DOE/EIS-0541

# Final Environmental Impact Statement for Plutonium Pit Production at the Savannah River Site in South Carolina

September 2020

U.S. Department of Energy
National Nuclear Security Administration
Savannah River Site

Summary

## CONVERSIONS

| To Convert Into Metric | | | To Convert Into English | | |
|---|---|---|---|---|---|
| **If You Know** | **Multiple By** | **To Get** | **If you Know** | **Multiple By** | **To Get** |
| **Length** | | | | | |
| Inch | 2.54 | Centimeter | Centimeter | 0.3937 | Inch |
| Foot | 30.48 | Centimeter | Centimeter | 0.0328 | Foot |
| Foot | 0.3048 | Meter | Meter | 3.281 | Foot |
| Yard | 0.9144 | Meter | Meter | 1.0936 | Yard |
| Mile | 1.60934 | Kilometer | Kilometer | 0.62414 | Mile |
| **Area** | | | | | |
| Square inch | 6.4516 | Square centimeter | Square centimeter | 0.155 | Square inch |
| Square foot | 0.092903 | Square meter | Square meter | 10.7639 | Square foot |
| Square yard | 0.8361 | Square meter | Square meter | 1.196 | Square yard |
| Acre | 0.40469 | Hectare | Hectare | 2.471 | Acre |
| Square mile | 2.58999 | Square kilometer | Square kilometer | 0.3861 | Square mile |
| **Volume** | | | | | |
| Fluid ounce | 29.574 | Milliliter | Milliliter | 0.0338 | Fluid ounce |
| Gallon | 3.7854 | Liter | Liter | 0.26417 | Gallon |
| Cubic foot | 0.028317 | Cubic meter | Cubic meter | 35.315 | Cubic foot |
| Cubic yard | 0.76455 | Cubic meter | Cubic meter | 1.308 | Cubic yard |
| **Weight** | | | | | |
| Ounce | 28.3495 | Gram | Gram | 0.03527 | Ounce |
| Pound | 0.45360 | Kilogram | Kilogram | 2.2046 | Pound |
| Short ton | 0.90718 | Metric ton | Metric ton | 1.1023 | Short ton |
| **Force** | | | | | |
| Dyne | 0.00001 | Newton | Newton | 0.00001 | Dyne |
| **Temperature** | | | | | |
| Fahrenheit | Subtract 32 then multiply by 5/9ths | Celsius | Celsius | Multiply by 9/5$^{th}$ then add 32 | Fahrenheit |

## METRIC PREFIXES

| Prefix | Symbol | Multiplication factor |
|---|---|---|
| exa- | E | 1,000,000,000,000,000,000 = $10^{18}$ |
| peta- | P | 1,000,000,000,000,000 = $10^{15}$ |
| tera- | T | 1,000,000,000,000 = $10^{12}$ |
| giga- | G | 1,000,000,000 = $10^{9}$ |
| mega- | M | 1,000,000 = $10^{6}$ |
| kilo- | k | 1,000 = $10^{3}$ |
| deca- | D | 10 = $10^{1}$ |
| deci- | d | 0.1 = $10^{-1}$ |
| centi- | c | 0.01 = $10^{-2}$ |
| milli- | m | 0.001 = $10^{-3}$ |
| micro- | µ | 0.000 001 = $10^{-6}$ |
| nano- | n | 0.000 000 001 = $10^{-9}$ |
| pico- | p | 0.000 000 000 001 = $10^{-12}$ |

## COVER SHEET

***Responsible Federal Agency*:** U.S. Department of Energy (DOE) / National Nuclear Security Administration (NNSA)

**Title:** Final Environmental Impact Statement for Plutonium Pit Production at the Savannah River Site in South Carolina (SRS Pit Production EIS) (DOE/EIS-0541)

***Location*:** Savannah River Site, South Carolina

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This document is available for viewing and downloading on the NNSA NEPA Reading Room website (http://www.energy.gov/nnsa/nnsa-nepareading-room), the DOE NEPA website (http://energy.gov/nepa/nepa-documents), and the Savannah River Operations Office website (http://www.srs.gov/general/pubs/envbul/nepa1.htm).

***Abstract:*** NNSA, a semi-autonomous agency within DOE, is responsible for meeting the national security requirements established by the President and Congress to maintain and enhance the safety, reliability, and performance of the U.S. nuclear weapons stockpile. NNSA prepared this SRS Pit Production EIS to evaluate the potential environmental impacts of repurposing the Mixed-Oxide Fuel Fabrication Facility (MFFF) to produce a minimum of 50 war reserve pits per year at SRS and to develop the ability to implement a short-term surge capacity to enable NNSA to meet the requirements of producing pits at a rate of not less than 80 war reserve pits per year beginning during 2030 for the nuclear weapons stockpile.

Repurposing the MFFF would require internal modifications and installation of manufacturing and support equipment directly associated with the pit production mission. In addition to internal modifications of the MFFF, additional requirements for establishing pit production at SRS include: (1) removal of some existing facilities; (2) construction of new facilities and modification of some existing support facilities; and (3) construction of a Perimeter Intrusion Detection and Assessment System. Together, these changes would comprise the new Savannah River Plutonium Processing Facility (SRPPF) complex. Under the No-Action Alternative, NNSA would not proceed with the SRPPF, which might limit the ability to maintain, long-term, the nuclear deterrent that is a cornerstone of U.S. national security policy.

***Preferred Alternative:*** For this SRS Pit Production EIS, NNSA's preferred alternative is the Proposed Action of repurposing the MFFF into the SRPPF, based on national policy and considerations of environmental, economic, technical, and other factors.

***Public Comments:*** In preparing this Final SRS Pit Production EIS, NNSA considered comments received during the scoping period (June 10, 2019 through July 25, 2019), during the public comment period on the Draft SRS Pit Production EIS (April 3, 2020 through June 2, 2020), and late comments received after the close of the public comment period. In light of the Coronavirus Disease 2019 (COVID-19) national emergency and guidance from the Centers for Disease Control and Prevention on public gatherings, NNSA held an internet-based (with telephone access) virtual public hearing in place of an in-person hearing. The virtual public hearing was held on April 30, 2020.

This Final SRS Pit Production EIS contains revisions and new information based in part on comments received on the Draft SRS Pit Production EIS. Volume 3 contains summaries of the comments received, images of the comment documents, and NNSA's responses to the comments. NNSA will use the analysis presented in this SRS Pit Production EIS, as well as other information, in preparing a Record of Decision regarding the pit production at SRS.

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| CD | critical decision |
| CFR | Code of Federal Regulations |
| Complex Transformation SPEIS | *Final Complex Transformation Supplemental Programmatic Environmental Impact Statement* |
| DoD | U.S. Department of Defense |
| DOE | U.S. Department of Energy |
| ECF | entry control facility |
| EIS | environmental impact statement |
| HEPA | high-efficiency particulate air (filter) |
| HC | hazard category |
| LANL | Los Alamos National Laboratory |
| LCF | latent cancer fatality |
| LLW | low-level radioactive waste |
| MFFF | Mixed-Oxide Fuel Fabrication Facility |
| MLLW | mixed low-level radioactive waste |
| NEPA | *National Environmental Policy Act* |
| NNSA | National Nuclear Security Administration |
| NNSS | Nevada National Security Site |
| NOI | Notice of Intent |
| NRC | U.S. Nuclear Regulatory Commission |
| PIDAS | Perimeter Intrusion Detection and Assessment System |
| ROD | Record of Decision |
| SPD SEIS | *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* |
| SPEIS | supplemental programmatic environmental impact statement |
| SRPPF | Savannah River Plutonium Processing Facility |
| SRS | Savannah River Site |
| TRU | transuranic (waste) |
| U.S.C. | *United States Code* |
| WIPP | Waste Isolation Pilot Plant |

# SUMMARY

## S.1 Introduction

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the U.S. Department of Energy (DOE), is responsible for meeting the national security requirements established by the President and Congress to maintain and enhance the safety, reliability, and performance of the U.S. nuclear weapons stockpile, including the ability to design, produce, and test (Public Law 106-65, as amended). Plutonium pits are critical components of every nuclear weapon; nearly all current stockpile pits were produced from 1978 to 1989 (DoD 2018a, p. 62). Today, the United States' capability to produce plutonium pits is limited.

> **Pit**
>
> A pit is the central core of a nuclear weapon, principally containing plutonium or enriched uranium.

As explained in the *Supplement Analysis of the Complex Transformation Supplemental Programmatic Environmental Impact Statement* (2019 SPEIS SA) (NNSA 2019a, Sec. 1.0), to meet Federal law and national security requirements, NNSA is pursuing a two-prong (two-site) approach to the production of plutonium pits—produce a minimum of 50 pits per year at the Savannah River Site (SRS) near Aiken, South Carolina (Figure S-1) and a minimum of 30 pits per year at Los Alamos National Laboratory (LANL) in New Mexico. This approach would provide an effective, responsive, and resilient nuclear weapons infrastructure with the flexibility to adapt to shifting requirements. NNSA has prepared this *Environmental Impact Statement for Plutonium Pit Production at the Savannah River Site in South Carolina* (DOE/EIS-0541) (SRS Pit Production EIS) to evaluate the potential environmental impacts of producing a minimum of 50 pits per year at SRS. Apart from this EIS, NNSA also prepared a separate analysis of increasing production activities at LANL.

> **Pit Production**
>
> Pit production is a term used to describe a complex process that involves three main areas: (1) material receipt, unpacking, and storage; (2) feed preparation; and (3) manufacturing. The production of pits includes the activities needed to fabricate new pits, to modify the internal features of existing pits, and to certify new pits or requalify existing pits. Intrusive pit modification reuse requires handling and processing of the plutonium internal to the pit. Conservatively, intrusive pit reuse is assumed to require the same basic capabilities as new pit production.

### S.1.1 Relevant History—Pit Production

From 1952 to 1989, plutonium pits for the nuclear weapons stockpile were manufactured at the Rocky Flats Plant in Golden, Colorado, at a rate of 1,000 to 2,000 pits per year. In December 1989, pit production at Rocky Flats ceased and DOE decided not to restart production at the facility. During the mid-1990s, DOE conducted a comprehensive analysis of the capability and capacity needs for the entire nuclear weapons complex (Complex) in a post-Cold War era and evaluated alternatives for maintaining the Nation's nuclear stockpile, including pit production. In 1999, DOE decided to increase pit production at LANL in a limited capacity of no more than 20 pits per year, although the actual number of pits produced has been less than 20 per year (DOE 1999).

