National Nuclear Security Administration | SRS Savannah River Site | Los Alamos National Laboratory | Lawrence Livermore National Laboratory

Savannah River Plutonium Processing Facility (SRPPF)

Data Call Responses Supporting the SRS Pit Production EIS

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Prepared by:

Keith W. Dyer
Fellow Scientist
SRNS

2/18/2020
Date

Approved by:

Mary A. Flora
Manager, ESH&QA\Waste Management SRPPF
SRNS

2/18/2020
Date

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APPENDICES

ABBREVIATIONS AND ACRONYMS

DOE	Department of Energy
DOE-SR	DOE Savannah River Site Operations Office
HEPA	High-Efficiency Particulate Air
LANL	Los Alamos National Laboratory
LLW	Low Level Waste
MFFF	Mixed (Oxide) Fuel Fabrication Facility
MLLW	Mixed Low Level Waste
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
PIDAS	Perimeter Intrusion Detection and Assessment System
SREL	Savannah River Ecology Laboratory
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions
SRPPF	Savannah River Pit Production Facility
SRS	Savannah River Site
TRU	Transuranic
USF&W	U.S. Fish and Wildlife Service
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

This document provides Savannah River Nuclear Solutions (SRNS) responses to the data requests from Tetra Tech, the NEPA contractor, to assist in the preparation of the SRS Pit Production EIS. Responses provided are based on best information available at the time.

2.0 GENERAL

2.1 A.1 REQUEST

Provide best available description of the Proposed Action to repurpose the Mixed Oxide Fuel Fabrication Facility (MFFF) to produce a minimum of 50 pits per year with additional surge capacity to produce 80 pits per year by 2030. The description should include:

- Identification and description of all modifications to the MFFF
- Any new facilities required (including proposed locations and alternatives)
- Facilities that would be demolished/relocated
- Infrastructure requirements (e.g., roads, utilities, and parking)
- Drawings depicting the existing layout of the F-Area and the proposed layout of the Proposed Action facilities

Response: Appendix 1 presents figures depicting the proposed site layout for the facilities associated with the modified MFFF for repurpose as the SRPPF.

2.2 A.2 REQUEST

Describe the construction process, including dates of construction and sequence of construction. Provide key construction-related data.

Response: If NNSA decides to repurpose the MFFF into the SRPPF, the primary construction activities would last approximately six years. Construction activities would follow issuance of a ROD, as appropriate. Minor construction activities in the SRPPF complex could also continue during startup of the SRPPF, which would be accomplished by the end of 2026 when NNSA would begin to produce pits for the qualification process. Fifty certified pits would be delivered to the stockpile by 2030.

Key Construction Parameters and Wastes for the SRPPF Complex

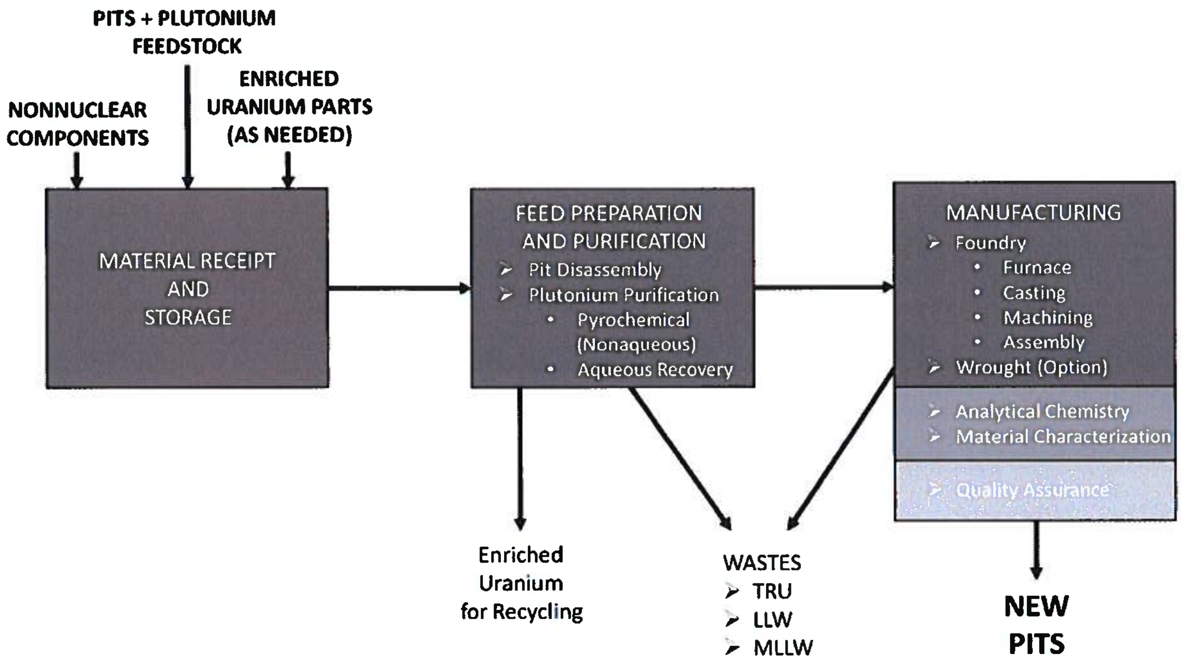
Parameter	50–80 Pits Per Year[a]
Resources	
Additional land disturbance on previously disturbed land (acres)	48
Additional land disturbance on previously undisturbed land (acres)	0
Construction duration (years)	6
Peak electricity (megawatts-electric/year)	2–3
Diesel fuel (gallons/year)	700,000
Peak water use (gallons/year)	16,600,000
Peak construction workforce (persons)	1,800[b]

a. Construction requirements would be essentially the same regardless of production capacity.
b. Peak construction activities would occur during 2023 and 2024.

