gases also would be released to the atmosphere, and would not be expected to result in measurable environmental impacts to Facility workers, onsite personnel or offsite individuals.

Accident Scenarios

A suite of accident scenarios during stabilization, packaging and storage of plutonium-bearing materials in the PFP Facility were analyzed in the PFP EIS. It would be expected that similar accidents would be considered for the proposed action, with unit operations being conducted in 2736-ZB Building as well as the 234-5Z Building.

In the PFP EIS, the bounding accident scenario was postulated to be an explosion and/or fire during muffle furnace operations.[10] The event was a result of thermal stabilization, in air, of plutonium-bearing materials contaminated with organics. The consequences of such an event, with 2.5 kilograms of plutonium considered as the inventory at risk during muffle furnace operations, are shown in Table 2. These results are documented in SA2, and are consistent with calculations presented in *Plutonium Finishing Plant Final Safety Analysis Report* (HNF-SD-CP-SAR-021, Rev. 1).

The proposed design features for the muffle furnaces in the 2736-ZB Building include use of a nitrogen atmosphere in seismically qualified gloveboxes during muffle furnace operations. In addition, the plutonium-bearing material undergoing thermal stabilization in the 2736-ZB Building would not contain sufficient quantities of organic impurities to act as an ignition source supporting an explosion (as was the case in the PFP EIS analysis); ignition of the plutonium-bearing material in the 2736-ZB Building furnaces is not credible. Therefore, a fire scenario in 2736-ZB is the result of electrical wiring powering equipment within a glovebox providing an ignition source. Combustible material within the glovebox would exist in isolated locations and in small quantities. Common combustible material that might be packaged as waste include gloves, swabs, tools, and small equipment resulting from maintenance and cleaning activities within the glovebox. The material typically would be placed into two layers of plastic and heat sealed to form a packet. For this analysis, the assumption is that two maximally loaded packages of waste burn in the glovebox. The maximum plutonium contamination in a consolidated package of waste in the glovebox is 17 grams; therefore, 34 grams of plutonium (two waste packages) represents the material at risk.

[10] As stated in the PFP EIS (Section 5.1.10.2, "Accidents Associated with the Preferred Alternative"), "…The pertinent factors used to quantify the releases and health effects from a fire/explosion associated with muffle furnace operations include a total mass of material being processed at one time (one batch) of 1,200 g (2.64 lbs) (600 g [1.32 lb]) plutonium…" Appendix C of the PFP EIS provides a more detailed evaluation of potential muffle furnace accident scenarios.

Table 2.
Impacts from Thermal Stabilization Accident Scenarios,
234-5Z Building and 2736-ZB Building*

Location	Doses (rem effective dose equivalent)			Latent Cancer Fatalities		
	Max. Onsite Hanford Worker	Max. Site Boundary Individual	PFP Facility Worker[11]	Max. Onsite Hanford Worker	Max. Site Boundary Individual	PFP Facility Worker[11]
234-5Z	1×10^{-3}	3×10^{-4}	1×10^{3}	4×10^{-7}	2×10^{-7}	4×10^{-1}
2736-ZB	1×10^{-5}	4×10^{-6}	1×10^{1}	4×10^{-9}	2×10^{-9}	4×10^{-3}

* Impacts assume contamination filtered through an operable HEPA filter prior to release.

This contamination is pulled through the operational ventilation system and is filtered by high-efficiency particulate air filters prior to being exhausted through the 2736-ZB Building stack.

For analysis, it is assumed that the two maximally loaded packages of waste burn. A certain amount of time passes prior to the recognition of the event and subsequent response. During this time period, a quantity of the airborne plutonium oxide would be pulled into the glovebox exhaust duct. As shown in Table 2, the proposed muffle furnace operations in 2736-ZB Building pose a substantially lower risk than similar operation in the 234-5Z Building (the latter being analyzed in the PFP EIS).

[11] It would be expected that similar activities conducted in the 2736-ZB Building, given proposed design considerations (e.g., modern seismically-qualified gloveboxes and a nitrogen atmosphere), would result in lower impacts to a directly-involved worker.

DETERMINATION

The proposed action for conducting construction and operations associated with Project W-460, "Plutonium Finishing Plant Stabilization and Packaging System," and the BTS in the 234-5Z Building is not substantially changed in matters relevant to environmental concerns from the stabilization, packaging, and storage processes analyzed in the PFP EIS. There are no significant circumstances or new information relevant to environmental concerns associated with the proposal. Therefore, no supplemental EIS is necessary, and no additional NEPA review is required.

Signed at Richland, Washington, this 9th day of March, 2000.