Subsequent to deciding on this level of pit production at LANL, NNSA has continued to evaluate pit production needs and alternatives. Nonetheless, the United States has emphasized the need to

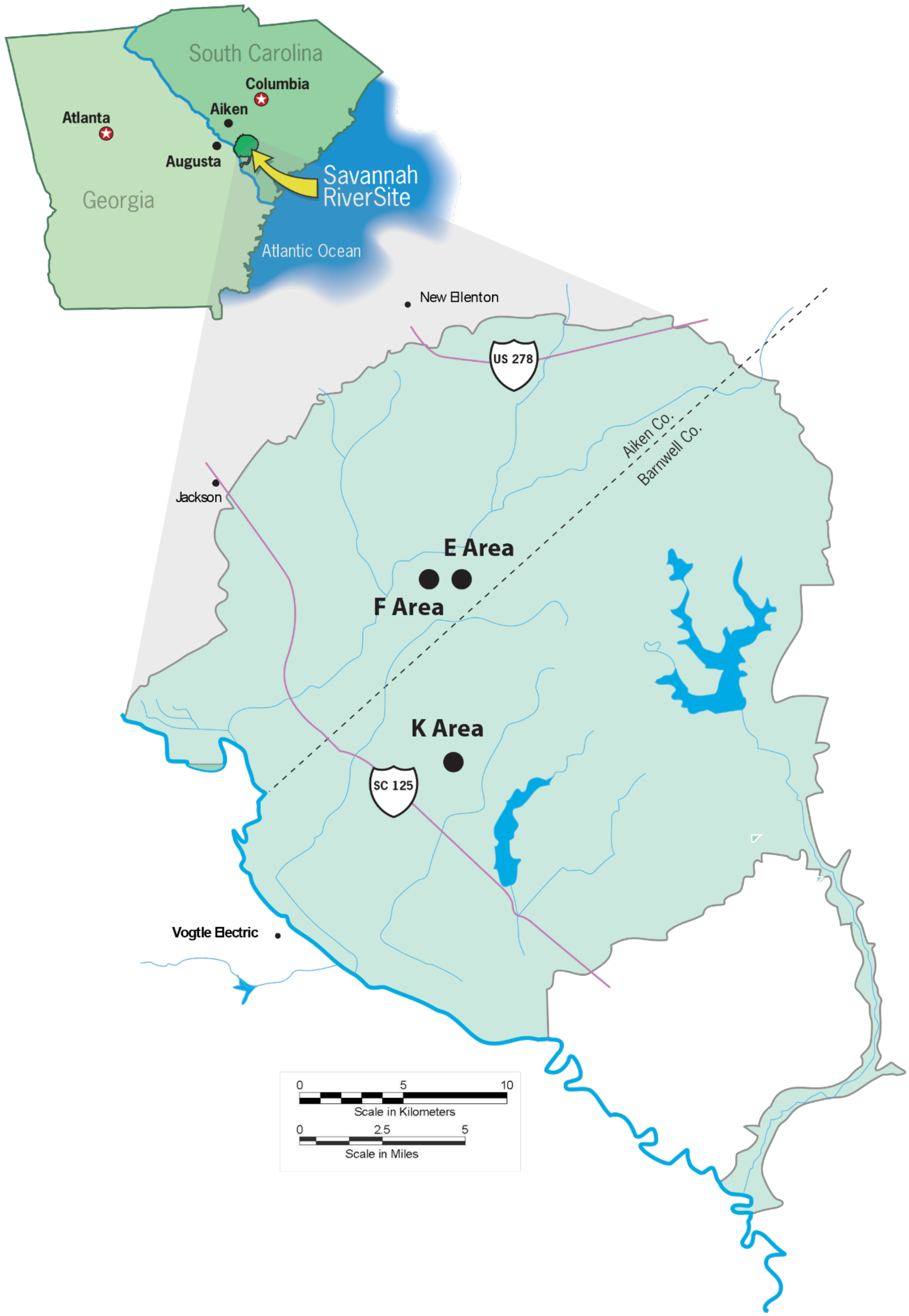


**Figure S-1—Location of Savannah River Site (Source: NNSA 2019a)**

eventually produce 80 pits per year. The joint U.S. Department of Defense (DoD)–DOE white paper *National Security and Nuclear Weapons in the 21st Century* cataloged the need and justification for pit production rates (DoD and DOE 2008). Since 2014, Federal law has required the nuclear security enterprise to produce not less than 30 war reserve plutonium pits during 2026. Federal law now requires that the nuclear security enterprise produces not less than 80 war reserve plutonium pits during 2030 (Volume 50 of the *United States Code*, Section 2538a [50 U.S.C. § 2538a], as amended). The 2018 Nuclear Posture Review reinforces this pit production requirement by stating that NNSA must produce at least 80 plutonium pits per year beginning during 2030 and must sustain the capacity for future life extension programs[1] and follow-on programs (DoD 2018a, p. 62). As a result, the United States is pursuing an initiative to provide the enduring capability and capacity to produce plutonium pits at a rate of no fewer than 80 pits per year beginning during 2030 (DoD 2018a, pp. 62–63). To these ends, the DoD Under Secretary of Defense for Acquisition and Sustainment and the NNSA Administrator issued a Joint Statement on May 10, 2018, describing NNSA's recommended alternative to pursue a two-prong approach—a minimum of 50 pits per year produced at SRS and a minimum of 30 pits per year produced at LANL (DoD 2018b). This approach would provide an effective, responsive, and resilient nuclear weapons infrastructure with the flexibility to adapt to shifting requirements. Figure 1-2 (located in Section 1.5) provides a visual representation of the relevant pit production history and more details concerning DOE/NNSA's analyses of pit production in relevant documents prepared under the *National Environmental Policy Act of 1969* (NEPA), as amended (42 U.S.C. § 4321 et seq.).

### S.1.2 Purpose and Need for the Proposed Action

Under Federal law and to meet national security requirements, NNSA must implement a strategy to provide the enduring capability and capacity to produce not less than 80 war reserve plutonium pits per year beginning during 2030 (50 U.S.C. § 2538a). NNSA's current pit production capacity cannot meet this requirement. NNSA needs to establish additional pit production capability and capacity to (1) mitigate against the risk of plutonium aging (see Section S.1.2.1); (2) produce pits with enhanced safety features to meet NNSA and DoD requirements (see Section S.1.2.2), (3) respond to changes in deterrent requirements driven by growing threats from peer competitors (see Section S.1.2.3); and (4) improve the resiliency, flexibility, and redundancy of the nuclear security enterprise (see Section S.1.2.4).

**Pit Production Using Existing Pits as Feedstock**

From 1944 to 1992, DOE produced plutonium in government-owned nuclear reactors and extracted the plutonium from spent nuclear fuel to produce plutonium pits. NNSA can store up to 20,000 pits at Pantex. Because those pits would provide the feedstock for pit production activities at LANL and SRS, there is no need for NNSA to produce any new plutonium; rather, NNSA is remanufacturing existing, but aged, pits into new pits using the process shown in Chapter 2, Figure 2-3, of this SRS Pit Production EIS.

[1] Life extension programs include pit reuse activities. The Complex Transformation SPEIS (NNSA 2008a) provides the following description of pit reuse, which his taken from the SSM PEIS (DOE 1996, p. S-20): "Intrusive pit modification reuse requires handling and processing of the plutonium internal to the pit. Non-intrusive pit modification reuse involves the external features of the pit and does not require an extensive plutonium infrastructure; the risk of contamination and generation of radioactive waste is very low for non-intrusive modification activities."

### S.1.2.1 Pit Aging and Pit Lifetime

Modern nuclear weapons have a primary, or trigger, that contains a central core, called the "pit." Over time, as materials age, their fundamental properties change; these age-related changes affect a nuclear weapon's plutonium pit. The reliability of a nuclear weapon is directly dependent on the plutonium. Although U.S. nuclear weapons are presently safe and reliable, they are undoubtedly aging; most of the pits in the enduring stockpile were produced in the mid to late 1970s and 1980s.

Considerable research has been dedicated to understanding how long plutonium pits will remain effective. Results thus far show that uncertainty in the performance of older plutonium increases over time resulting in decreasing confidence. At some age, the properties will change sufficiently to warrant replacement. NNSA continues to research the life expectancy of plutonium pits. This is scientifically challenging and will require many years to fully understand. Implementing a moderate pit manufacturing capability now is a prudent approach to mitigate against age-related risk.

As recently as April 6, 2020, NNSA provided Congress with the findings, observations, and recommendations of the JASON Defense Advisory Group Phase One report, *Pit Aging* (JASON 2019). In that report, JASON urged "that pit manufacturing be re-established as expeditiously as possible in parallel with the focused program to understand Pu [Plutonium] aging, to mitigate potential risks posed by Pu aging on the stockpile. The reuse of aged pits in rebuilt primaries can address certain issues but cannot change the aged pits themselves. A significant period of time will be required to recreate the facilities and expertise needed to manufacture Pu pits. Given the number and age distribution of weapons in the stockpile, it will then include some eighty-year-old pits, even under most favorable circumstances" (JASON 2019).

Based on the current information, there is no conclusive evidence to rule out concerns of pit aging. Delaying pit production and discovering that pit aging is a concern would leave the Nation in a very difficult position with respect to the effectiveness of the deterrent and would jeopardize the ability to meet capacity requirements in a timely manner. For the foreseeable future, NNSA will rely on a combination of newly manufactured pits and judicious reuse of existing pits to modernize the U.S. nuclear stockpile. This judicious reuse is an element of pit production analyzed in this SRS Pit Production EIS. This approach enables NNSA to implement a moderately sized pit manufacturing capability of not less than 80 pits per year beginning during 2030. This capability allows for:

- Enhanced warhead safety and security to meet DoD and NNSA requirements;
- Deliberate, methodical replacement of older existing plutonium pits with newly manufactured pits as risk mitigation against plutonium aging; and
- Response to changes in deterrent requirements driven by renewed great power competition.

### S.1.2.2 Enhanced Safety Features

The Stockpile Stewardship Program enables NNSA to address aging and performance issues, enhance safety features, improve security, and meet today's military and national security requirements (DoD 2018a). Each different weapon type in the U.S. nuclear stockpile requires routine maintenance, periodic repair, replacement of limited life components, and surveillance (i.e., a thorough examination of a weapon) to ensure continued safety, security, and effectiveness. The pit capacity requirements analyzed in the 2019 SPEIS SA and this EIS account for producing pits with enhanced safety features to meet NNSA and DoD requirements. In some instances, these enhanced safety features could be incorporated into a pit through modifications associated with pit reuse.

#### S.1.2.3 Deterrent Requirements by Growing Threats

Nuclear weapons have played, and will continue to play, a critical role in deterring nuclear attack and in preventing large-scale conventional warfare between nuclear-armed states for the foreseeable future. U.S. nuclear weapons not only defend our allies against conventional and nuclear threats, they also help them avoid the need to develop their own nuclear arsenals. This, in turn, furthers global security (DoD 2018a, p. III). While the United States has continued to reduce the number and salience of nuclear weapons, others, including Russia and China, have moved in the opposite direction. They have added new types of nuclear capabilities to their arsenals, increased the salience of nuclear forces in their strategies and plans, and engaged in increasingly aggressive behavior, including in outer and cyber space. North Korea continues its illicit pursuit of nuclear weapons and missile capabilities in direct violation of United Nations Security Council resolutions (DoD 2018a, p. V).

An effective, responsive, and resilient nuclear weapons infrastructure is essential to the U.S. capacity to adapt flexibly to shifting requirements. Such an infrastructure offers tangible evidence to both allies and potential adversaries of U.S. nuclear weapons capabilities and thus contributes to deterrence, assurance, and hedging against adverse developments. It also discourages adversary interest in arms competition. Providing the enduring capability and capacity to produce plutonium pits at a rate of not less than 80 pits per year beginning during 2030 is an integral part of this strategy (Public Law 116-92, Section 3116(a); DoD 2018a, p. XIV).