2.3 A.3 REQUEST

Describe the typical operations at the facility, including a discussion of whether production would occur in single-shift or multiple-shift operations. Discuss facility safety systems.

Response: Typical operating process for the SRPPF is shown in the Figure below.



As shown on that figure, and described below, pit production would involve three major processes: (1) Material Receipt and Storage; (2) Feed Preparation and Purification; and (3) Manufacturing.

2.3.1 Material Receipt and Storage

Existing plutonium feedstock would be delivered from Pantex near Amarillo, Texas, in DOE/U.S. Department of Transportation (USDOT)-approved shipping containers via NNSA's safe, secure transport system. The bulk of the feedstock material would be in the form of pits from retired weapons, although some plutonium from other locations, such as LANL, Pantex, and SRS, could also be used. The shipping containers would be unloaded from the truck within the SRPPF and the shipping packages unpacked. Each shipment would be measured to confirm the plutonium content, entered into the facility's material control and accountability database, and placed into temporary storage in vaults or safes until transferred to the Feed Preparation Area.

2.3.2 Feed Preparation and Purification

Pits and/or plutonium would be transferred through a secure transfer corridor to an adjacent Feed Preparation Area to process the existing plutonium metal to meet metal specifications of new pits. Activities involving pits would be conducted in gloveboxes that would be interconnected by a contained conveyor system to move materials from one process step to the next. Gloveboxes would remain completely sealed and operate independently, except during material transfer operations. Built-in safety features would limit the temperature and pressure inside the gloveboxes and ensure that operations are conducted safely. When dictated by process needs or safety concerns, an inert atmosphere would be maintained in gloveboxes. The exhaust from the gloveboxes would be monitored continuously for radioactive contamination. The atmosphere in the gloveboxes would be kept at a lower pressure than that of the surrounding areas so that any leaks of gaseous or suspended particulate matter would be contained and filtered appropriately. The building ventilation system would include high-efficiency particulate air (HEPA) filters and would be designed to maintain confinement, thus precluding the spread of airborne radioactive particulates or hazardous chemicals within the facility or to the outside environment. Both intake and exhaust air would be filtered, and exhaust gases would be monitored for radioactivity.

Plutonium recovery would be accomplished using mechanical disassembly. For pits whose components would not separate easily, thermal or chemical means could also be used. Enriched uranium parts would be disassembled from the pit assemblies, converted to oxide, and shipped to another NNSA site (currently Y 12) for recycling. All other disassembled components that could not be reused would be decontaminated to the maximum extent possible and then disposed of as either LLW or TRU waste, as appropriate.

Beryllium may be a component in both pit disassembly and assembly operations. Because inhalation of beryllium dust and particles can cause adverse health effects, beryllium is of special interest. The disassembly operations are expected to generate only larger, non-respirable turnings and pieces of metal, and all work would be performed in gloveboxes. No operations are expected to cause beryllium to become airborne. The beryllium in solid form would be disposed of as LLW or TRU waste and is included in the waste estimates presented in this EIS.

In general, the pit-derived plutonium would not be suitable for new manufacturing—it would contain plutonium radioactive decay products (uranium, americium-241, and neptunium-237) and other undesirable characteristics. Therefore, the plutonium would be purified using pyrochemical (nonaqueous) recovery techniques, which would generate plutonium-bearing residues that must be recovered using aqueous techniques or disposed of as TRU waste.

Nonaqueous plutonium metal purification operations could contain three primary processes: (1) direct oxide reduction, which uses calcium metal to reduce plutonium oxide to plutonium metal; (2) molten salt extraction, which uses calcium to remove americium-241 from the plutonium; and (3) electrorefining, which uses sodium, potassium, and calcium chloride salts to remove other key impurities from the plutonium metal. In aqueous recovery, plutonium-bearing residues would be recovered using techniques in which nitric acid and hydrochloric acid are used to chemically dissolve feed material. Use of the aqueous process to recover plutonium would reduce the overall quantities of TRU wastes needing disposal at WIPP. Pit production could continue without aqueous recovery; however, TRU waste generation would increase.

Solid waste would be generated throughout the feed preparation and purification process and would consist of TRU waste, LLW, and uncontaminated waste (e.g., waste that can be assayed and certified for disposal as commercial waste). The aqueous recovery process would also generate most of the liquids. Precipitates and evaporator sludge would be solidified into a drum, which is typically categorized as solid TRU waste.

