

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

April 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

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ABBREVIATIONS AND ACRONYMS

CFR	Code of Federal Regulations
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
ECF	entry control facility
HC	hazard category
LANL	Los Alamos National Laboratory
LLW	low-level radioactive waste
MFFF	Mixed-Oxide Fuel Fabrication Facility
MLLW	mixed low-level radioactive waste
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NRC	U.S. Nuclear Regulatory Commission
PIDAS	Perimeter Intrusion Detection and Assessment System
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 national security requirements, NNSA is pursuing a two-prong 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 is also preparing a separate analysis of increasing production activities at LANL.

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.

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 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 Secretary of Energy to produce no less than 30 war reserve plutonium pits beginning during 2026 and thereafter demonstrate the capability to produce war reserve plutonium pits at a rate sufficient to produce 80 pits per year (Volume 50 of the *United States Code*, Section 2538a [50 U.S.C. § 2538a], as amended by the National Defense Authorization Act for Fiscal Year 2020

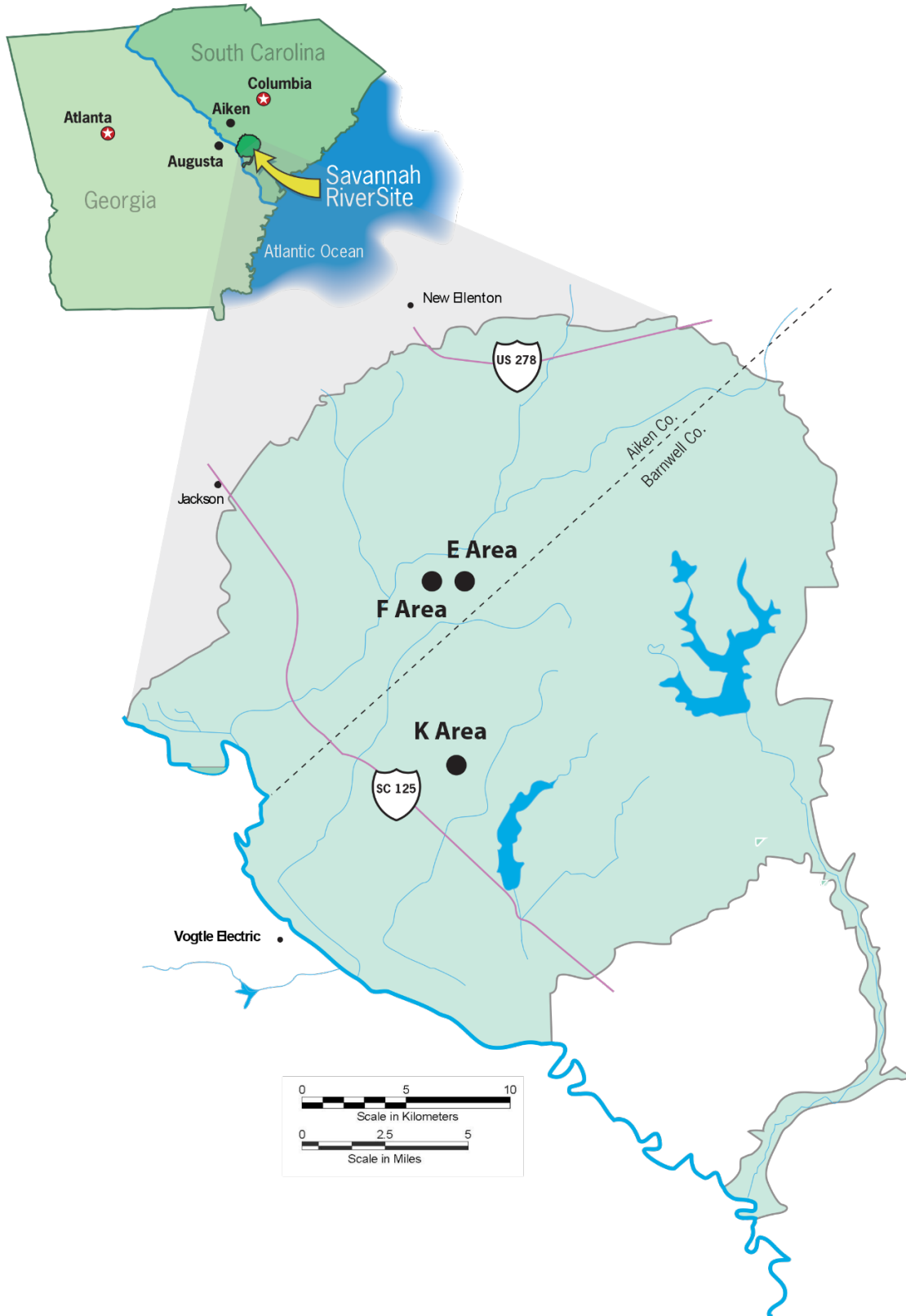


Figure S-1—Location of Savannah River Site (Source: NNSA 2019a)

[Public Law 116-92]). 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 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).

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.

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.

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 over time. 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.

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 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.

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 up to 80 pits per year, would enable NNSA to meet national security requirements if one facility became unavailable.

S.1.3 Public Participation Process

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 supporting the pit mission at SRS. NNSA considered all comments received during the scoping process for this EIS, including comments received after the close of the comment period.¹ Comments were systematically reviewed by NNSA. Where possible, comments on similar or related topics were grouped under comment issue categories as a means of summarizing the comments. The comment issue categories were used to identify specific issues. Table S-1 provides a summary of the major scoping comments received during the public scoping process. Comments were considered in preparing this Draft EIS.

¹ 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.