#### S.1.2.4 Dual Pit Production Sites

Using two pit production sites would improve the resiliency, flexibility, and redundancy of the nuclear security enterprise by not relying on a single production site and is considered the best way to manage the cost, schedule, and risk of such a vital undertaking (DoD 2018b). According to NNSA testimony, "Even though this approach will require NNSA to fund activities at two sites, any interruption or delay to pit production in the future due to the lack of resiliency will have huge cost increases across the entire Nuclear Security Enterprise" (DOE 2019). A two-site pit production strategy, in which each site would have the capability to produce 80 pits per year, would enable NNSA to meet national security requirements if one facility became unavailable.

### S.1.3 Public Participation Process

#### S.1.3.1 Public Scoping

Scoping is a process in which the public and stakeholders provide comments directly to the Federal agency on the scope of an EIS. This process begins with the publication of a Notice of Intent (NOI) in the *Federal Register*. On June 10, 2019, NNSA published an NOI to prepare this SRS

Pit Production EIS (84 FR 26849) and announced a 45-day EIS scoping period that ended on July 25, 2019. The NOI also provided information regarding DOE's overall NEPA strategy related to fulfilling national requirements for pit production. NNSA held a public scoping meeting in North Augusta, South Carolina, on June 27, 2019, to discuss the SRS Pit Production EIS and to receive comments on the potential scope. In addition, the public was encouraged to provide comments via U.S. postal mail and e-mail.

An independent moderator facilitated the scoping meeting to direct and clarify discussions and comments. A court reporter was also present to provide a transcript of the proceedings and record formal comments. Forty-four people spoke at the scoping meeting. NNSA received 161 unique documents with scoping comments, as well as more than 300 postcards that were part of a campaign. NNSA considered all comments received during the scoping process for this EIS, including comments received after the close of the scoping period.[2]

#### S.1.3.4 Public Comment on the Draft SRS EIS

On April 3, 2020, NNSA electronically published the Draft SRS Pit Production EIS and published a Notice of Availability (NOA) in the *Federal Register* announcing a 45-day public comment period for the Draft EIS (85 FR 18947). The comment period was scheduled to end on May 18, 2020. On April 23, 2020, NNSA notified the U.S. Environmental Protection Agency (EPA) that it was extending the comment period until June 2, 2020. On May 1, 2020, the EPA published a notice in the *Federal Register* that announced the extension to the public comment period (85 FR 25436). NNSA also notified members of the public and participants of the extension at the virtual public hearing discussed below.

In addition to publishing the NOA in the *Federal Register*, NNSA posted the Draft EIS on the NNSA NEPA Reading Room at https://www.energy.gov/nnsa/nnsa-nepa-reading-room and the DOE NEPA website at https://www.energy.gov/nepa/doeeis-0541-plutonium-pit-production-savannah-river-site-aiken-south-carolina.

In light of the Coronavirus Disease 2019 (COVID-19) national emergency and guidance from the Centers for Disease Control and Prevention on public gatherings, NNSA held an internet-based (with telephone access) virtual public hearing in place of an in-person hearing. The virtual public hearing was held on April 30, 2020. Notice of the date, time, and information related to the virtual public hearing, including internet and telephone access details and instructions on how to participate, were sent via email to individuals and groups that participated in scoping for the EIS, had indicated a preference to be notified concerning the pit production program, or were on the SRS mailing list for the *Environmental Bulletin*. The same information was posted in the local newspapers and on the NNSA NEPA Reading Room website on April 15, 2020. A 60-second radio spot also aired on local radio stations to solicit comments and notify individuals of the virtual public hearing.

[2] NNSA published the notice of availability for the Draft 2019 SPEIS SA on June 28, 2019 (84 FR 31055) and provided a 45-day public comment period for that document, which ended on August 12, 2019. Because of the overlap in issues and the public review periods between the Draft 2019 SPEIS SA and this SRS Pit Production EIS, NNSA considered all comment documents received by August 12, 2019, as well as comment documents received after the August 12, 2019, deadline for the Draft 2019 SPEIS SA.

In addition to the public hearing, the public was encouraged to provide comments via U.S. postal mail or electronically via email. Comments received by mail were date stamped when received by the DOE mail distribution center. Comments received by email have the date automatically included. NNSA considered all comments received.

Approximately 400 comment documents (including approximately 190 comment documents submitted as one of seven email campaign letters) were received from individuals, interested groups, and Federal, State, and local agencies during the public comment period on the Draft EIS. In addition, 44 commenters spoke at the virtual public hearing, and their comments were recorded in formal transcripts. The majority of the comments focused on policy issues related to the appropriateness or the need for nuclear weapons or the need for additional pits. The primary topics identified in the public comments include:

- Requests for a programmatic EIS for pit production,
- Requests to consider pit reuse as a reasonable alternative,
- Requests for an extension to the comment period due to the COVID-19 pandemic,
- Disagreement with the two-prong (two-site) approach to pit production,
- General opposition to, or support for, the proposal,
- Comments about nuclear weapon policies or new weapon design,
- Comments about the need for pits and the lifetime of current pits,
- Comments about waste management,
- Comments about transuranic (TRU) waste storage at the Waste Isolation Pilot Plant (WIPP) facility,
- Comments about impacts to human health,
- Comments about potential environmental justice impacts, and
- Comments about budget priorities and the need to clean up SRS.

The Comment Response Document (CRD) (Volume 3 of this Final EIS) includes NNSA responses to the primary topics identified above and others raised in public comments.

### S.1.4 Primary Changes from the Draft SRS EIS

NNSA revised the Draft SRS Pit Production EIS to incorporate changes after considering public comments. Additionally, NNSA updated the Final EIS to describe and analyze the evolution of details associated with the Proposed Action. All changes are indicated by vertical lines in the page margins. The primary changes to the EIS that resulted from public comments include:

- Updated information related to pit aging,
- Clarification of NNSA's expectations for pit reuse,
- Clarification on the management of potential liquid TRU waste streams,
- Clarification of the information on seismic hazards, including capable faults and the probabilistic seismic hazards analysis,
- Information related to monitoring radiological air emissions, and
- Updated accident information to address potential impacts to first responders.

Since publication of the Draft EIS, NNSA made minor changes to the overall layout of the facilities inside and adjacent to the Protected Area and has updated information related to operational parameters for the Savannah River Plutonium Processing Facility (SRPPF[3]), including:

- Increase in estimated total worker numbers for SRPPF operations
- Reduction in the estimated annual volumes of TRU waste generated and the associated number of TRU waste shipments to the WIPP facility,[4]
- Reduction in estimated annual volumes of solid LLW, and
- Increase in liquid LLW generation rates.

Chapter 2, Section 2.1, of the Draft EIS described the proposed SRPPF based on the best available design information that existed at the time of publication. Since publication of the Draft EIS, NNSA has continued to refine/optimize the conceptual design documentation for the SRPPF. This Final EIS identifies potential design changes that reflect that refinement. These potential design changes are identified and discussed in Section S.2.1.4 and include an option to: (1) retain the existing administration building; (2) use a sand filter system; and (3) change gloveboxes and the aqueous recovery process. Any changes to potential environmental impacts that might result from such design changes are presented in Chapter 4 of this Final EIS.

## S.2 Proposed Action and Alternatives

This section describes the Proposed Action and the reasonable alternatives considered in this EIS. The Proposed Action is described in Section S.2.1 and the No-Action Alternative is described in Section S.2.2. Section S.2.1 also includes a description of the pit production process. Alternatives considered and subsequently eliminated from detailed evaluation are discussed in Section S.2.3. The section also identifies NNSA's preferred alternative (Section S.2.4).

### S.2.1 Proposed Action—Repurpose the Mixed-Oxide Fuel Fabrication Facility into the Savannah River Plutonium Processing Facility

NNSA's Proposed Action is to repurpose the MFFF to produce a minimum of 50 war reserve pits per year at SRS and to develop the ability to implement a short-term surge capacity to enable NNSA to meet the requirements of producing pits at a rate of not less than 80 war reserve pits per year beginning during 2030 for the nuclear weapons stockpile. Production of pits includes the activities needed to fabricate new pits, modify the internal features of existing pits, and certify new pits or requalify existing pits. The Proposed Action also includes activities across the Nuclear Weapons Complex associated with transportation, waste management, and ancillary support (e.g., staging and testing) for the pit production mission at SRS.

In this SRS Pit Production EIS, NNSA evaluates the potential environmental impacts of producing 50, 80, and 125 pits per year at SRS. This approach provides a conservative analysis and affords

[3] Throughout this SRS Pit Production EIS, the repurposed MFFF is referred to as the SRPPF to reflect the reconfiguration of the existing MFFF to perform plutonium-related processing to support NNSA missions.
[4] The WIPP facility is authorized to accept TRU waste that was generated from atomic energy defense activities. The TRU waste shipped from SRS and projected to be generated at SRPPF is, and would be, defense-related TRU waste. Throughout this SRS Pit Production EIS, the defense-related TRU waste from SRS and SRPPF is referred to as TRU waste.

NNSA the flexibility to adapt to shifting requirements or changed circumstances in the future if SRS must produce more than 50 pits per year. For example, if pit production at LANL were paused for some reason, overall pit production requirements could be satisfied at SRS. This EIS also includes an analysis of producing 125 pits per year at SRS. That analysis affords NNSA greater flexibility if requirements were to change in the future. The higher value of 125 pits per year was chosen to be consistent with the value used in the previous analysis contained in the *Final Complex Transformation Supplemental Programmatic Environmental Impact Statement* (Complex Transformation SPEIS) (NNSA 2008a).

The Draft EIS described the proposed SRPPF based on the best available design information that existed at the time of publication. Since publication of the Draft EIS, NNSA has continued to prepare conceptual design documentation for the SRPPF in accordance with the DOE Order 413.3B, "Program and Project Management for the Acquisition of Capital Assets." A primary objective of the conceptual design process is to optimize facility design to maximize operational performance and minimize costs and environmental impacts. Such optimization has the potential to change the SRPPF layout, construction approach, and operations compared to the information that was presented in this section of the Draft EIS. This Final EIS identifies design changes currently being considered by NNSA in the critical decision (CD)-1 process. These potential design changes are identified and discussed in Section S.2.1.4. In addition, any effects on potential environmental impacts that might result from such optimization options are presented in Chapter 4 of this Final EIS. The CD-1 documentation is scheduled to be finalized by the end of calendar year 2020, with NNSA evaluation and approval to follow.

**NEPA and the Design Process**

The design process for a major facility such as the SRPPF is carried out in accordance with DOE Order 413.3B. Within DOE, projects typically progress through five critical decisions (CDs), which serve as major milestones. Following approval of the first milestone, CD-0 (Mission Need), conceptual design activities and NEPA evaluations begin. CD-1 approval marks the completion of the project definition and the conceptual design. Following CD-1, a project enters the execution phase, which includes preliminary design. The NEPA evaluation is generally completed between CD-0 and CD-2 and must be completed before CD-3 (Approve Start of Construction/Execution). After completion of CD-4, the project is ready to start operations. Conducting NEPA review early in the CD process provides environmental input into the design.