2.3.3 Manufacturing

The plutonium metal resulting from the purification process would be transferred to the manufacturing area, where it would be melted and cast in a foundry operation. Some plutonium metal from other sources may be used to supplement the plutonium recovered from the purification operations, including from internal process metal recycle. These castings would then be machined to proper dimensions, combined with other non-plutonium parts, which could include beryllium and enriched uranium components, and would be assembled into pits.

Analytical chemistry capabilities would be installed in the SRPPF. Plutonium-bearing samples from all aspects of the pit production process would be tested to ensure they are within specified limits. Analytical chemistry requires rigorous quality controls, including National Institute of Standards and Technology traceability for key analytes. Materials characterization operations analyze plutonium metal and pit-derived samples for physical properties, validate results from key manufacturing steps, and support process troubleshooting. A materials characterization laboratory would perform analyses to ensure that commercial materials used in process operations meet specifications, and do not adversely affect product performance or quality.

Throughout the manufacturing operations, certification and inspection would be conducted to ensure that components meet specifications. New pits would be inspected and prepared for storage and eventual shipment.

To ensure special nuclear material is adequately protected, NNSA would utilize physical barriers; access control systems; detection and alarm systems; procedures, including the two-person rule (requiring at least two people to be present during work with special nuclear material in the facility); and personnel security measures, including security clearance investigations and access authorization levels. Nuclear material control and accountability are ensured through a system for monitoring storage, processing, and transfers. At any time, the total amount of special nuclear material in the SRPPF would be known. As appropriate, closed-circuit television, intrusion detection, motion detection, and other automated methods would be used as part of the overall security strategy. A material control and accountability program is also a key part of that strategy specifically focused on nuclear material management. Physical measurements and inspections of material would be used to verify inventory records.

Single-shift pit production operations (e.g., disassembly, recovery, casting, machining, and assembly) are expected to occur five days per week because this represents the currently projected normal operating scenario for the SRPPF. Most waste operations and maintenance activities would occur on night shifts and weekends, but could also occur on the main shift, depending on the operation. If national security requirements ever demand, potential pit production capacity increases could be supported through the use of multiple shifts and/or expansion into available space. In order to produce up to 125 pits per year at SRS, this EIS analyzes expansion into available space with multiple-shift production.

2.4 A.4 REQUEST

Provide information on differences between cast processing and wrought processing for a sensitivity analysis.

Response: The wrought process is a potential manufacturing alternative to casting that could be used in the SRPPF. If implemented, some gloveboxes would be modified to support the wrought process to supplement, not replace, the casting process. In the wrought process, plutonium metal is annealed in a furnace and fed to a rolling mill to produce a flat sheet for further processing.

Differences between casting and wrought processes are primarily in waste management and human health – normal operations; although even those differences are minor. The types of wastes (i.e., TRU waste, LLW, or MLLW) generated using the wrought process would be the same as the casting process, and waste quantities generated during pit production would be similar for both processes. The only notable difference in waste quantities would result from maintenance associated with the wrought process. Because the wrought process would use rollers and hydraulic presses, equipment replacements and dye changeouts could generate TRU or LLW that would not be generated in the casting process. However, these wastes would occur infrequently and quantities would be much smaller than the annual wastes from pit production operations. Conversely, the casting process involves the disposition of molds, which would not occur in the wrought process. Therefore, the overall differences in wastes generated would be minor. Wastes from the wrought process would be managed in the same manner as the casting process and waste management facilities have adequate capacity to dispose of all wastes generated.

During pit production, the wrought process would use rollers and hydraulic presses that could introduce occupational safety hazards (i.e., rolling/pinching/crushing hazards, ejection hazards, electrical hazards, and chemical hazards from hydraulic fluid and lubricants) which are different than the casting process. However, because the analysis in this EIS of potential occupational hazards during operations is based on injury and fatality rates for general chemical manufacturing, it is not possible to quantify the magnitude of any changes in occupational hazards between the wrought and casting processes. Radiological doses to occupational workers are largely a function of the time required to produce a pit as well as the number of workers involved in the process. For production of large quantities of pits, the wrought process is considered to be a quicker process than the casting process, which would suggest a potential for reduced worker exposure.

2.5 A.5 REQUEST

Identify and discuss all required permits for construction and operation.

Response: See the SRPPF Environmental Permitting **Plan, Rev.0.**

2.6 A.6 REQUEST

Describe the process to be employed for purification of plutonium metal (e.g., aqueous or pyrochemical). Explain the rationale for the selected process.

Response: Refer to Response A.3.

2.7 A.7 REQUEST

Describe any interdependency between the pit production mission and existing SRS facilities (e.g., waste management at E Area).

Response: Sanitary sewers, industrial wastewater treatment, process water, domestic water, electricity, emergency services including security, fire, and medical, and trash services will be provided to SRPPF by the SRS. SRPPF could also utilize hazardous and low level waste disposal facilities at E-Area, the Construction and Demolition landfill, and transportation assistance to Three Rivers Landfill for disposal of solid waste. SRS will provide environmental, regulatory and packaging expertise.