Table S-1—Summary of Major Scoping Comments

Scoping Comment Issue
Purpose and Need
There is no need for new pits.
Pits have credible lifetimes of at least 100 years and possibly as long as 150 years.
National Security Policies
Deployment of new weapons with new pits will violate the treaties.
Development of new pits could lead to nuclear escalation and a new arms race.
EIS Alternatives
Pit reuse should be evaluated as a reasonable alternative.
Evaluate a reasonable alternative of new warhead designs.
NEPA Process
The EIS and other plutonium pit decisions must be put on hold until such time as the Complex Transformation SPEIS ROD is amended.
The public scoping period should be extended.
General Support or Opposition
Opposition to pit production for a variety of reasons, including health and environmental risks and accidents.
Support for pit production for a variety of reasons, including an experienced nuclear workforce and historical support of defense mission.
EIS Resource Analyses
NNSA should address the health impacts of radiological materials, chemicals, and toxic air pollutants.
Need to assess the impact of waste from new pit production. EIS should include a comprehensive “cradle to grave” plan that designates how and when pit production waste will be disposed out of South Carolina.
Need to include a robust analysis about the effects of climate change on the Southeast.
Impacts of accidents must be addressed.
The risks of transporting plutonium back and forth to SRS from such sites as the Pantex Plant and LANL must be analyzed in the Draft EIS.
Cumulative tritium emissions must be addressed.

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 chapter also identifies NNSA’s preferred alternative (Section S.2.4).

S.2.1 Proposed Action—Repurpose the Mixed Oxide Fuel Fabrication Facility (MFFF) into the Savannah River Plutonium Processing Facility (SRPPF)²

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. 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.

S.2.1.1 Construction of the Savannah River Plutonium Processing Facility

In order to produce a minimum of 50 pits per year, with a surge capacity up to 80 pits per year at SRS, 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 MFFF in August 2007 and construction ceased on October 10, 2018, when DOE terminated the contract for the facility. The MFFF 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). The facility is being verified to meet all relevant DOE requirements for the pit production mission. The exterior walls and roofs have been 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,³ 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.

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 new pit production mission;

² Throughout this Summary and the 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.

³ 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).