The potential changes in design and layout of the SRPPF complex do not change the definition of the Proposed Action, which is to repurpose the MFFF to produce a minimum of 50 war reserve pits per year at SRS and to develop the ability to implement a short-term surge capacity to enable NNSA to meet the requirements of producing pits at a rate of not less than 80 war reserve pits per year beginning during 2030 for the nuclear weapons stockpile. Additionally, as shown in Chapter 4, the potential environmental impacts associated with these changes would not be notably different from those presented for the Proposed Action.

#### S.2.1.1 Construction of the Savannah River Plutonium Processing Facility

In order to produce a minimum of 50 pits per year at SRS and to develop the ability to implement a short-term surge capacity to enable NNSA to meet the requirements of producing pits at a rate of not less than 80 pits per year beginning during 2030 for the nuclear weapons stockpile, NNSA proposes to repurpose the existing MFFF and the administrative and support facilities. The MFFF is in F Area (see Figure S-1). DOE began construction of the MFFF in August 2007 and construction ceased on October 10, 2018, when DOE terminated the contract for the facility. The MFFF (labeled "226-F" on Figure S-2) was designed to safety and security standards (including seismic performance category 3+ to meet U.S. Nuclear Regulatory Commission [NRC] requirements), with walls of reinforced concrete (NNSA 2017, p. A-29). NNSA would verify that the facility meets all relevant requirements for the pit production mission. The exterior walls and roofs were designed and constructed to resist all credible manmade and natural phenomena hazards. Standing approximately 73 feet tall above grade, the MFFF contains three floors and more than 400,000 square feet of available Hazard Category (HC)-2 space,[6] which would be more than sufficient to meet the pit production requirements (NNSA 2017, pp. 79–80). Interior walls of the MFFF are reinforced concrete to provide personnel shielding and durability in the 50-year facility design life. The MFFF also was designed to have safe havens (e.g., safety areas for personnel in the event of an accident) constructed in accordance with applicable safety requirements.[7]

Repurposing the MFFF would require internal modifications and installation of manufacturing and support equipment directly associated with the pit production mission. Internal modifications to the MFFF required for pit production could include:

- Removing equipment and utility commodities intended for fuel fabrication that had been previously installed in the existing MFFF building; making facility modifications to support the new mission processes; and installation of pit production and process support equipment and utilities;

- Modifying existing support facilities as required to provide the personnel support functions for the pit production mission;

- Installing an analytical chemistry and materials characterization laboratory in the Savannah River Plutonium Processing Facility (SRPPF); and

- Installing fire water supply equipment and the backup diesel generators in or adjacent to the SRPPF.

In addition to internal modifications of the MFFF, as discussed below, additional requirements for establishing pit production at SRS include: (1) removal of some existing facilities; (2) construction of new facilities and modification of some existing support facilities; and (3) construction of a Perimeter Intrusion Detection and Assessment System (PIDAS). This EIS refers to the SRPPF and its support facilities as the SRPPF complex.

**Removal of Existing Facilities.** Figure S-2 shows the existing facilities in F Area and Figure S-3 depicts the layout of the proposed SRPPF complex, showing the major buildings and their

[6] Under 10 CFR Part 830, DOE assigns hazard categories to nuclear and radiological facilities in accordance with the potential consequences in the event of a radiological accident. Facilities with at least 2,610 grams of plutonium-239 are assigned HC-2 (NNSA 2014, Attachment 2, Table 1).
[7] The SRPPF design refers to these safe havens as areas of refuge.

relationships to each other. A comparison of those two figures demonstrates that the following existing facilities would be removed/relocated:

- The existing administration building, located north of the MFFF (labeled "706-5F" on Figure S-2), could be demolished to accommodate the PIDAS.[8]

- The Construction Administration Complex (labeled "706-2F" on Figure S-2) would be demolished and provide a possible location for a cafeteria.

- The Mixed-Oxide Administration Complex (labeled "706-1F" and "706-8F" on Figure S-2) would be demolished and provide a possible location for the new administration building.

- The current maintenance facility (labeled "706-7F" on Figure S-2) would be used during initial construction then demolished and a new maintenance facility would be constructed inside the PIDAS.

- Temporary trailers and support buildings east of the MFFF would be removed to provide a possible location for ancillary support facilities.

**Construction of New Facilities and Modification of Existing Support Facilities.** Figure S-3 shows that the following facilities would be constructed or modified to support SRPPF operations:

- A new administration building (labeled "706-5F" on Figure S-3) would be constructed south of the existing MFFF. The new administration building would be the same size and design of the existing administration building (approximately 56,100 square feet). Parking would be provided adjacent to the administration building. (Note: The conceptual design also includes a cafeteria that would be located on the site of the demolished 706-2F. Although the ultimate layout of SRPPF complex may change compared to the notional layout presented in Figure S-3, NNSA would not expect any notable changes in key construction and operational parameters from layout changes. This conclusion is largely because any SRPPF construction activities are expected to occur on previously disturbed land.)

- The replacement maintenance facility (designated "Replacement 706-7F" on Figure S-3) would be constructed within the PIDAS.

- A vehicle inspection facility would be constructed outside of the PIDAS. The protective force would inspect the vehicles and occupants prior to the vehicles being allowed into the Protected Area. After the inspection, the vehicles would proceed through an entry control facility (ECF) for vehicles.

- Environmental storage facilities would be constructed for managing wastes. Two of the environmental storage facilities would be within the PIDAS and would support TRU waste

[8] This EIS also analyzes an option in which the existing administration building could be retained (see Section S.2.1.4).

operations. The storage facilities would be capable of staging approximately 2,500 to 3,000, 55-gallon drums of TRU waste within the PIDAS. Existing Building 731-2F is planned to house the TRU waste WIPP characterization process and also be used for packaged waste storage.

- The existing Training Building (labeled “706-4F” on Figure S-2), which currently houses offices, training rooms, and computer support, would be repurposed as a security force support facility. The facility would include lockers, an arms room, and offices.

- The existing Training and Operations Center (Building 226-2F) would be modified to provide office space and include equipment that would support pit production training using surrogate materials that mimic the characteristics of plutonium operations. No radioactive material would be used in the Training and Operations Center.

- Existing facilities 221-21F, 221-22F, and 221-12F are metal buildings on concrete slabs that are currently used for storage. They would be repurposed to provide storage for the SRPPF complex.

- The annexes on the north and south faces of the SRPPF would be constructed exterior to the existing MFFF and would provide protection for electrical and ventilation equipment servicing the building.

- Ancillary support facilities would be constructed near or inside the PIDAS, depending on the final layout of the SRPPF complex. Examples of these support facilities include:

  - Chiller building and cooling tower to support the SRPPF heating, ventilation, and air conditioning systems (which would have a combined footprint of approximately 26,000 square feet),

  - Nitrogen generators to support the SRPPF glovebox inerting system (which would have a footprint of about 3,100 square feet),

  - A 300,000-gallon fire water storage tank and pumphouse, which would support the fire protection system, and

  - An unloading and storage pad for receipt and storage of bottled gases required for SRPPF operations (about 12,000 square feet).


**Figure S-2—Existing F Area Facilities (Source: SRNS 2020)**


Figure S-3—Notional Layout of the SRPPF Complex (Source: SRNS 2020a)

Any additional new facilities for the SRPPF complex would be constructed on land previously disturbed by the construction of the MFFF, MFFF support facilities, or earlier SRS operations. All construction would comply with State and Federal permitting requirements (see Section 4.18 of this EIS).

**Construction of a PIDAS.** NNSA did not construct a PIDAS for the MFFF (NNSA 2017, p. A-29). To provide security for the SRPPF, NNSA would construct a PIDAS around the facility to enclose all operations involving Security Category I quantities of *special nuclear material*. The area inside the PIDAS would be referred to as the Protected Area. The PIDAS would be a multiple-sensor system within a 30-foot-wide zone enclosed by two parallel fences that would surround the entire Protected Area. In addition, there would be clear zones on either side of the PIDAS. Without encompassing the administration building, the PIDAS would be approximately 4,700 linear feet in length, and the enclosed area (i.e., Protected Area) would be approximately 25 acres. A buffer area beyond the external clear zone would provide an unobstructed view of the area surrounding the PIDAS. As shown on Figure S-3, there would be at least one vehicle ECF through the PIDAS and a pedestrian ECF (labeled "Vehicle ECF" and "Ped ECF," respectively). These would be the locations through which personnel and vehicles could gain access to the SRPPF through the PIDAS. An emergency ECF for vehicles could also be installed through the PIDAS. Table S-1 lists the construction parameters for the SRPPF complex, including the associated waste values.

**Table S-1—Key Construction Parameters for the SRPPF Complex**

| Parameter | 50, 80, or 125 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) | 2–3 |
| Diesel fuel (gallons/year) | 700,000 |
| Peak water use (gallons/year) | 16,600,000 |
| Peak construction workforce (persons) | 1,800[b] |
| **Wastes** | |
| Nonhazardous solid waste (cubic yards/year) | 1,700 |
| Hazardous waste (cubic yards/year) | 6 |
| LLW | 0 |
| MLLW | 0 |
| TRU waste | 0 |

LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; TRU = transuranic.
a. Construction parameters for the SRPPF would be essentially the same regardless of production capacity.
b. Peak construction activities would occur during 2023 and 2024.
Source: SRNS 2020

### S.2.1.2 SRPPF Operations

The SRPPF would include plutonium processing and manufacturing support areas; analytical chemistry and materials characterization support; waste handling; control rooms; support facilities for operations personnel; utilities such as heating, ventilation, and air conditioning systems; high-efficiency particulate air filters; breathing/plant/instrument air compressor rooms; electrical rooms and backup diesel generators; process support equipment rooms; and miscellaneous support space. A detailed description of the pit production process is included in Section 2.1.2 of this SRS Pit Production EIS. Normal electrical power would be supplied to the SRPPF by two independent, offsite power supplies. An uninterruptible power supply and backup diesel generators would provide power for critical systems. This arrangement would ensure continued operation of critical systems during any interruption of offsite power.