2.8 A.8 REQUEST

Provide information related to an option to retain the existing administrative building.

Response: The figure in Appendix 1 depicts the PIDAS layout for this option. Notable differences in this PIDAS layout versus the proposed layout for the Proposed Action would be as follows:

- The existing culvert north of the existing administrative building would be filled in using a "cut and fill" design in which the higher slopes would be removed, and the lower elevations would be filled in. A reinforced earth retaining wall would be constructed. The wall would be about 800 feet long, up to 30 feet high, approximately one foot thick, and rest atop a five-foot-wide foundation. Construction of the wall would require approximately 22,350 cubic yards of suitable soils. Less than one acre of land would be disturbed by the construction work along the culvert. Because the culvert runs beneath an existing utility corridor, much of the land that would be disturbed was previously disturbed when the utility corridor was constructed.
- The PIDAS would be approximately 320 feet longer than the PIDAS currently planned. This would increase the size of the Protected Area by approximately 15 percent.
- The new administrative building (labeled "706-5F") would not be constructed. Not building the new administrative building would reduce the key construction parameters and wastes; however, those reductions would be offset by the additional construction associated with the culvert fill, earthen retaining wall, and PIDAS expansion. Consequently, SRNS does not expect any notable change in the construction parameters for this option, with the exception of nonhazardous construction and demolition waste, which would be reduced from 1,700 cubic yards per year to 700 cubic yards per year. This reduction is associated with not demolishing the existing administration building.

3.0 LAND USE

3.1 B.1 REQUEST

Provide the number of acres that could potentially be disturbed during construction. If any previously undisturbed land would be disturbed, identify the acreage of new land disturbance and locations. Preferably, illustrate this response graphically.

Response: There will be no disturbance of previously undisturbed land in F-Area. All potential disturbances during construction were previously disturbed by the MOX Project or previous F Area industrial development. SRNS estimates that approximately 48 acres of previously disturbed land will be affected by the proposal.

3.2 B.2 REQUEST

Describe PIDAS land disturbance specifically and provide figures showing PIDAS location. Include alternatives if a single PIDAS location has not been decided.

Response: See figures in Appendix 1. The EIS should also evaluate a sensitivity analysis in case the Admin Building is not moved. Alternate PIDAS configurations have been provided.

4.0 INFRASTRUCTURE

4.1 C.1 REQUEST

Describe the on-site electrical distribution system requirements and provider. What will be the peak electrical energy demand (MWe) and average electrical energy demand (kW-hours) for the facility during construction and operation?

Response: The SRPPF facility will have two separate 3 phase sources: feeder 1 and feeder 5. These two feeders come from Dominion Energy's owned Substation 23. Feeder 1 is coming from substation 23 bus-1 and feeder 2 comes from substation bus-2. The voltage of these feeders is 13.8kV. Feeder 1 and Feeder 5 would have a peak demand of 2–3 megawatts during construction activities. The SRS power grid can support a peak demand of 500 megawatts, and peak SRS demand is generally below 50 megawatts. SRPPF operations would require an estimated peak load of less than or equal to 11 megawatts for production of 50-125 pits per year. Feeders 1 and 5 exceed peak load operation requirements of the SRPPF. Electrical power consumption is estimated at 17,520 megawatt-hours per year during the peak year of construction and less than or equal to 30,000 megawatt-hours per year for production of 50-125 pits per year.

4.2 C.2 REQUEST

Discuss backup diesel generators, capacity, and annual operations. Include surveillance requirements in the response.

Response: There will be two emergency diesel generators (EDG) which are both redundant systems that tie into 4.160 kV power buses (within SRPPF). The EDG will have enough capability to start and operate all associated loads while maintaining acceptable voltage levels and will have a continuous rating of 1800 kW.

4.3 C.3 REQUEST

Discuss water requirements and provider. What will be the average water demand (gal/yr) for the facility during construction and operation?

Response: The provider for the domestic water will be SRS site utilities. The SRS domestic water distribution system has an annual capacity that exceeds 1,600 million gallons, and the current annual SRS demand is approximately 320 million gallons. The peak annual water demand of 16.6 million gallons from construction activities (see Table below) would represent a small fraction (1.3 percent) of the unused SRS domestic water capacity. The annual water demand of 7.9 million gallons from SRPPF operations would represent a small fraction (less than one percent) of the unused SRS domestic water capacity and would therefore have a minimal impact on the SRS water distribution system.

YEAR	CONSTRUCTION WATER REQUIRMENTS (GAL/YR)
2021	5,044,000
2022	7,477,600
2023	10,660,000
2024	16,575,000
2025	14,826,500
2026	7,104,500

4.4 C.4 REQUEST

Describe the sanitary sewer system for the site once operational. What will be the capacity of the system?

Response: SRS has a central sanitary wastewater treatment system (CSWTF) and it is currently running at approximately 30 percent of its capacity. The available capacity of the CSWTF is 268 million gallons per year. F-Area is serviced by 2 wells, both capable of 450 gallons per minute. F-Area is currently using only 1 (one) well which is piped to a tank and then distributed. Sanitary wastewater is estimated at 5,500,000 gallons per year during the peak year of construction and 2,600,000 gallons per year for production of 50-80 pits per year.