- 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 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), would be demolished to accommodate the PIDAS.⁴
- The Construction Administration Complex (labeled “706-2F” on Figure S-2) would be used as long as possible to support SRPPF construction, but eventually would be demolished.
- The Mixed-Oxide Administration Complex (labeled “706-1F” and “706-8F” on Figure S-2) would be used to support SRPPF design and construction as long as possible, but eventually would be demolished.
- The current maintenance facility (labeled “706-7F” on Figure S-2) would be relocated northeast of the MFFF.
- Temporary trailers and support buildings east of the MFFF would be removed.

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 southeast 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) but could also include a cafeteria and auditorium. Parking would be provided adjacent to the administration building. (Note: it is possible that a cafeteria would be located within the PIDAS. However, as explained in Section 2.5, 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

⁴ This EIS also analyzes an option in which the existing administration building could be retained (see Section S.2.1.4).

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 northeast of the existing MFFF.
- A vehicle inspection facility would be constructed southeast 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 the entry control facility (ECF) for vehicles.
- Environmental storage facilities (concrete pads, each approximately several thousand square feet) would be constructed for managing wastes. Two of the environmental storage facilities would be within the PIDAS and would support transuranic (TRU) waste operations. The storage facilities would be capable of staging approximately 5,000 to 6,000, 55-gallon drums of TRU waste within the PIDAS.
- The existing Training Building (labeled “706-4F” on Figure S-2), which currently houses offices, training rooms, and computer support, would be repurposed as either a waste staging/TRU waste packaging building or a security force support facility. If used for TRU waste, the facility would be used for characterizing and certifying the TRU waste prior to packaging and short-term lag storage. If used for security, the facility would include lockers, an arms room, and offices. TRU waste staging could also be accommodated in Building 731-2F.
- 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 radiological 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.

Any 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 produce pits in 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. The PIDAS would be approximately 4,700 to 5,200 linear feet in length, and the enclosed area (i.e., Protected

