DOE/EIS-0549

Draft Environmental Impact Statement for the Surplus Plutonium Disposition Program

December 2022

K-Area at Savannah River Site

PF-4 at Los Alamos National Laboratory

National Nuclear Security Administration

U.S. Department of Energy
National Nuclear Security Administration

Summary

COVER SHEET

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

Title: Draft Environmental Impact Statement for the Surplus Plutonium Disposition Program (Draft SPDP EIS) (DOE/EIS-0549)

Locations: New Mexico, South Carolina, Texas, and Tennessee

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This document is available for viewing and downloading on the NNSA NEPA Reading Room Website (https://www.energy.gov/nnsa/nnsa-nepa-reading-room), the DOE NEPA website (https://www.energy.gov/nepa/doeeis-0549-surplus-plutonium-disposition-program), the Savannah River Site website (https://www.srs.gov/general/pubs/envbul/nepa1.htm), and the Los Alamos National Laboratory website (https://www.lanl.gov/environment/public-reading-room.php).

Abstract: The National Nuclear Security Administration (NNSA), a semi-autonomous agency organized in 2000 within the United States (U.S.) Department of Energy (DOE),[1] works to prevent nuclear weapon proliferation and reduce the threat of nuclear and radiological terrorism around the world. The agency endeavors to prevent the development of nuclear weapons and the spread of materials or knowledge needed to create them. NNSA is engaged in a program to disposition U.S. surplus weapons-grade plutonium (referred to in this Surplus Plutonium Disposition Program Environmental Impact Statement (SPDP EIS) as "surplus plutonium"). NNSA has prepared this document (DOE/EIS-0549) pursuant to the *National Environmental Policy Act* of 1969 (NEPA) (42 United States Code 4321 et seq.), to evaluate the potential environmental impacts of the disposition of plutonium that is surplus to the defense needs of the U.S.

On December 16, 2020, the DOE published a Notice of Intent in the *Federal Register* (85 FR 81460) to prepare the *Environmental Impact Statement for the Surplus Plutonium Disposition Program* (SPDP EIS) to evaluate the potential environmental impacts of disposition of 34 metric tons of surplus plutonium. The Notice of Intent initiated a public scoping period starting December 16, 2020 and extended through February 18, 2021.

[1] In this SPDP EIS, DOE's NNSA is referred to as NNSA for the sake of brevity.

DOE's purpose and need for action is to safely and securely disposition plutonium that is surplus to the Nation's defense needs so that it is not readily usable in nuclear weapons.

Preferred Alternative: NNSA's Preferred Alternative to meet the purpose and need is implementation of the dilute and dispose strategy for the full 34 metric tons of surplus plutonium (DOE 2018c). The effort would require new, modified, or existing capabilities at the Pantex Plant, Los Alamos National Laboratory, Savannah River Site, Y-12 National Security Complex, and the Waste Isolation Pilot Plant facility. Four sub-alternatives to the Preferred Alternative are considered in this EIS. The sub-alternatives differ based on the location (Los Alamos National Laboratory or Savannah River Site) for the processing activities. The sub-alternatives were selected so that the analyses presented in this EIS would bound the impacts (including impacts from transportation) that would occur if either site or a combination of the sites was used (i.e., if some of the 34 metric tons of surplus plutonium is processed at one site and the remainder is processed at the other site).

Public Involvement: NNSA announced the availability of this Draft SPDP EIS for comment in the *Federal Register*, on the NNSA NEPA Reading Room website at https://www.energy.gov/nnsa/nnsa-nepa-reading-room, and on the DOE NEPA website at http://energy.gov/nepa. Comments on this Draft SPDP EIS should be submitted within 60 days from the date the U.S. Environmental Protection Agency's Notice of Availability is published in the *Federal Register*, to allow for their consideration in the preparation of the Final SPDP EIS. Written comments may be submitted to Maxcine Maxted via postal mail to the address provided on the cover page of this Summary, or via email to: SPDP-EIS@NNSA.DOE.gov. Public hearings on this Draft SPDP EIS will be held during the public comment period to gather input from the public and other interested parties. The dates, times, and locations of these hearings were announced in the *Federal Register,* on the NNSA NEPA Reading Room website, and by other means, including newspaper advertisements, and notification to persons and organizations on the SPDP EIS mailing list.