Table S-2 presents the key operational parameters associated with producing 50, 80, and 125 pits per year at the SRPPF.[9] The current estimate of the number of workers required for operations of SRPPF has increased since the Draft SRS Pit Production EIS. This revised estimate reflects the

**Table S-2—Key Annual Operational Parameters and Wastes for the SRPPF Complex**

| Parameter | 50 Pits Per Year | 80 Pits Per Year | 125 Pits Per Year |
|---|---|---|---|
| **Resources** | | | |
| Electrical consumption[a] (megawatt-hours) | ≤30,000 | ≤30,000 | 30,000 |
| Peak electrical (megawatts-electric) | ≤11 | ≤11 | 11 |
| Diesel fuel (gallons)[b] | 15,000 | 15,000 | 15,000 |
| Nitrogen (cubic yards)[c] | 36,000 | 57,000 | 90,000 |
| Argon (cubic yards)[c] | 900 | 1,400 | 2,200 |
| Domestic water (gallons) | 12,100,000 | 13,300,000 | 19,000,000 |
| Steam[d] | within existing capacity | within existing capacity | within existing capacity |
| Radiological air emissions (curies)[e] | $8.4\times10^{-5}$ | $1.3\times10^{-4}$ | $2.1\times10^{-4}$ |
| Total SRPPF workers (persons)[f] | 1,590 | 1,775 | 2,660 |
| Security workforce | 240 | 240 | 290 |
| Radiation workers (persons)[g] | 1,190 | 1,330 | 1,995 |
| Average radiation worker dose (millirem) | 150 | 150 | 150 |
| Maximum radiation worker dose (millirem) | 500 | 500 | 500 |
| **Wastes** | | | |
| TRU waste (cubic yards) | 600 | 880 | 1,000 |
| LLW solid (cubic yards) | 2,200 | 2,840 | 3,460 |
| LLW liquid (gallons)[h] | 600,000 | 740,000 | 1,154,000 |
| MLLW (cubic yards) | 10 | 15 | 20 |
| Hazardous (cubic yards) | 20 | 27 | 43 |

LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; TRU = transuranic.
a. Based on 24 hours per day, 365 days per year.
b. Based on diesel generator testing one hour per week.
c. Nitrogen and argon; annual consumption is based on one percent makeup.
d. Facility heating (comfort and process) could be electrical or steam. If steam is used, the existing steam infrastructure in F Area would be extended to the SRPPF. No new land disturbance would be required to extend the infrastructure. Steam would be supplied by the existing 684-G Biomass Cogeneration Facility, which currently produces approximately 85,000 pounds of steam per hour and has adequate capacity to supply steam to the SRPPF.
e. See Chapter 4, Tables 4-7 and 4-8, of the EIS for a breakdown of the radionuclides.
f. Does not include security personnel.
g. Radiation workers are a subset of the "Total SRPPF workers" presented above.
h. The estimated volume of liquid LLW increased from the values presented in the Draft EIS to account for larger estimates that could result from laboratory wastes from Analytical Chemistry and Material Characterization.
Source: SRNS 2020, 2020a

[9] This EIS also includes an analysis of producing up to 125 pits per year at SRS (Section S.1.4) to be consistent with the value used in the Complex Transformation SPEIS (NNSA 2008a).

current design and operational expectations. Operation of the SRPPF would generate radiological emissions and wastes and would result in radiological doses to workers. Existing waste management facilities at SRS would be used to support SRPPF operations. These facilities are described and discussed in Chapter 3, Section 3.9, of this EIS.

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.

#### S.2.1.3 Transportation Activities Associated with Pit Production at the SRPPF

Pit production at the SRPPF would require transportation activities as described in this section. Plutonium pit assemblies would be shipped from Pantex to the SRPPF and would be used as material feedstock. As necessary, enriched uranium parts would be disassembled from the pit assemblies, converted to oxide, and shipped to Y-12. Y-12 would provide new enriched uranium parts to the SRPPF, as required. During startup, and potentially at other infrequent times, additional plutonium metal could be used in the pit production process. This additional plutonium could be shipped to the SRPPF from other locations, such as LANL and/or Pantex.

Both TRU waste and low-level radioactive waste (LLW) would be generated at the SRPPF. TRU waste would be disposed of at the WIPP facility near Carlsbad, New Mexico. SRS has existing LLW disposal facilities (as discussed in Section 3.9 of this EIS) that would typically be used for LLW disposal; however, LLW could also be disposed of at the Nevada National Security Site (NNSS) northwest of Las Vegas, Nevada, or a commercial facility (e.g., Waste Control Specialists near Andrews, Texas, or Energy*Solutions* near Clive, Utah). Mixed low-level radioactive waste (MLLW) (LLW that contains hazardous waste) could be disposed of at either NNSS or one of the aforementioned commercial facilities. Table S-3 provides a matrix depicting the origins, destinations, and materials shipped.

#### S.2.1.4 Analyses of Operational Variations and Design Optimizations

Because there could be variations in the Proposed Action, this EIS also includes analyses of operational variations and design optimizations. The Draft EIS referred to the first three of these as sensitivity analyses. Operational variations are defined as potential changes to internal processes of the SRPPF that are analyzed to provide flexibility in the NEPA coverage to address uncertainties in this early stage of review. Design optimizations are options that are being considered early in the design process that have the potential to affect construction of the SRPPF complex and the internal facility layout.

**Table S-3—Shipments that Support Pit Production at SRS**

| Shipment Type | Origin ⇒ Destination |
|---|---|
| Existing pits | Pantex ⇒ SRS |
| Plutonium | LANL and/or Pantex ⇒ SRS |
| Enriched uranium | Y-12 ⇒ SRS<br>SRS ⇒ Y-12 |
| Quality assurance sample | SRS ⇒ LANL or another DOE site[a] |
| Beryllium | LANL or commercial manufacturer ⇒ SRS |
| Nonnuclear parts | KCNSC ⇒ SRS |
| New or recertified pits | SRS ⇒ Pantex |
| TRU waste | SRS ⇒ WIPP |
| LLW | Onsite disposal at SRS, or SRS ⇒ commercial facility, or SRS ⇒ NNSS (classified LLW) |
| MLLW | SRS ⇒ commercial facility, or SRS ⇒ NNSS (classified MLLW) |

KCNSC = Kansas City National Security Campus; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed LLW; NNSS = Nevada National Security Site; SRPPF = Savannah River Plutonium Processing Facility; SRS = Savannah River Site; TRU = transuranic; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

a. Some quality assurance samples could also be returned to SRS.

## Operational Variations

**Production of 125 Pits per Year (Operational Variation #1).** The exact size and composition of the enduring nuclear weapons stockpile is determined on an annual basis. Therefore, the annual requirement for pits could change over time. The annual pit requirement could be achieved through a combination of new pit production and pit reuse. If national security requirements ever demand, pit production capacity increases could be supported using multiple shifts and/or expansion into available space within the SRPPF. In order to analyze the potential environmental impacts from producing up to 125 pits per year at SRS, this EIS analyzes expansion into available space with multiple-shift production. Although no additional facilities would be required to support production of up to 125 pits per year, additional equipment (e.g., pyrochemical furnaces, lathes, and heat treat equipment) would need to be installed in available space within the SRPPF. The higher value of 125 pits per year was chosen to be consistent with the value used in the previous analysis contained in the Complex Transformation SPEIS (available online: https://www.energy.gov/nepa/downloads/eis-0236-s4-final-supplemental-programmatic-environmental-impact-statement).

**Wrought Production Process (Operational Variation #2).** 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. Because the wrought process could be used in the SRPPF, this EIS includes an analysis of that process. That analysis, which is included in Chapter 4 of this EIS, identifies and characterizes any notable changes in the potential environmental impacts between the casting (see Chapter 2, Section 2.1.2.3 of the EIS) and wrought processes.

## Design Optimizations

Because the CD-1 approval process would not be completed until after publication of this Final EIS, the optimization options may not be approved and thus, have not been integrated into the SRPPF baseline. Consequently, for purposes of describing the Proposed Action in this EIS, the SRPPF baseline information presented in S.2.1.1 through S.2.1.3, remains valid and forms the basis for the environmental impact analyses in Chapter 4 of this EIS. However, Chapter 4 also addresses the potential changes in environmental impacts that could occur if the design optimization options discussed below were implemented. The three design optimization options include: (1) retain the existing administration building, (2) use a sand filter system, and (3) implement changes to gloveboxes and the aqueous recovery process.

**Option to Retain Existing Administration Building (Design Optimization #1).**[10] This EIS analyzes an option in which the existing administration building could be retained. If the existing administration building were retained, it would be located within an expanded PIDAS. Such a situation would require administrative personnel to work within the Protected Area, which could be costly and inefficient. Consequently, NNSA would likely still build the new administration building outside of the Protected Area, as identified under the Proposed Action. Figure S-4 depicts the larger PIDAS layout for this option.

Notable differences in this PIDAS layout versus the proposed layout discussed in Section S.2.1.1 (and shown in Figure S-3) would be as follows:

- The existing culvert north of the existing administration building would be partially 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, the land was previously disturbed when the utility corridor was constructed.

- The PIDAS would be approximately 320 feet longer than the PIDAS described in Section S.2.1.1. This would increase the size of the Protected Area by approximately 30 percent.

- The new administration building (labeled “706-5F” on Figure S-3) would still be constructed to provide office and administrative capacity outside of the Protected Area. Not demolishing the existing administration building would reduce the key construction parameters and wastes presented in Table S-1; however, those reductions would be offset by the additional construction associated with the culvert fill, earthen retaining wall, and PIDAS expansion. Consequently, NNSA 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

[10] The Draft EIS referred to this option as “Sensitivity Analysis #3.” This Final EIS refers to it as “Design Optimization #1” to more accurately characterize it as an option that has evolved during the SRPPF design process.

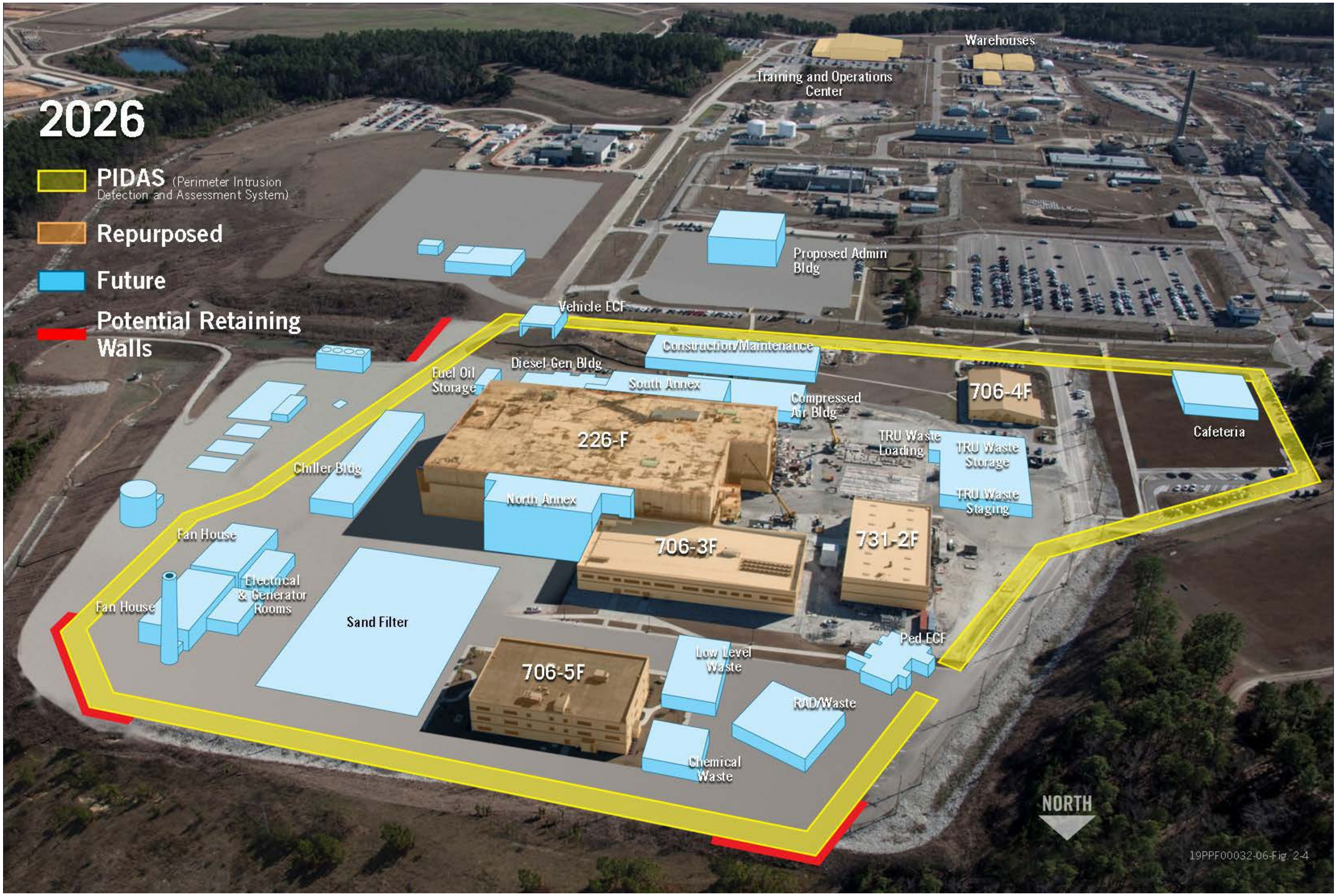


**Figure S-4—Notional PIDAS Configuration for Option of Retaining Existing Administration Building (Source: SRNS 2020a)**

cubic yards per year. This reduction is associated with not demolishing the existing administration building.