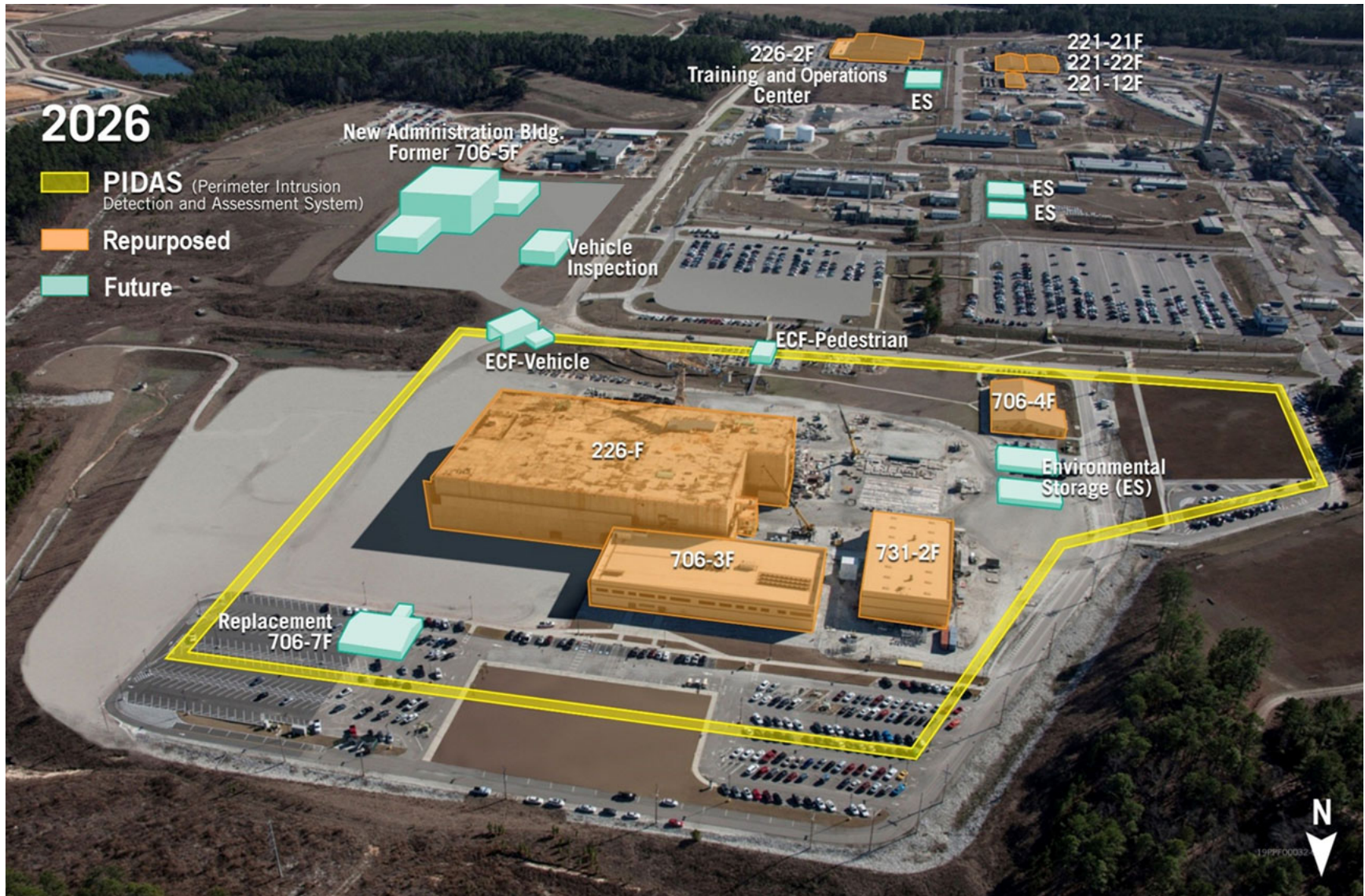


Figure S-3—Notional Layout of the SRPPF Complex (Source: SRNS 2020)

Area) would be approximately 15 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 on the south side of the PIDAS (labeled “ECF-Vehicle” and “ECF-Pedestrian, 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 located on the western portion of the PIDAS

Table S-2 lists the construction requirements for the SRPPF complex along with the associated waste values.

Table S-2—Key Construction Parameters and Wastes 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 requirements 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. 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-3 presents the key operational parameters associated with producing 50, 80, and 125 pits per year at the SRPPF.⁵ 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.

Table S-3—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)	7,200,000	7,900,000	10,800,000
Steam (million pounds) ^d	0	0	0
Radiological air emissions (curies) ^e	8.4×10 ⁻⁵	1.3×10 ⁻⁴	2.1×10 ⁻⁴
Total SRPPF workers (persons) ^f	910	1,000	1,500
Security workforce	200	220	240
Radiation workers (persons) ^g	680	750	1,125
Average radiation worker dose (millirem)	150	150	150
Maximum radiation worker dose (millirem)	500	500	500
Wastes			
TRU (cubic yards)	820	1,200	1,370
LLW solid (cubic yards)	7,800–10,500	10,500–13,100	13,100–15,700
LLW liquid (gallons)	65,000	80,000	125,000
MLLW (cubic yards)	20	30	40
Hazardous (cubic yards)	30	40	65

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. Steam would not be used in facility. Facility heating (comfort and process) would be electrical.

e. See Chapter 4, Tables 4-6 and 4-7, 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.

Source: SRNS 2020

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

⁵ This EIS also includes a sensitivity analysis of producing up to 125 pits per year at SRS (see Section S.2.1.4) to be consistent with the value used in the previous analysis in the Complex Transformation SPEIS (NNSA 2008a).

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 used as material feedstock would be shipped from Pantex to the SRPPF. 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 would be disposed of at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. SRS has existing LLW disposal facilities (as discussed in Section 3.11 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) north of Las Vegas, Nevada, or a commercial facility (e.g., Waste Control Specialists near Andrews, Texas, or EnergySolutions 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-4 provides a matrix depicting the origins, destinations, and materials shipped.