Keith A. Klein
Manager
Richland Operations Office

APPENDIX A
SAVANNAH RIVER SITE BAGLESS TRANSFER SYSTEM

The PFP EIS addressed packaging using a bagless transfer system (BTS) concept; packaging which does not rely on the use of plastic bags or organic seals. The aforementioned process was described in the PFP EIS as a prototype BTS under development at DOE's Savannah River Site[12].

Development of the BTS has continued. Presently, SRS has an operating system which has produced approximately 300 inner-welded containers since August 1998. The current SRS BTS is shown pictorially in Figure A.1, and schematically in Figure A.2. The SRS BTS environmental impacts have been addressed in DOE/EIS-0219, *Stabilization of Plutonium Solutions Stored in the F-Canyon Facility at the Savannah River Site, Aiken, South Carolina*.

The proposed Hanford Site system (HNF-SD-W460-CDR-001, Rev. 1, *Conceptual Design Report – Plutonium Stabilization and Handling, Project W-460*) would be a third-generation BTS, based on development activities conducted at SRS since the aforementioned prototype. The Hanford Site system would be configured, per a Memorandum of Understanding[13], similar to the system presently in operation at SRS.

Actual hands-on experience at SRS, including routine operational history and off-normal event evaluation, would be considered in optimizing the proposed Hanford Site packaging system. Such optimization would be accomplished by several activities, including : (1) training by SRS subject matter experts for Hanford Site personnel; (2) enhanced equipment design; and (3) enhanced inspection and testing procedures. Technical and procurement documentation provided by SRS would be incorporated into Hanford site-specific procedures for the operation of the Hanford Site system.

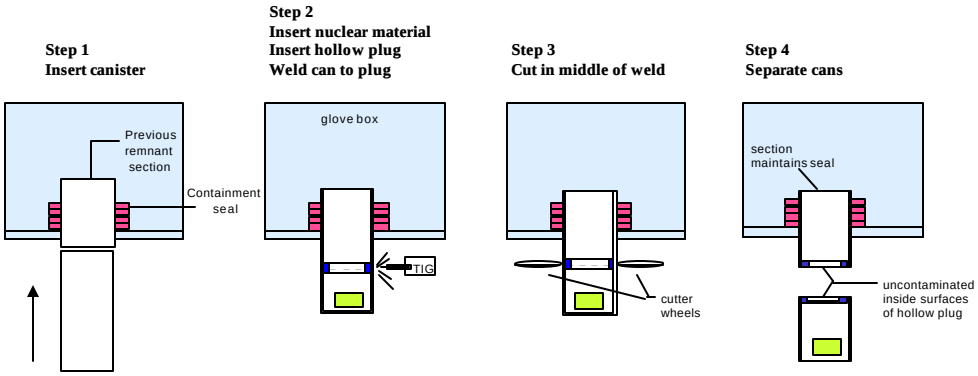
The resulting 3013 standard package (i.e., BTS inner-welded container in conjunction with an outer-welded container), stored within Hanford Site vaults pending future disposition, would be substantially more robust than the current storage configuration. The enhanced containerization (i.e., primary convenience can in two welded containers), coupled with stringent post-packaging non-destructive testing, would result in packages with low probability of failure. It would be expected that the frequency of material surveillance activities would be minimized, resulting in long-term worker dose reduction.

[12] Details on the prototype were incorporated by reference in the PFP EIS. The full citation is: "Bigler, R.M., R.H. Jones, and M. L. Rogers, 1994, Bagless Transfer System for Gloveboxes, Paper presented at the Uranium/Plutonium Recovery Operations Conference, Technical Presentations No. 8: Special Nuclear Material Storage, at Knoxville, Tennessee, October 17-20."

[13] "Memorandum of Understanding for Supply of a Bagless Transfer System for the Plutonium Finishing Plant, Revision 0, June 1999", transmitted via letter [L.J. Olguin, FDHI, to Dr. S. Wood, WSRC, "Contract No. DE-AC06-96RLL13200 – Repeat Transmittal of Memorandum of Understanding for Acquisition of Bagless Transfer System for Project W-460, Plutonium Stabilization and Handling," FDH-9951828.2 R1, dated June 14, 1999].

FIGURE A.1 SRS BTS

Figure A.2 SRS BTS Process



- **Transfers nuclear material from a glovebox directly into a metal container without the use of plastic bags**
- **Integrates commercially available welding/cutting equipment into an semi-automated machine**
- **Adaptable to existing glovebox lines at many sites within the DOE complex**

APPENDIX B

DOSE CONSEQUENCES ASSOCIATED WITH CONSTRUCTION/ROUTINE OPERATIONS ASSOCIATED WITH PROJECT W-460, PLUTONIUM FINISHING PLANT PLUTONIUM STABILIZATION AND PACKAGING SYSTEM

CONSTRUCTION

Construction activities associated with Project W-460 would involve vault modifications in the 2736-Z Building. These vault modifications would be in addition to those projected with the total vault handling activities described in the PFP EIS preferred alternative for various categories of plutonium-bearing materials. Doses to PFP Facility workers resulting from proposed vault modifications have been estimated in HNF-5398.