4.5 C.5 REQUEST

Discuss steam requirements (and provider) for the facility.

Response: No steam use is planned.

4.6 C.6 REQUEST

Discuss other notable energy requirements (i.e., natural gas) of the facility during operations.

Response: The following table provides an estimate of fuels and gases anticipated on an annual basis.

Resources	50 Pits Per Year	80 Pits Per Year	125 Pits Per Year
Diesel fuel (gallons)	15,000	15,000	15,000
Nitrogen (cubic yards)	36,000	57,000	90,000
Argon (cubic yards)	900	1,400	2,200

5.0 NOISE

5.1 D.1 REQUEST

Identify any notable sources of noise for the pit facility and associated support facilities. This should include notable construction (or demolition) activities as well as expected noise sources during operations.

Response: Beyond normal construction noise, there should not be any significant noise sources.

6.0 VISUAL

6.1 E.1 REQUEST

Provide the height of the tallest facility associated with pit production mission. Will there be any visible emissions during operation (e.g., steam, smoke, etc.)?

Response: The existing MFFF is approximately 73 feet above grade, with a building footprint of approximately 120,000 square feet. Diesel generator emissions could possibly be seen.

7.0 SOCIOECONOMICS

7.1 F.1 REQUEST

Estimate the peak employment for construction and identify the year in which this would occur.

Response: See Table below.

	2021	2022	2023	2024	2025	2026
Construction Workforce	720	1,188	1,800	1,800	1,531	343

7.2 F.2 REQUEST

Estimate the number of operational workers. Provide a breakdown of the operational workforce for the following categories: administrative/support; facility operators; security.

Response: See Table below.

	50 Pits Per Year	80 Pits Per Year	125 Pits Per Year
Total SRPPF workers (persons)	910	1,000	1,500
Security workforce	200	220	240
Radiation workers (persons)	680	750	1,125

7.3 F.3 REQUEST

Estimate any increases in employment for existing SRS facilities that would also support pit production.

Response: No additional increases in employment at existing SRS facilities are expected to support pit production.

7.4 F.4 REQUEST

Provide distribution of employees by place of residence

Response: See Table below.

Distribution of Employees by Place of Residence in the SRS ROI in 2018

County, State	Number of Employees	% of Total Site Employment
Aiken, South Carolina	5,995	53.7
Barnwell, South Carolina	663	6.0
Columbia, Georgia	1,693	15.3
Richmond, Georgia	1,287	11.6
Other	1,496	13.5
ROI Total	**11,093**	**100.0**

8.0 WATER RESOURCES

8.1 G.1 REQUEST

Describe any facility discharges (constituents, quantities, receiving waters).

Response: There would be no direct discharges of water or wastewater to the environment from the proposed SRPPF.

9.0 AIR QUALITY

9.1 H.1 REQUEST

Describe any facility emissions (constituents, quantities, stack locations and heights). Discuss relationship to new or existing permits.

Response: The only emissions associated with the SRPPF would be standard pollutants associated with construction activities and the minor releases from downstream of HEPA filter banks in series. An estimate of radionuclide releases can be scaled from the Complex

Transformation SPEIS projections as provided in the table below:

Isotope	Annual Emissions, 50 pits per year (Ci/yr)	Annual Emissions, 80 pits per year (Ci/yr)	Annual Emissions, 125 pits per year (Ci/yr)
Americium-241	7.80×10^{-8}	1.25×10^{-7}	1.95×10^{-7}
Plutonium-239	2.55×10^{-6}	4.08×10^{-6}	6.38×10^{-6}
Plutonium-240	6.65×10^{-7}	1.06×10^{-6}	1.66×10^{-6}
Plutonium-241	4.90×10^{-5}	7.84×10^{-5}	1.23×10^{-4}
Uranium-234	1.26×10^{-9}	2.01×10^{-9}	3.14×10^{-9}
Uranium-235	3.95×10^{-11}	6.32×10^{-11}	9.88×10^{-11}
Uranium-236	6.40×10^{-12}	1.02×10^{-11}	1.60×10^{-11}
Uranium-238	3.55×10^{-13}	5.68×10^{-13}	8.88×10^{-13}
Tritium	0	0	0
Krypton-85	0	0	0
All other	0	0	0
Total	5.23×10^{-5}	8.37×10^{-5}	1.31×10^{-4}

10.0 WASTE MANAGEMENT

10.1 I.1 REQUEST

Identify the quantities of wastes (cubic meters/yr or cubic yards/yr) generated during construction and operation and describe the process for managing/disposing of wastes for the following waste classes (separate by classified and unclassified wastes):

- Hazardous waste
- Non-hazardous waste
- Low-level waste
- Transuranic waste

Response: The following information is provided for the requested waste types:

No radiological wastes (TRU, LLW, MLLW) are expected during construction. Estimates of hazardous and non-hazardous solid waste expected during construction would be as follows:

Waste Type	
Nonhazardous solid waste (cubic yards/year)	1,700
Hazardous waste (cubic yards/year)	6
LLW	0
MLLW	0
TRU waste	0

Operational Wastes (annual) are shown in the table below:

Waste Type	50 pits per year	80 pits per year	125 pits per year

TRU (cubic yards)	820	1,200	1,370
LLW solid (cubic yards)	7,800–10,500	10,500–13,100	13,100–15,700
LLW liquid (gallons)	65,000	80,000	125,000
MLLW (cubic yards)	20	30	40
Hazardous (cubic yards)	30	40	65

The presented amount of TRU waste generated from operations of the SRPPF is a bounding value that assumes that aqueous recovery is not operating to recover plutonium. SRNS estimates that the implementation of aqueous recovery would result in a reduction of approximately 25 percent of the projected TRU waste volume. The primary reason that TRU waste generation rates are higher at SRPPF (on a per pit basis) than at LANL is that SRPPF sends Americium 241 to waste while LANL recovers Am-241 as a byproduct.

10.2 I.2 REQUEST

Identify current/existing SRS waste generation rates.

Response: The following information is provided for the requested waste types:

- TRU Waste – 460 yd^3/yr
- LLW (general, solid) – 13,100 yd^3/yr
- MLLW – 520 yd^3/yr
- Hazardous Waste – 76 yd^3/yr
- Solid (sanitary/municipal) Waste – 6,500 yd^3/yr

11.0 HUMAN HEALTH (NORMAL OPERATIONS)

11.1 J.1 REQUEST

Estimate the number of radiation workers during operations and the direct radiation dose (MREM/YR) for the average worker and the maximally exposed worker.

Response: Average worker dose estimated to be 150 mrem/yr. Maximum exposed worker estimated to be 500 mrem/yr. Note: Average worker dose and maximum exposed worker are based on professional judgement and current Administrative Control Levels (ACLs). A preliminary dose assessment for this scope will be drafted in March 2020 which will provide an estimate of average worker dose, but that number will change as the design of the facility matures.

Resources	50 Pits Per Year	80 Pits Per Year	125 Pits Per Year
Radiation workers (persons)	680	750	1,125
Average radiation worker dose (millirem)	150	150	150
Maximum radiation worker dose (millirem)	500	500	500
Security workforce	200	220	240

Note: a security worker would receive half as much an average annual dose as a "radiation worker."

11.2 J.3 REQUEST

Quantify radiological releases (airborne and liquid effluents) from the facility during operations (curies released by radionuclide).

Response: Potential airborne releases are provided in response to H.1 (above). Liquid effluents, which would go to the Effluent Treatment Facility through an existing piping system, are provided in response to I.1 above.

11.3 J.4 REQUEST

Identify any hazardous chemicals that would be utilized in the facility and discuss operations involving hazardous materials such as Beryllium.

Response: No hazardous chemicals have been identified that would pose a risk to members of the public from construction activities. No chemical-related health impacts are associated with normal (accident-free) operations of the SRPPF. Initial screens for the hazard analysis did not result in the identification of any controls necessary to protect the public or workers from direct chemical exposures.

12.0 ACCIDENTS

12.1 K.1 REQUEST

Based on the accident scenarios analyzed in the Complex Transformation SPEIS, provide an update list of scenarios that would be applicable to SRPPF with a best-available approximation of material at risk (MAR), source term, and accident frequency.

Response: Tables 1 and 2 identify the radiological and chemical accidents, respectively, that should be evaluated in the Draft EIS.

Table 1—SRS Pit Facility Postulated Radiological Accidents

Accident	Accident Description	Material at Risk	Source Term	Event Frequency
Natural Phenomena Events				

Extremely unlikely earthquake with subsequent fire	A seismic event is postulated, causing failure of internal walls or other overhead objects. The collapsed walls and overhead objects cause a loss of confinement and a potential release of radioactive materials in multiple areas of the facility. The seismic event could cause the ignition of combustible materials, initiating fires in multiple areas of the facility.	4,000 kg plutonium-239 equivalent: 99.65% metal 0.21% powder 0.14% solution	1.0 kg metal 0.0005 kg oxide 0.011 kg solution	1.0×10^{-6} to 1.0×10^{-4}/yr
Internal Process Events				
1. Fire in a single fire zone	A fire is postulated to start within a glovebox, processing room, or storage vault. The fire propagates within the fire zone that contains the largest quantities of plutonium metal.	2,000 kg plutonium metal	0.50 kg plutonium	1×10^{-6} to 1×10^{-4}
2. Explosion in a furnace	A steam explosion/over-pressurization explosion is postulated to occur in a furnace.	4.50 kg molten plutonium metal	2.25 kg molten plutonium metal	1×10^{-4} to 1×10^{-2}
3. Nuclear criticality	An inadvertent criticality is postulated based on several potential events involving handling errors. Accumulation of fissile material in excess of criticality safety limits, addition of a moderator causing a critical configuration, or a seismic event causing collapse of storage vault racks are potential scenarios.	See Appendix 2	5×10^{17} fissions	1×10^{-2}
5. Radioactive Material Spill	A loss of confinement and spill of molten plutonium into the metal reduction glovebox is postulated. The spill occurs due to a failure or rupture of the feed casting furnace.	4.5 kg molten plutonium metal	0.045 kg plutonium	1.0×10^{-4} to 1.0×10^{-2}/yr