Table S-4—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 SRS ⇒ Y-12
Quality assurance sample	SRS ⇒ LANL or another DOE site
Beryllium	LANL or commercial manufacturer ⇒ SRS
Nonnuclear parts	KCNSC ⇒ SRS
New pits	SRS ⇒ Pantex
TRU waste	SRS ⇒ WIPP
LLW	Onsite disposal at SRS, or SRS ⇒ commercial facility, or SRS ⇒ NNSS (classified LLW)
MLLW	Offsite disposal 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 Pit Production Facility; SRS = Savannah River Site; TRU = transuranic; WIPP = Waste Isolation Project Plant; Y-12 = National Security Complex in Oak Ridge, Tennessee.

S.2.1.4 Sensitivity Analyses

Because there could be variations in the Proposed Action, this EIS also includes three sensitivity analyses: (1) producing up to 125 pits per year; (2) producing pits using the wrought process; and (3) retaining the existing administration building. These are described below.

Production of 125 Pits per Year (Sensitivity Analysis #1). 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 produce 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 (Sensitivity Analysis #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 a sensitivity analysis of that process. That sensitivity 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.

Option to Retain Existing Administration Building (Sensitivity Analysis #3). This EIS also analyzes an option in which the existing administration building could be retained. Figure S-4 depicts the 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 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.



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

- 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 15 percent.
- The new administration building (labeled “706-5F” on Figure S-3) would not be constructed. Not constructing the new administration building would reduce the key construction parameters and wastes presented in Table S-2; 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 cubic yards per year. This reduction is associated with not demolishing the existing administration building.

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 evaluated the impacts of the pit production capacity at LANL in the 2019 SPEIS SA (NNSA 2019a) and the 2020 LANL SA (NNSA 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. 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, and 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. 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. Consequently, only reusing 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, if one or more exists, in a Draft EIS (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	
<p>Construction activities would involve approximately 48 acres and occur on previously disturbed land. Once construction is complete, the area inside the PIDAS (about 15 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.</p>	<p>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.</p>
Visual Resources	
<p>Construction activities would result in temporary changes to the visual appearance of F Area due to 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, these activities would not be noticeable at or beyond the SRS boundary (approximately six miles away).</p>	<p>SRS visual appearance would not change. Facilities are scattered throughout SRS and are generally not visible off site, as views are limited by rolling terrain and heavy vegetation. Visual resource conditions reflect an industrialized area.</p>
Geology and Soils	
<p>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.</p>	<p>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.</p>
Water Resources	
<p>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 percent, respectively, of the total current water use at SRS.</p>	<p>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.</p>
Air Quality	
<p>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 0.00044 percent of the total U.S. greenhouse gas emissions.</p>	<p>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.</p>

Proposed Action	No-Action Alternative
Noise	
<p>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 like other operations in F Area.</p>	<p>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.</p>
Ecological Resources	
<p>There are no notable ecological resources (including threatened or endangered and protected species) or wetlands on or surrounding the proposed SRPPF complex. No notable impacts are expected.</p>	<p>Current and planned activities at SRS would continue as required to support various missions. There would be no incremental impacts to ecological resources beyond current levels.</p>
Cultural Resources	
<p>Construction and operational activities are not expected to impact cultural resources because such activities would occur in areas previously surveyed during MFFF construction.</p>	<p>Current and planned activities at SRS would continue as required to support various missions. There would be no additional impacts to cultural resources.</p>
Infrastructure	
<p>Minimal impacts are anticipated, as SRS has adequate capacity to meet demand requirements for electricity, water use, fuels, and sanitary wastewater.</p>	<p>Current and planned activities at SRS would continue as required to support various missions. The SRS infrastructure capacity is adequate to support current activities.</p>
Socioeconomics	
<p>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.</p> <p>Once operational, additional direct employment is estimated to be 1,110 jobs (for 50 pits per year) and 1,220 jobs (for 80 pits per year). Another 1,321 (for 50 pits per year) and 1,452 (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 0.9 percent (for 50 pits per year) and one 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</p>	<p>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.</p>