For analysis, it was assumed that all material in a vault cubicle would be removed prior to construction entry. Appropriate personnel, including construction crafts and radiological control technicians, would support the activity. Task steps include evaluation of existing dose rate, entrance into the vault area and subsequently to the selected cubicle, installation of pre-fabricated rack (i.e., support structure for 3013 standard containers), and vault exit/survey.

The total PFP Facility worker dose was estimated to be approximately 64 person-rem. Additional details are in HNF-5398.

ROUTINE OPERATIONS

Routine operations associated with Project W-460 would involve handling radioactive materials; specifically stabilized plutonium oxides and metals would be packaged in 3013 standard containers. The maximum annual exposure to a facility worker from all sources must not exceed the cumulative limits set forth in 10 CFR 835, *Occupational Radiation Protection*, and in HSRCM-1, *Hanford Site Radiological Control Manual*, summed over all controlled access areas. Appropriate procedures would be developed to minimize worker exposure, in keeping with As Low As Reasonably Achievable (ALARA) principles.

Facility Worker

Appendix D, Section D.3.1 of the PFP EIS describes potential direct radiation exposures to PFP Facility workers from routine operations associated with stabilization of PFP Pu-bearing materials. Those stabilization activities included the following steps: retrieve plutonium from vaults; transfer plutonium to process location; seal plutonium into glovebox and proceed with feed preparation; thermally stabilize material in glovebox; package product and seal out; transfer to nondestructive assay; perform testing; and transfer/offload in vault for interim storage. Table B.1 shows a summary of personnel exposure estimates associated with stabilization of various categories of PFP materials. The estimates were based on actual sludge stabilization exposure data from calendar year 1995, which was assumed to be representative of future process exposures (PFP EIS, Section D.6.1).

Table B.1
Summary of Personnel Exposure Estimates
(Table D-3, PFP EIS)

PFP Pu Material Category	Total Exposure (person-rem)	Latent Cancer Fatalities
Oxides, Fluorides, Process Residues	640	0.26
Metals	180	0.07
Solutions	86	0.03
Polycubes/Combustibles	15	0.01
Sludges*	*	*
Total	921	0.37

*Sludges were considered in the PFP EIS as "Plutonium-Bearing Hold-up Materials Potentially Suitable for Removal" [PFP EIS, Section 3.1.2], and are included in the dose for oxides, fluorides, and process residues. See Table B.2.

Updated potential dose consequences to workers involved in stabilization activities have been provided in HNF-5398. As shown in Table B.2, updated total Facility worker exposure (person-rem activities in both the 234-5Z Building and the 2736-ZB Building) for stabilization/packaging and storage is projected to be approximately 262 person-rem (equating to 0.1 latent cancer fatalities). The lower exposure, when compared to those doses projected in the PFP EIS, is attributable in part to operational cycles. Specifically, as stated in HNF-5398, "…. For instance, in one area of the EIS, one stabilization operation is assumed to continue at full crew levels for 16 years versus 2.5 years (operational cycle) for the current study."

Table B.2
Updated Summary of Personnel Exposure Estimates
(HNF-5398)

PFP Pu Material Category	Total Exposure (person-rem)	Latent Cancer Fatalities
Oxides, Fluorides, Process Residues	144	0.06
Metals	31	0.01
Solutions	32	0.01
Polycubes/Combustibles	28	0.01
Sludges*	27	0.01
Total	262	0.1

*Sludges were considered in the PFP EIS as "Plutonium-Bearing Hold-up Materials Potentially Suitable for Removal" [PFP EIS, Section 3.1.2]. See Table B.1.

As discussed in HNF-5398, approximately 101 person-rem Facility worker exposure (of the 262 person-rem total) would result from stabilization/packaging activities conducted in the 2736-ZB Building. Specifically, calculated Facility worker dose consequences for PFP stabilization and packaging by location are shown in Table B.3 for various categories of plutonium-bearing materials.

Table B.3
Whole Body Dose Equivalent Summary for PFP Stabilization and Packaging Program
(HNF-5398)

PFP Pu Material Category	234-5Z (person-rem)	2736-ZB (person-rem)	Total (person-rem)
Oxides, Fluorides, Process Residues	64	80	144
Metals	19	12	31
Solutions	27	5	32
Polycubes/Combustibles	27	1	28
Sludges	24	3	27
Total	161	101	262

Hanford Site Worker and Maximum Site Boundary Individual

Appendix D, Section D.3.2 of the PFP EIS describes potential population doses from routine operations associated with stabilization of PFP Pu-bearing materials. As shown in Table B.4, potential consequences to the onsite worker and maximum site boundary individual were projected to be low.