Table 2— SRS Pit Facility Postulated Chemical Accidents

Chemical Release Events				
1. Nitric Acid Release From Bulk Storage	Nitric acid is inadvertently released from bulk storage due to natural phenomena, equipment failure, mechanical impact, or human error during storage, handling, or process operations.	10,500 kg	10,500 kg	1.0×10^{-5} to 1.0×10^{-4}/yr
2. Hydrofluoric Acid Release From Bulk Storage	Hydrofluoric acid is inadvertently released from bulk storage due to natural phenomena, equipment failure, mechanical impact, or human error during storage, handling, or process operations.	550 kg	550 kg	1.0×10^{-5} to 1.0×10^{-4}/yr

13.0 TRANSPORTATION

13.1 L.1 REQUEST

Estimate the annual number of shipments for the following materials/wastes:

- LLW (identify receiving site)
- Mixed waste (identify receiving site)

- TRU waste
- Pits from Pantex to SRS and SRS to Pantex
- Enriched uranium parts/material from Y-12 to SRS and SRS to Y-12

Response: The following estimates are associated with processing 50 pits per year:

- Low-level waste 200 shipments/yr to NNSS (see Note 1)
- Mixed waste 5 shipments/yr to NNSS (see Note 1)
- Transuranic waste 106 shipments/yr to WIPP
- Pits 6 shipments/yr (see Note 2)
- Enriched uranium parts/material 4 shipments/yr (see Note 2)

Response: The following estimates are associated with processing 80 pits per year:

- Low-level waste 250 shipments/yr to NNSS (see Note 1)
- Mixed waste 8 shipments/yr to NNSS (see Note 1)
- Transuranic waste 156 shipments/yr to WIPP
- Pits 10 shipments/yr (see Note 2)
- Enriched uranium parts/material 6 shipments/yr (see Note 1)

Note 1: LLW could be disposed of on-site at SRS and MLLW could be disposed of at facilities in SRS area. The number of shipments above assumes that all LLW and MLLW generated by SRPPF operations would be transported to NNSS for treatment, storage, and disposal. If LLW and MLLW were transported to the Waste Control Specialists or Energy*Solutions* commercial disposal facilities, transportation impacts would be bounded by transport to NNSS.

Note 2: Shipment numbers for pits and HEU are classified. Unclassified estimate was derived from the Draft Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility (DOE/EIS-0236-S2).

14.0 BIOLOGICAL RESOURCES

14.1 M.1 REQUEST

Provide information on the presence and status of the smooth purple coneflower (*Echinacea laevigata*) that has been planted in locations in front of the existing MFFF administration building.

Request: If these plants are the smooth purple coneflower that occurs on the SRS, provide additional background information on the history of these plants such as 1) were these plants established by seed or transplants grown from seeds (i.e., not naturally occurring plants), 2) were they planted strictly for landscaping purposes or a means to establish additional plants, and approximately how many are there, 3) do these plants serve a specific purpose in the management of the coneflower on the SRS such as being a reserve population or a seed source, and 4) were these plants established under a permit or agreement with the U.S. Fish and Wildlife Service?

Response: The Savannah River Ecology Laboratory (SREL) was instrumental in the design and species selection of the garden in front of the administration building. Seeds were collected from local populations. There was zero impact to local (SRS) populations. Plants were propagated from seed in the SREL greenhouse and transplanted to the educational garden. They were planted solely as an educational example of local pollinators. SREL did obtain a permit with the U.S. Fish and Wildlife Service (USF&W). After receiving the permit (TE1066A-0) SREL submitted a couple of progress status reports for educational management of the natural population to USF&W.

Some of the established plants have been successfully relocated within the garden for "landscaping" purpose. SREL has been "managing" the garden by removing weeds and lawn encroachment by hand removal.

The population is reproducing in the garden and may be successfully relocated to a new location. SREL suggested that the plants could be moved to the Ecology Laboratory Conference Center on site or to the New Admin building after construction. Mature plants are hardy and should transplant well.

15.0 CULTURAL RESOURCES

15.1 N.1 REQUEST

Request: Provide any relevant information on cultural resources that could be impacted by the Proposed Action.

Response: SRARP has been conducting archaeological investigations on SRS since 1973. Approximately 36.4 percent of SRS has been surveyed for archaeological resources and historic built environment resources that date prior to 1950, with 70,458 acres surveyed as of 2018. Surveyors have identified a total of 2,043 archaeological sites and 7 historic buildings/structures that date prior to 1950 on SRS. Prehistoric resources across SRS include village sites, base camps, limited activity sites, quarries, and workshops. Historic sites include farmsteads, tenant dwellings, mills, plantations, slave quarters, farm dikes, dams, cattle pens, ferry locations, churches, schools, towns, cemeteries, commercial building locations, and roads. Of the archaeological sites, 1,303 are pre-contact Native American sites and 740 are historic archaeological sites (pre-1942) that may be related to early historic Native American, Hispanic, and Euro-American cultures. Of the 1,303 pre-contact archaeological sites, 82 have been determined eligible for listing on the National Register. Of the 740 historic archaeological sites, 64 have been determined eligible for listing on the National Register. Of the seven historic buildings/structures, all have been determined eligible for listing on the National Register.