- Figure S-4 also includes a potential sand filter and associated fan house, electrical, and generator facilities. These features could be included within the Protected Area for this layout; however, they are discussed further in Design Optimization #2 below.

**Option to Use Sand Filter (Design Optimization #2).** This section discusses the option to use a sand filter system for SRPPF ventilation/filtration/ exhaust. Such a system would be similar to other sand filters used at SRS for processing and material storage facilities and would consist of deep (several feet thick) beds of rock, gravel, and sand, constructed in layers, with the smallest granule size at the top. The sand filter system would be located within the PIDAS (see Figure S-4). Consequently, the sand filter system would require an area of approximately 260 feet by 360 feet in length and width, with a depth of approximately 35 feet.

If the sand filter option is used for the SRPPF, a total of three retaining walls would be constructed. All three walls would be outside the PIDAS. The first wall would be at the northeast corner of the PIDAS and would be about 455 feet long. The second wall would be at the northwest corner of the PIDAS and would be about 239 feet long. The third wall would be along the east service road and would be about 121 feet long. The total length of the walls would be 815 feet (see Figure S-4). Soils excavated from the construction of the sand filter would be stockpiled until an evaluation of their stability and suitability for other purposes is completed. If suitable, some of the soils would be placed as backfill around the perimeter of the sand filter. The topography of the area would be graded and contoured to facilitate surface water drainage (SRNS 2020b).

Because airflow direction through the sand filter system would be upward, exhaust from Building 226-F would be routed through a safety-class, seismically-qualified annex (on top and adjacent to Building 226-F, as shown in Figure S-4) into an underground tunnel with a cross section of approximately 23 feet by 23 feet. The underground tunnel would connect to the sand filter. An additional duct or tunnel would take the discharge of the sand filter to a fan house (also containing diesel generators and electrical switchgear) and then release the air to a single stack, as shown in Figure S-5. The fan house would be a steel reinforced concrete structure. The rock, gravel, and sand layers would be positioned and sized for structural strength, cleaning ability, dirt-holding capacity, and long life. The sand filter would replace the final set of high-efficiency particulate air (HEPA) filters in the SRPPF prior to release to the atmosphere. The sand filter would not replace the HEPA filters on Zone 1 areas (inlets and outlets of gloveboxes containing plutonium).

Figure S-6 shows the cross section of a typical sand filter. Ideally, the layers of larger granules, through which the ventilated air passes first, remove most of the larger particles and particulate mass, and the layers of finer sands provide high-efficiency removal. Below the fixed bed of sand and gravel is a course of hollow tile that forms the air distribution passages. The filter would be enclosed in a concrete-reinforced, seismically qualified structure.

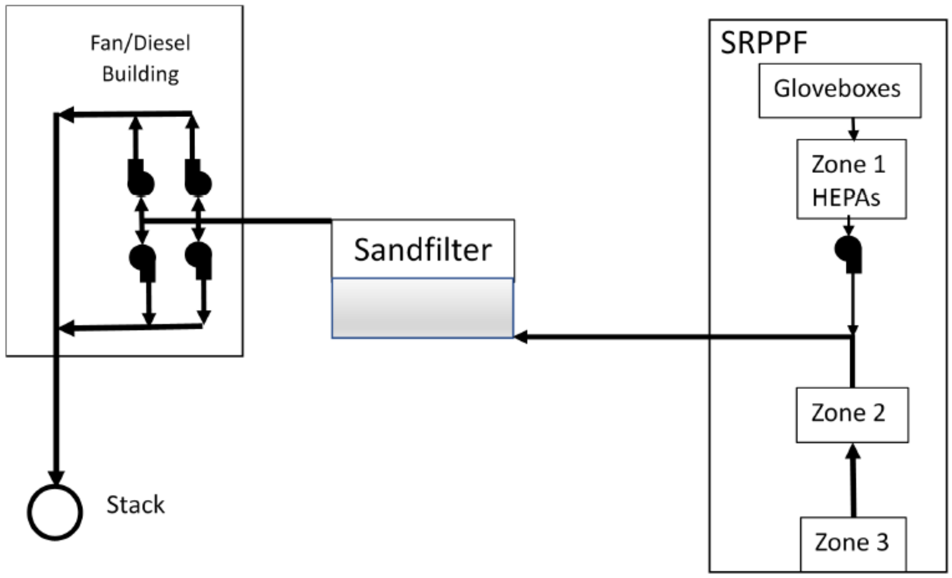


**Figure S-5—Ventilation Flow in Sand Filter System (Source: SRNS 2020b)**

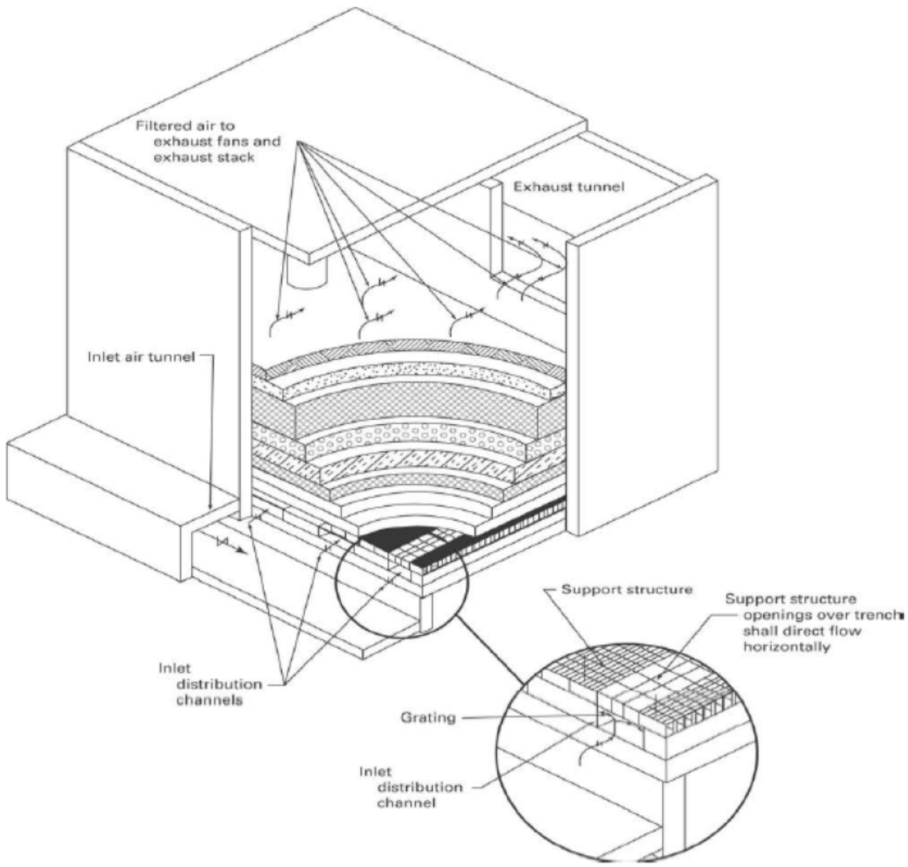


**Figure S-6—Sand Filter Cross Section (Source: SRNS 2020b)**

The sand filter would provide greater simplicity in design, operation, and maintenance than the HEPA filter system and would last throughout the life of the SRPPF with minimal maintenance. Radiation levels near the sand filter boundary would be undetectable compared to background levels. At the project's end of life, the sand filter would likely be left in place for in situ decommissioning (i.e., grouting in place) (SRNS 2020b).

The sand filter would enable NNSA to eliminate two-thirds of the exhaust fans and HEPA filters in Building 226-F, which would free up space in the facility. Use of a sand filter would result in an insignificant reduction in filtration efficiency (sand filter is 99.89 percent effective for 0.3-micron particulates versus HEPA efficiency of 99.99 percent for 0.3-micron particulates). Because HEPA filters require a safety class fire protection system and cease to filter once they become wet, the sand filter system would be more reliable and provide an improvement in safety related to some accident scenarios. Additionally, the sand filter system would reduce the need for periodic replacement of HEPA filters and associated wastes. Five sand filters are currently in use at SRS, in F-Canyon, H-Canyon, the Defense Waste Processing Facility, Building 235-F, and at Savannah River National Laboratory (SRNS 2020b). Table S-4 presents changes to key construction parameters associated with the sand filter system.

**Table S-4—Key Construction Parameters for Sand Filter System**

| Parameter | Value |
|---|---|
| **Resources** | |
| Additional land disturbance on previously disturbed land (acres) | 2.9 |
| Additional land disturbance on previously undisturbed land (acres) | 0 |
| Excavated soil during construction (cubic yards) | 3,435,000 |
| Additional water use during construction (gallons/year) | 120,000 |

Source: SRNS 2020a

**Option to Change Gloveboxes and Aqueous Recovery Process (Design Optimization #3).** As listed below, NNSA has identified several changes in the SRPPF design that would reduce the number of gloveboxes in the SRPPF and modify the aqueous recovery process while not adversely affecting facility operational throughput, including (SRNS 2020a):

- Installing two furnaces per glovebox in the pyrochemical processing, heat treatment, and casting process steps;
- Reducing the number of waste staging gloveboxes;
- Combining the cleaning and density operations into single gloveboxes;
- Combining furnace gloveboxes in foundry and machining operations;
- Reducing the nitrate recovery to a single line; and
- Eliminating the chloride recovery line.

These design changes would free up space in the facility, reduce required quantities of nitric acid in the SRPPF at any one time, and eliminate the use of hydrochloric acid in the SRPPF. Chapter 4 of this Final EIS discusses the potential environmental effects of this optimization option.

### S.2.2 No-Action Alternative

Under the No-Action Alternative, NNSA would not proceed with the SRPPF, which might limit the ability to maintain, long-term, the nuclear deterrent that is a cornerstone of U.S. national security policy. Under the No-Action Alternative, the existing MFFF would remain unused and NNSA would utilize the capabilities at LANL to meet the Nation's long-term needs for pit manufacturing. DOE has re-evaluated the impacts of the pit production capacity at LANL in the Complex Transformation SPEIS and 2019 SPEIS SA (NNSA 2008a, 2019a) and the LANL SWEIS and 2020 Final LANL SA (NNSA 2008b, 2020).