Table B.4
Summary of Dose Estimates

Receptor	PFP EIS **		Project W-460***	
	Total Dose	Latent Cancer Fatalities	Total Dose	Latent Cancer Fatalities
Hanford Site Worker population (5 workers)	4×10^{-3} person-rem	2×10^{-6}	1×10^{-8} person-rem	4×10^{-12}
Maximum Site Boundary Individual	2×10^{-4} rem	1×10^{-7}	1×10^{-10} rem	5×10^{-14}

** PFP EIS, Table D-9
*** Preliminary calculations for Clean Air Act Notice of Construction permitting activities

Table B.4 also includes estimated potential doses to Hanford Site workers and the maximum site boundary individual from proposed Project W-460 operations. These data are derived from preliminary calculations supporting Clean Air Act permitting documentation for potential emissions from the new stack, and represent a maximum incremental increase in environmental consequences associated with activities in 2736-ZB. Process ventilation for Project W-460 equipment would exhaust to a new exhaust stack through high-efficiency particulate air (HEPA) filters. The Room 641B HEPA filter bank (see Figure 3) has a two-section testable HEPA filter system with a pre-filter; a third testable HEPA filter is located at each major glovebox exhaust outlet, which branches into the exhaust system upstream of the aforementioned Room 641B HEPA filter bank. For routine operations, emission calculations are based on three testable HEPA filters prior to release to the environment.

The data in Table B.4 for Project W-460 operations are conservative estimates based on maximum, worst-case isotopic inventories. That is, it was assumed an annual throughput of 1,600 kilograms plutonium-239; 1,100 kilograms uranium-233; and 13 kilograms americium-241. The calculation is conservative because actual isotopic content, current planning does not include thermal stabilization of metals, and it would be expected that much of the plutonium oxide would be remain sealed and directly repackaged, not requiring thermal stabilization.

REFERENCES

10 CFR 835, *Occupational Radiation Protection*.

10 CFR 1021, *National Environmental Policy Act Implementing Procedures.*

40 CFR 61, *National Environmental Standards for Hazardous Air Pollutants*.

40 CFR 1500, *Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.*

61 FR 6352, *Record of Decision for Plutonium Finishing Plant Stabilization Final Environmental Impact Statement, Hanford Site, Richland, Washington*, July 10, 1996.

Bigler, R.M., R.H. Jones, and M. L. Rogers, "Bagless Transfer System for Gloveboxes", Paper presented at the Uranium/Plutonium Recovery Operations Conference, Technical Presentations No. 8: Special Nuclear Material Storage, at Knoxville, Tennessee, October 17-20, 1994.

DOE/EIS-0219, *Stabilization of Plutonium Solutions Stored in the F-Canyon Facility at the Savannah River Site, Aiken, South Carolina*.

DOE/EIS-0244-F, *Plutonium Finishing Plant Stabilization Final Environmental Impact Statement, Hanford Site, Richland, Washington*

DOE/EIS-0244-FS/SA2, *Increasing Batch Size for Thermal Stabilization of Plutonium Finishing Plant Metals, Oxides, and Process Residues, 200 West Area, Hanford Site, Richland, Washington.*

DOE STD-1128-98, *Guide to Good Practices for Occupational Radiological Protection in Plutonium Facilities*.

DOE-STD-3013-96 and/or latest revision, *Criteria for Safe Storage of Plutonium Metals and Oxides*.

HNF-5398, Rev. 1, *Anticipated Radiological Dose to Workers for Plutonium Stabilization and Handling at PFP - Project W-460*.

HNF-SD-CP-SAR-021, Rev 1, *Plutonium Finishing Plant Final Safety Analysis Report.*

HNF-SD-W460-CDR-001, Rev. 1, *Conceptual Design Report – Plutonium Stabilization and Handling, Project W-460*.

HNF-SD-W460-FDC-001, Rev. 1, *Functional Design Criteria - Plutonium Stabilization and Handling (PuSH) Project W-460*.

HSRCM-1, *Hanford Site Radiological Control Manual*

Memorandum of Understanding for Supply of a Bagless Transfer System for the Plutonium Finishing Plant, Revision 0, transmitted via letter (L.J. Olguin, FDHI, to Dr. S. Wood, WSRC, Contract No. DE-AC06-96RLL13200 – and Transmittal of Memorandum of Understanding for Acquisition of Bagless Transfer System for Project W-460, Plutonium Stabilization and Handling, FDH-9951828.2 R1, dated June 14, 1999).

Recommendation 94-1 to the Secretary of Energy, pursuant to 42 U.S.C. 2286 a(5) Atomic Energy Act of 1954, as amended, 1994, Defense Nuclear Facilities Safety Board, Washington, D.C.