SRS contains no National Historic Landmarks. All of the Cold War-era resources on SRS constructed between 1950 and 1989 were inventoried in 2004. Cold War-era properties include buildings and structures associated with the development of nuclear materials and technologies for use in weapons, power generation, and medical treatments. One Cold War-era historic district, which includes a landscape, sites, buildings, and structures, has been determined eligible for listing on the National Register.

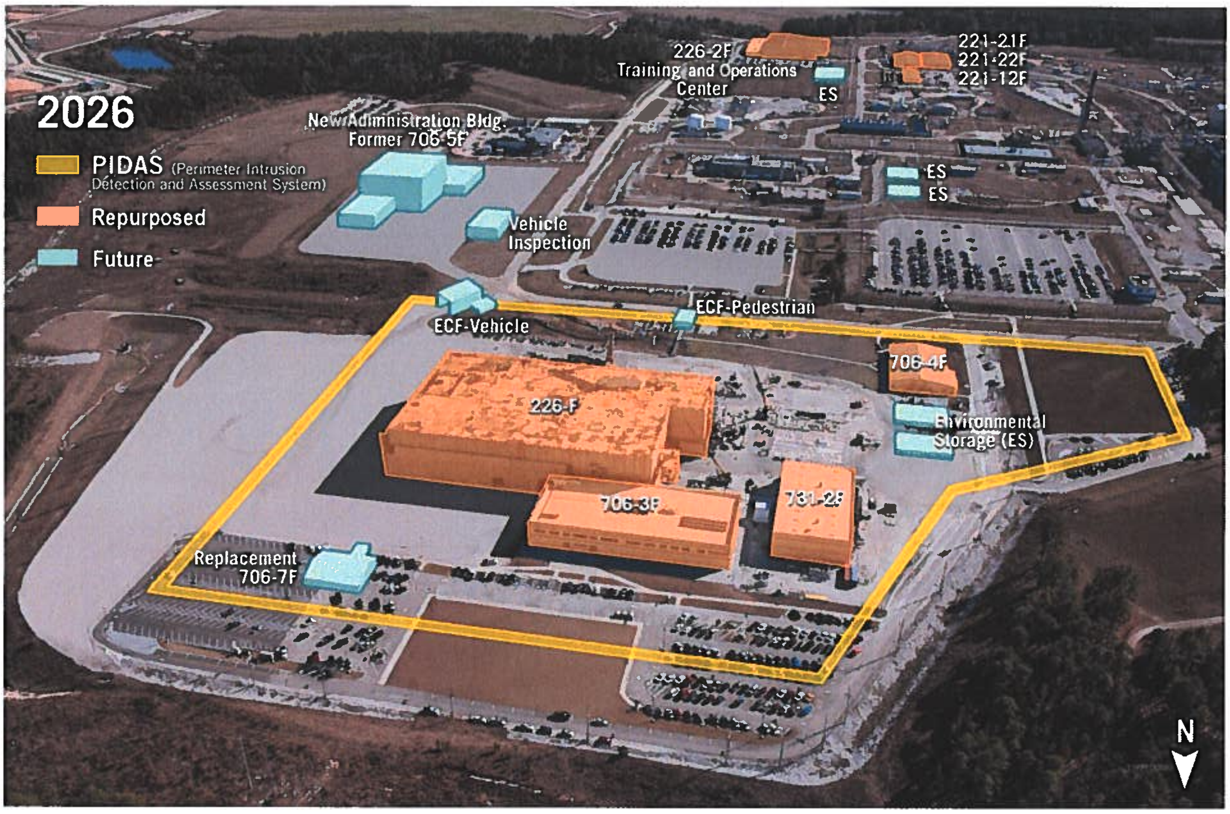
Appendix A: Graphics to support the SRNS Data Call Response.

Existing F Area Facilities

Preliminary layout 2022

Preliminary layout 2023

Preliminary layout 2024



Preliminary layout 2026

PIDAS Configuration for Option of Retaining Existing Administrative Building

Appendix B: Radionuclide Distribution for a Criticality Involving Weapons Grade Plutonium

Radionuclide	Activity Released (Ci)
Kr-83m	8
Kr-85m	7.5
Kr-85	8.0×10^{-5}
Kr-87	49.5
Kr-88	32.5
Kr-89	2.1×10^{3}
Xe-131m	4.1×10^{-3}
Xe-133m	0.09
Xe-133	1.35
Xe-135m	110
Xe-135	18
Xe-137	2.45×10^{3}
Xe-138	650
I-131	0.11
I-132	14
I-133	2
I-134	55
I-135	6