### S.2.3 Alternatives Considered but Eliminated From Detailed Study

In preparing this EIS, NNSA considered other alternatives, but eliminated those alternatives from detailed study based on the reasons stated below.

#### S.2.3.1 Utilize Other Savannah River Site Facilities

The canyon facilities in F Area and H Area at SRS were designed to recover plutonium (F-Canyon) and uranium (H-Canyon) from reactor fuel. Only the New Special Recovery Facility in F-Canyon is set up to purify plutonium material from recycled pits. Because F-Canyon is in a cold standby status after de-inventory and partial decommissioning in the early 2000s, extensive modifications, with significant costs, would be required to generate an adequate capacity for the length of the pit production mission. As a result, NNSA determined that the canyon facilities are not reasonable alternatives for supporting the pit production mission.

#### S.2.3.2 Construct a New Greenfield Pit Production Facility at SRS

NNSA considered the alternative of building a new Greenfield pit production facility at SRS. The mean acquisition cost of such a new facility was determined to be approximately $1.8 billion more than the cost of repurposing the MFFF (NNSA 2017, Figure 6-2). Additionally, a new facility would introduce significant schedule risk compared to repurposing the MFFF. The operational date for a new facility was projected to be 2034 (NNSA 2017, Figure 7-1). Consequently, this alternative was eliminated from detailed analysis.

#### S.2.3.3 Redesign of Weapons to Require Less or No Plutonium

The pits in the enduring nuclear weapons stockpile were designed and built with plutonium in an era when underground nuclear testing was being conducted to verify these designs. Replacing these pits with new pits that would use little or no plutonium (i.e., using highly enriched uranium instead of plutonium) for the sole reason of not building a long-term, assured pit production facility would not be feasible. Underground nuclear testing would likely be required to verify performance of any new designs that use uranium instead of plutonium. In addition, these new pits would require costly changes in the weapon delivery systems. Finally, the *Atomic Energy Defense Act* also requires plutonium pits, so this alternative would not support the purpose and need for agency action (50 U.S.C. § 2538a). Consequently, this alternative is considered unreasonable.

#### S.2.3.4 Only Reuse Existing Pits

NNSA currently stages plutonium pits at Pantex. Like the pits in the active stockpile, those pits are aging and would not mitigate plutonium aging risks or enable NNSA to implement enhanced safety features to pits to meet NNSA and DoD requirements. As identified earlier in Sections S.1.2.1 and S.2.1, this SRS Pit Production EIS analyzes judicious reuse of pits from the existing stockpile, however, the *Atomic Energy Defense Act* requires the production of new pits, so this alternative would not support the purpose and need for agency action (50 U.S.C. § 2538a). Consequently, an alternative that relies only on reused pits was eliminated from detailed analysis.

#### S.2.3.5 Locate the Pit Production Mission at Other DOE/NNSA Sites

The Complex Transformation SPEIS evaluated all reasonable sites for the pit production mission and explained why other sites were eliminated from detailed analysis (NNSA 2008a, Sec. 3.15). In the 2019 SPEIS SA, NNSA considered whether any new sites should be evaluated for the pit production mission and explained the reasons why additional DOE/NNSA sites were not added (NNSA 2019a, Sec. 2.3.7). NNSA is not revisiting that programmatic decision in this tiered EIS. Consequently, sites other than SRS were eliminated from detailed analysis.

### S.2.4 Preferred Alternative

The CEQ regulations require an agency to identify its preferred alternative to fulfill its statutory mission (40 CFR 1502.14[e]). For this SRS Pit Production EIS, the Proposed Action of repurposing the MFFF into the SRPPF is the preferred alternative based on national policy and considerations of environmental, economic, technical, and other factors.

## S.3 Environmental Impacts

To aid the reader in understanding the differences between the Proposed Action and No-Action Alternative, this section presents a summary comparison of the associated potential environmental impacts. For direct and indirect impacts, Table S-5 summarizes the environmental impacts presented in Chapter 4 of this EIS. For cumulative impacts, Table S-6 summarizes the environmental impacts presented in Chapter 5 of this EIS.

**Table S-5—Summary Comparison of Direct and Indirect Environmental Impacts**

| Proposed Action | No-Action Alternative |
|---|---|
| **Land Use** | |
| Construction activities would involve approximately 48 acres and occur on previously disturbed land. Once construction is complete, the area inside the PIDAS (about 25 acres) would be restricted to authorized personnel. Construction and operation of the SRPPF complex would be consistent with current industrial land use within F Area. | The MFFF would remain unused. Current and planned activities at SRS would continue as required to support various missions. Land use at SRS would continue to reflect a mix of forest/undeveloped, water/wetlands, and developed facilities. |
| **Visual Resources** | |
| Construction activities would result in temporary changes to the visual appearance of F Area due to | SRS visual appearance would not change. Facilities are scattered throughout SRS and are |

| Proposed Action | No-Action Alternative |
|---|---|
| the presence of cranes, construction equipment, demolition, new buildings in various stages of construction, and possibly increased dust. Because the SRPPF complex is in the interior of the SRS, construction activities and the operational facilities would not be noticeable at or beyond the SRS boundary (approximately six miles away). | generally not visible off site, as views are limited by rolling terrain and heavy vegetation. Visual resource conditions reflect an industrialized area. |
| **Geology and Soils** | |
| Minimal impacts on geologic and soil resources due to no new land disturbance. There are no faults located within SRS that intersect the ground surface and therefore ground displacement near the SRPPF complex is highly unlikely. Potential accident impacts associated with earthquakes are discussed under "Facility Accidents" in this table. | Current and planned activities at SRS would continue as required to support various missions. There would be no additional impacts to geology and soil resources beyond current and planned activities. |
| **Water Resources** | |
| There would be minimal impacts on surface water and groundwater resources. Nonhazardous facility wastewater, stormwater runoff, and other industrial waste streams would be managed and disposed of in compliance with the National Pollutant Discharge Elimination System permit limits and requirements. There would be no direct release of contaminated effluents to groundwater or surface waters. During construction and operations, groundwater use would be approximately 2.2 percent and 1.7 percent, respectively, of the total current water use at SRS. | Current and planned activities at SRS would continue as required to support various missions. Impacts to water resources from SRS operations would remain at current levels. DOE will continue to operate facilities in accordance with permit requirements and continue remediation efforts to improve water quality. |
| **Air Quality** | |
| Fugitive dust would be generated during clearing, grading, and other earth-moving operations. Construction and operational emissions would not contribute to an exceedance of an ambient air quality standard at the SRS site boundaries. Total radionuclide emissions at SRS would increase by less than one percent. Greenhouse gas emissions would be approximately 0.00045 percent of the total U.S. greenhouse gas emissions. | Current and planned activities at SRS would continue as required to support various missions. There would be no incremental impacts to air quality and noise beyond current levels and the SRS would remain below the applicable NAAQS. |
| **Noise** | |
| Noise levels in construction areas could be as high as 110 A-weighted decibels, but would not be noticeable at the site boundary (approximately six miles away). Operational noises would be similar to other operations in F Area. | Current and planned activities at SRS would continue as required to support various missions. Most industrial facilities at SRS are far enough from the site boundary that noise levels at the boundary from these sources would not be measurable or would be barely distinguishable from background levels. |
| **Ecological Resources** | |
| There are no notable ecological resources (including threatened or endangered and protected species) or wetlands on or surrounding the proposed SRPPF | Current and planned activities at SRS would continue as required to support various missions. |

| Proposed Action | No-Action Alternative |
|---|---|
| complex. No notable impacts are expected during either construction or operations. | There would be no incremental impacts to ecological resources beyond current levels. |
| **Cultural Resources** | |
| Construction and operational activities are not expected to impact cultural and paleontological resources; such activities would occur in areas previously surveyed during MFFF construction, and no fossil-bearing strata are known within F Area. | Current and planned activities at SRS would continue as required to support various missions. There would be no additional impacts to cultural resources. |
| **Infrastructure** | |
| Minimal impacts are anticipated, as SRS has adequate capacity to meet demand requirements for electricity, water use, steam, fuels, and sanitary wastewater. | Current and planned activities at SRS would continue as required to support various missions. The SRS infrastructure capacity is adequate to support current activities. |
| **Socioeconomics** | |
| Approximately 1,800 workers would be directly employed during the peak year of construction. Another 1,134 indirect jobs are expected to be generated in the region of influence. The peak construction employment (direct and indirect) is estimated to represent approximately 1.2 percent of the projected region of influence labor force and is not expected to impact community resources. The value added from the direct economic activity to the local economy would be approximately $178 million, or about 0.6 percent of the projected personal income in the region of influence.<br><br>Once operational, additional direct employment is estimated to be 1,830 jobs (for 50 pits per year) and 2,015 jobs (for 80 pits per year). Another 2,178 (for 50 pits per year) and 2,398 (for 80 pits per year) indirect jobs are expected to be generated. The total additional employment (direct and indirect workers) is estimated to represent approximately 1.5 percent (for 50 pits per year) and 1.7 percent (for 80 pits per year) of the projected region of influence labor force in 2030. The value added from the direct economic activity to the local economy would be approximately $273 million (for 50 pits per year) and $300 million (for 80 pits per year), or approximately 0.8 percent of the projected personal income in the region of influence in 2030. | Current and planned activities at SRS would continue as required to support various missions. There would be no additional impacts to socioeconomic resources beyond current activities. There would be no major changes in the workforce at SRS. |
| **Environmental Justice** | |
| No disproportionately high and adverse impacts on minority or low-income populations are expected; to the extent that any impacts may be high and adverse, NNSA expects the impacts to affect all populations in the area equally. | Current and planned activities at SRS would continue as required to support various missions. There would be no disproportionately high and adverse impacts on minority or low-income populations. |

| Proposed Action | No-Action Alternative |
|---|---|
| **Waste Management** | |
| Minimal wastes would be generated during construction. Operations would generate the following additional volumes of waste beyond that currently generated at SRS:<br><br>TRU waste (yd$^3$/year): 600–880<br>LLW solid (yd$^3$/year): 2,200–2,840<br>LLW liquid (gallons per year): 600,000–740,000<br>MLLW (yd$^3$/year): 10–15<br>Hazardous (yd$^3$/year): 20–27<br><br>All wastes generated could be managed by existing and planned waste management facilities. | Current and planned activities at SRS would continue. There would be no incremental impacts to waste generation beyond current levels. Current waste generation rates are as listed:<br><br>TRU waste (yd$^3$/year): 460<br>LLW solid (yd$^3$/year): 13,100<br>LLW liquid (gallons per year): 20,000,000<br>MLLW (yd$^3$/year): 520<br>Hazardous (yd$^3$/year): 76<br>All wastes generated are managed by existing and planned waste management facilities. |
| **Human Health** | |
| **Occupational injuries:**<br>During construction, 73 days of lost work from illness/injury and less than one fatality would be expected.<br><br>During operations, NNSA estimates 15 to 17 days per year of lost work from illness/injury and less than one fatality for the duration of the Proposed Action. | Current and planned activities at SRS would continue as required to support various missions. There would be no incremental impacts to human health beyond current levels. Current radiological impacts from SRS are as listed below. |