Proposed Action	No-Action Alternative																																												
approximately \$166 million (for 50 pits per year) and \$182 million (for 80 pits per year), or approximately 0.5 percent of the projected personal income in the region of influence in 2030.																																													
Environmental Justice																																													
Minimal “high and adverse” impacts from construction and operations 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.																																												
Waste Management																																													
Minimal wastes would be generated during construction. Operations would generate the following additional volumes of waste beyond that currently generated at SRS: TRU (yd ³ /year): 820–1,200 LLW solid (yd ³ /year): 7,800–13,100 LLW liquid (gallons per year): 65,000–80,000 MLLW (yd ³ /year): 20–30 Hazardous (yd ³ /year): 30–40 All wastes generated could be managed by existing and planned waste management facilities.	Current and planned activities at SRS would continue. Current waste generation rates are as listed: TRU (yd ³ /year): 460 LLW solid (yd ³ /year): 13,100 LLW liquid (gallons per year): 20,000,000 MLLW (yd ³ /year): 520 Hazardous (yd ³ /year): 76 All wastes generated are managed by existing and planned waste management facilities.																																												
Human Health																																													
<p>Occupational injuries: During construction, 38 days of lost work from illness/injury and less than one fatality would be expected.</p> <p>During operations, 9 to 10 days of lost work from illness/injury and less than one fatality would be expected.</p>	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.																																												
<p>Incremental Radiological Impacts:</p> <table border="1" data-bbox="203 1375 779 1858"> <thead> <tr> <th>Receptor/Dose/Risk</th> <th>50 to 80 Pits Per Year</th> </tr> </thead> <tbody> <tr> <td colspan="2">Public</td> </tr> <tr> <td>Collective dose to 50-mile population (person-rem)</td> <td>3.3×10⁻⁵–5.2×10⁻⁵</td> </tr> <tr> <td>Population LCFs</td> <td>0 (1.9×10⁻⁸–3.1×10⁻⁸)</td> </tr> <tr> <td>Offsite MEI dose (millirem)</td> <td>5.0×10⁻⁷–8.0×10⁻⁷</td> </tr> <tr> <td>MEI LCF risk</td> <td>0 (3.0×10⁻¹³–4.8×10⁻¹³)</td> </tr> <tr> <td colspan="2">Workers</td> </tr> <tr> <td>Average dose to radiological worker (millirem/year)</td> <td>150</td> </tr> <tr> <td>Radiological worker LCF risk</td> <td>0 (9.0×10⁻⁵)</td> </tr> <tr> <td>Collective dose to radiological workers (person-rem/year)</td> <td>102–112</td> </tr> <tr> <td>Total radiological worker LCFs</td> <td>0 (0.06–0.07)</td> </tr> </tbody> </table> <p>LCF = latent cancer fatality</p>	Receptor/Dose/Risk	50 to 80 Pits Per Year	Public		Collective dose to 50-mile population (person-rem)	3.3×10 ⁻⁵ –5.2×10 ⁻⁵	Population LCFs	0 (1.9×10 ⁻⁸ –3.1×10 ⁻⁸)	Offsite MEI dose (millirem)	5.0×10 ⁻⁷ –8.0×10 ⁻⁷	MEI LCF risk	0 (3.0×10 ⁻¹³ –4.8×10 ⁻¹³)	Workers		Average dose to radiological worker (millirem/year)	150	Radiological worker LCF risk	0 (9.0×10 ⁻⁵)	Collective dose to radiological workers (person-rem/year)	102–112	Total radiological worker LCFs	0 (0.06–0.07)	<p>Radiological Impacts:</p> <table border="1" data-bbox="836 1375 1429 1780"> <thead> <tr> <th>Receptor/Dose/Risk</th> <th>2013–2017 Average</th> </tr> </thead> <tbody> <tr> <td colspan="2">Public</td> </tr> <tr> <td>Collective dose to 50-mile population (person-rem)</td> <td>4.3</td> </tr> <tr> <td>Population LCFs</td> <td>0 (0.0026)</td> </tr> <tr> <td>Offsite MEI dose (millirem)</td> <td>0.20</td> </tr> <tr> <td>MEI LCF risk</td> <td>0 (1.2×10⁻⁴)</td> </tr> <tr> <td colspan="2">Workers</td> </tr> <tr> <td>Average dose to radiological worker (millirem/year)</td> <td>50</td> </tr> <tr> <td>Radiological worker LCF risk</td> <td>0 (3.0×10⁻⁵)</td> </tr> <tr> <td>Collective dose to radiological workers (person-rem/year)</td> <td>112</td> </tr> <tr> <td>Total radiological worker LCFs</td> <td>0 (0.07)</td> </tr> </tbody> </table>	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 (1.2×10 ⁻⁴)	Workers		Average dose to radiological worker (millirem/year)	50	Radiological worker LCF risk	0 (3.0×10 ⁻⁵)	Collective dose to radiological workers (person-rem/year)	112	Total radiological worker LCFs	0 (0.07)
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Proposed Action					No-Action Alternative
Facility Accidents					<p>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.</p>
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	3.4×10^{-6}	$0 (2.0 \times 10^{-9})$	0.0064	$0 (3.8 \times 10^{-6})$	
Radioactive material spill	0.0037	$0 (2.2 \times 10^{-6})$	16.2	0 (0.0097)	
Risks:					
Accident	Maximally Exposed Individual (LCF Risk)	Offsite Population (LCF Risk)			
Extremely unlikely earthquake with subsequent fire	$0 (4.8 \times 10^{-8})$	$0 (2.2 \times 10^{-4})$			
Fire in a single fire zone	$0 (2.4 \times 10^{-8})$	$0 (1.1 \times 10^{-4})$			
Explosion in a furnace	$0 (1.1 \times 10^{-5})$	$0 (4.9 \times 10^{-2})$			
Nuclear criticality	$0 (2.0 \times 10^{-11})$	$0 (3.8 \times 10^{-8})$			
Radioactive material spill	$0 (2.2 \times 10^{-8})$	$0 (9.7 \times 10^{-5})$			
Intentional Destructive Acts					
<p>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” (DOE 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).</p>			<p>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.</p>		