**Incremental Radiological Impacts:** (Proposed Action)

| Receptor/Dose/Risk | 50 to 80 Pits Per Year |
|---|---|
| **Public** | |
| Collective dose to 50-mile population (person-rem) | $3.3\times10^{-5}$–$5.2\times10^{-5}$ |
| Population LCFs | 0 ($1.9\times10^{-8}$–$3.1\times10^{-8}$) |
| Offsite MEI dose (millirem) | $5.0\times10^{-7}$–$8.0\times10^{-7}$ |
| MEI LCF risk | 0 ($3.0\times10^{-13}$–$4.8\times10^{-13}$) |
| **Workers** | |
| Average dose to radiological worker (millirem/year) | 150 |
| Radiological worker LCF risk | 0 ($9.0\times10^{-5}$) |
| Collective dose to radiological workers (person-rem/year) | 178–200 |
| Total radiological worker LCFs | 0 (0.11–0.12) |

LCF = latent cancer fatality

**Current Radiological Impacts:** (No-Action Alternative)

| Receptor/Dose/Risk | 2013–2017 Average |
|---|---|
| **Public** | |
| Collective dose to 50-mile population (person-rem) | 4.3 |
| Population LCFs | 0 (0.0026) |
| Offsite MEI dose (millirem) | 0.20 |
| MEI LCF risk | 0 ($1.2\times10^{-4}$) |
| **Workers** | |
| Average dose to radiological worker (millirem/year) | 50 |
| Radiological worker LCF risk | 0 ($3.0\times10^{-5}$) |
| Collective dose to radiological workers (person-rem/year) | 112 |
| Total radiological worker LCFs | 0 (0.07) |

| Proposed Action | No-Action Alternative |
|---|---|

## Facility Accidents

**Proposed Action**

**Consequences:**

| Accident | MEI | | Offsite Population | |
|---|---|---|---|---|
| | Dose (rem) | LCFs | Dose (Person-rem) | LCFs |
| Extremely unlikely earthquake with subsequent fire | 0.8 | 0 (0.00048) | 3,610 | 2.2 |
| Fire in a single fire zone | 0.41 | 0 (0.00024) | 1,800 | 1.1 |
| Explosion in a furnace | 1.8 | 0 (0.0011) | 8,120 | 4.9 |
| Nuclear criticality | $3.4\times10^{-6}$ | 0 ($2.0\times10^{-9}$) | 0.0064 | 0 ($3.8\times10^{-6}$) |
| Radioactive material spill | 0.0037 | 0 ($2.2\times10^{-6}$) | 16.2 | 0 (0.0097) |

**Risks:**

| Accident | Maximally Exposed Individual (LCF Risk) | Offsite Population (LCF Risk) |
|---|---|---|
| Extremely unlikely earthquake with subsequent fire | 0 ($4.8\times10^{-8}$) | 0 ($2.2\times10^{-4}$) |
| Fire in a single fire zone | 0 ($2.4\times10^{-8}$) | 0 ($1.1\times10^{-4}$) |
| Explosion in a furnace | 0 ($1.1\times10^{-5}$) | 0 ($4.9\times10^{-2}$) |
| Nuclear criticality | 0 ($2.0\times10^{-11}$) | 0 ($3.8\times10^{-8}$) |
| Radioactive material spill | 0 ($2.2\times10^{-8}$) | 0 ($9.7\times10^{-5}$) |

**No-Action Alternative**

Current and planned activities at SRS would continue as required to support various missions. There would be no incremental impacts from accidents beyond current levels.

## Intentional Destructive Acts

**Proposed Action**

The Complex Transformation SPEIS, which includes a classified appendix that analyzes the potential impacts of intentional destructive acts (e.g., sabotage, terrorism), concluded that, "Depending on the malevolent, terrorist, or intentional destructive acts, impacts would be similar to, or exceed, accident impacts analyzed in the SPEIS" (NNSA 2008b). NNSA reviewed that classified appendix and concluded that the classified appendix analysis is reasonable and adequate to represent the Proposed Action in this EIS and does not need to be revised (NNSA 2019b).

**No-Action Alternative**

Current and planned activities at SRS would continue as required to support various missions. There would be no change in potential impacts from intentional destructive acts beyond current levels.

| Proposed Action | No-Action Alternative |
|---|---|
| **Transportation** | |
| For 50 pits per year, there would be approximately 145 shipments of radiological materials and wastes annually.<br><br>Total population dose: 6.68 person-rem/year<br>Population LCF risk: 0 (0.00335)<br>Worker dose: 11.61 person-rem/year<br>Worker LCF risk: 0 (0.00741)<br>Accident risks (rad): 0 ($3\times10^{-7}$) LCF/year<br>Accident risks (nonrad): 0.03 fatality/ year | Current and planned activities at SRS would continue as required to support various missions. There would be no incremental impacts to transportation beyond current levels. |

**Table S-6—Summary Comparison of Cumulative Environmental Impacts**

| Resource Area | Discussion |
|---|---|
| **Resources Areas Eliminated from Detailed Cumulative Impact Analysis** | |
| Land Use | Proposed Action would not involve any new land disturbance activities and would not affect current land use. Therefore, there would be no notable cumulative impacts. |
| Visual Resources | Proposed Action would require removal of existing facilities, construction of new facilities, modification of existing facilities, and construction of the PIDAS. These activities would result in temporary visual appearances at F Area and are in the interior of the SRS. Any visual impacts would not be noticeable beyond the SRS boundary. Therefore, there would be no notable cumulative impacts. |
| Geology and Soils | Proposed Action would not involve any new land disturbance activities and would not impact geological and soils resources. There would be no changes to existing facilities that would affect their ability to withstand a design basis seismic event. Therefore, there would be no notable cumulative impacts. |
| Water Resource (surface water and groundwater quality) | Proposed Action would not produce effluents that could affect surface water or groundwater quality. SRS has permits, plans, and procedures in place that would minimize any impacts. Therefore, there would be no notable cumulative impacts. |
| Air Quality | The emissions from construction activities are expected to be minimal and temporary. During operations, the estimated ambient air pollutant concentrations would be well below the applicable NAAQS and significant levels for all criteria pollutants. The total radionuclide emissions at SRS would increase less than one percent. Therefore, there would be no notable cumulative impacts. |
| Noise | Any noise levels associated with the Proposed Action would not reach far beyond the boundaries of SRS. DOE has implemented appropriate hearing protection programs to minimize noise impacts to workers. Therefore, there would be no notable cumulative impacts. |
| Ecological Resources | Proposed Action would not involve any new land disturbance activities and would not affect ecological resources. Therefore, there would be no notable cumulative impacts. |

| Resource Area | Discussion |
|---|---|
| Cultural and Paleontological Resources | Proposed Action would not involve any new land disturbance activities and would not affect cultural and Paleontological resources. Therefore, there would be no notable cumulative impacts. |
| **Resources Areas Included in Detailed Cumulative Impact Analysis** | |
| Global Climate Change | Emissions of greenhouse gases (carbon dioxide equivalents) in 2018 at SRS were estimated to be 0.559 million metric tons per year, which is less than 0.009 percent of the total U.S. emissions of 6.457 billion metric tons of carbon dioxide equivalent per year (EPA 2019, p. ES-4). Under the Proposed Action, the estimated total combined greenhouse gas emissions would be approximately 0.00044 percent of the total U.S. greenhouse gas emissions (6.457 billion metric tons of carbon dioxide equivalent in 2017). Therefore, the potential cumulative impacts to global climate change from the Proposed Action would be negligible. |
| Infrastructure | The cumulative electricity power consumption would be approximately 1,001,520 megawatt-hours, which is well within the total sitewide capacity of 4,400,000 megawatt-hours. The cumulative water usage consumption would be from approximately 459,100,000 to 469,000,000 gallons per year, which is well within the sitewide capacity of 2,950,000,000 gallons per year. |
| Socioeconomics | Cumulative employment at SRS from past, present, and reasonably foreseeable future actions could reach a peak of about 17,290 persons. By comparison, it is estimated that the projected labor force in the region of influence would be 252,188 workers in the peak year of construction and 264,146 workers when operations commence in 2030. In addition to the direct jobs, an estimated 2,178 to 2,398 indirect jobs could be created. Due to the low potential for in-migration and changes to the population in the region of influence, cumulative impacts on the availability of housing and community services are expected to be small. |
| Environmental Justice | Based on the analysis of impacts for the resource areas in this EIS, few adverse impacts from construction and operational activities at SRS are expected under the Proposed Action. To the extent that any impacts may be adverse, NNSA expects the impacts to affect all populations in the area equally and cumulative environmental justice impacts are not expected. |
| Waste Management | LLW: The Proposed Action would generate approximately 2,200 to 2,840 cubic yards of LLW generated annually, which would normally be disposed of at SRS. NNSA could also consider the use of a non-DOE commercial, licensed LLW/MLLW disposal facility. In the unlikely event that the LLW were disposed of at NNSS, this volume would represent approximately 5.7 percent of the average volume of LLW disposed of at the NNSS. The LLW generated at LANL from producing 30 pits per year (NNSA 2020) would be disposed of at the NNSS disposal site as well. At the production rate of 30 pits per year, approximately 885 cubic yards of LLW would be generated annually at LANL. The combined LLW generated from pit production at both SRS and LANL would be approximately 3,085 cubic yards, which would represent approximately 8 percent of the average annual volume of LLW disposed of at the NNSS. If needed, the available capacity at the NNSS would be adequate to accommodate this quantity of waste. |

| Resource Area | Discussion |
|---|---|
| | TRU Waste: Under the Proposed Action, significant quantities of TRU waste could be generated at SRS and shipped to WIPP for disposal. It is estimated that approximately 22,950 cubic meters (30,000 cubic yards) of TRU waste could be generated over the life of the project (i.e., 50 years) at SRS, assuming a production rate of 50 pits per year. In addition, approximately 5,350 cubic meters (6,998 cubic yards) of TRU waste could be generated over the life of the project (i.e., 50 years) at LANL, assuming a production rate of 30 pits per year. For NEPA purposes, it is assumed that the available volume capacity of the WIPP facility would accommodate the conservatively estimated TRU waste volume from pit production that could be generated over the next 50 years.<br><br>The relatively small increase in MLLW production under the Proposed Action would not be expected to adversely impact the current approach to SRS management of MLLW. |
| Human Health | The maximum cumulative offsite population dose is estimated to be about 30.3 person-rem per year for the regional population. This population dose is not expected to result in any LCFs to the population within a 50-mile radius of SRS. The maximum dose to the public MEI at the SRS boundary is estimated to be about 0.73 millirem per year, which is below the applicable DOE regulatory limits (10 millirem per year from airborne emissions, 4 millirem per year from the liquid pathway, and 100 millirem per year from all pathways). The maximum cumulative annual SRS worker dose could total 1,031.5 to 1,053.5 person-rem (based on 50 and 80 pits per year, respectively), which could result in up to 0.6 annual LCF. These doses fall within the regulatory limits of 10 CFR Part 835. |
| Transportation | The Proposed Action construction activities would generate commuter traffic. However, this commuter traffic would be less than what was needed for MFFF construction activities that occurred between 2007 and 2018. Area roads adequately supported those ongoing activities with no adverse effects on the level of service. Therefore, the overall contribution of construction activities to cumulative transportation impacts is expected to be negligible. With respect to radiological transportation, the Proposed Action would contribute less than one LCF and less than 1 traffic fatality to cumulative transportation risk. |

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