Proposed Action	No-Action Alternative
Transportation	
<p>For 50 pits per year, there would be approximately 321 shipments of radiological materials and wastes annually.</p> <p>Total population dose: 12.8 person-rem/year Population LCF risk: 0 (0.008) Worker dose: 26.8 person-rem/year Worker LCF risk: 0 (0.016) Accident risks (rad): less than 1 LCF/year Accident risks (nonrad): less than 1 fatality/ year</p>	<p>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.</p>

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 454,200,000 to 463,600,000 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 15,275 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 1,320 to 1,450 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	<p>LLW: The Proposed Action would generate approximately 7,800 to 10,500 cubic yards of LLW generated annually, representing approximately 20 to 27 percent of the average volume of LLW disposed of at the NNS. The LLW generated at LANL from producing 30 pits per year (NNSA 2020) would be disposed of at the NNS 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 from 8,685 to 11,385 cubic yards, which would represent approximately 22 to 29 percent of the average annual volume of LLW disposed of at the NNS. The available capacity at the NNS would be able to accommodate this quantity of waste.</p> <p>TRU: 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 31,350 cubic meters of TRU waste could be</p>

Resource Area	Discussion
	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 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. The available capacity of WIPP would accommodate the conservatively estimated TRU waste that could be generated over the next 50 years.
Human Health	The maximum cumulative offsite population dose is estimated to be about 30.1 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 0.72 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 849.5 to 1,006.5 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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