NNSA will provide responses to comments in the Final SPDP EIS. The availability of the Final SPDP EIS will be announced in the *Federal Register* and by other means. Following the publication of the Final SPDP EIS, and consistent with NEPA requirements, NNSA may announce a decision regarding future actions in a Record of Decision (ROD) to be issued no sooner than 30 days after the Notice of Availability of the Final SPDP EIS is published in the *Federal Register*. The ROD would describe the alternative(s) selected for implementation and explain how any environmental impacts would be avoided, minimized, or mitigated.

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ABBREVIATIONS AND ACRONYMS

ac	acre(s)
AROD	Amended Record of Decision
C&P	characterization and packaging
CCO	criticality control overpack
CH	contact-handled
CH-TRU	contact-handled transuranic
CRMP	Cultural Resources Management Plan
DHF	Drum Handling Facility
DOE	U.S. Department of Energy
EIS	environmental impact statement
FR	*Federal Register*
ft	foot (feet)
FY	fiscal year
HAP	hazardous air pollutant
HEU	highly enriched uranium
kg	kilogram(s)
L	liter(s)
LANL	Los Alamos National Laboratory
LLW	low-level (radioactive) waste
m^3	cubic meter(s)
MFFF	Mixed Oxide Fuel Fabrication Facility
mi	mile(s)
MLLW	mixed low-level radioactive waste
MOX	mixed oxide
MT	metric ton(s)
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
NPMP	non-pit metal processing
NRHP	National Register of Historic Places
OST	NNSA Office of Secure Transportation
PA	Programmatic Agreement
PDP	pit disassembly and processing
PEIS	programmatic environmental impact statement
PF-4	Plutonium Facility-4
ROD	Record of Decision
s	second(s)
S&D	storage and disposition
SEIS	supplemental environmental impact statement
SO_x	sulfur oxides
SPD EIS	*Surplus Plutonium Disposition Final Environmental Impact Statement* (1999)

SPD SEIS	*Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (2015)
SPD	surplus plutonium disposition
SPDP	Surplus Plutonium Disposition Program
SRPPF	Savannah River Plutonium Processing Facility
SRS	Savannah River Site
T	ton(s)
TA	Technical Area
TRU	transuranic
TRUPACT-II	Transuranic Package Transporter Model-II
U.S.	United States
VTR	Versatile Test Reactor
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 National Security Complex

1 # CONVERSION TABLE

Metric to English			English to Metric		
Multiply	**by**	**to get**	**Multiply**	**by**	**to get**
Area					
Square meters	10.764	square feet	square feet	0.092903	square meters
Square kilometers	247.1	acres	acres	0.0040469	square kilometers
Square kilometers	0.3861	square miles	square miles	2.59	square kilometers
Hectares	2.471	acres	acres	0.40469	hectares
Concentration					
Kilograms/square meter	0.16667	tons/acre	tons/acre	0.5999	kilograms/square meter
Milligrams/liter	1[a]	parts/million	parts/million	1[a]	milligrams/liter
Micrograms/liter	1[a]	parts/billion	parts/billion	1[a]	micrograms/liter
Micrograms/cubic meter	1[a]	parts/trillion	parts/trillion	1[a]	micrograms/cubic meter
Density					
Grams/cubic centimeter	62.428	pounds/cubic feet	pounds/cubic feet	0.016018	grams/cubic centimeter
Grams/cubic meter	0.0000624	pounds/cubic feet	pounds/cubic feet	16,018.5	grams/cubic meter
Length					
Centimeters	0.3937	inches	inches	2.54	centimeters
Meters	3.2808	feet	feet	0.3048	meters
Kilometers	0.62137	miles	miles	1.6093	kilometers
Radiation					
Sieverts	100	rem	rem	0.01	sieverts
Temperature					
Degrees Celsius (C)	Multiply by 1.8 and then add 32	degrees Fahrenheit (F)	degrees Fahrenheit (F)	Subtract 32 and then multiply by 0.55556	degrees Celsius (C)
Velocity/Rate					
Cubic meters/second	2,118.9	cubic feet/minute	cubic feet/minute	0.00047195	cubic meters/second
Grams/second	7.9366	pounds/hour	pounds/hour	0.126	grams/second
Meters/second	2.237	miles/hour	miles/hour	0.44704	meters/second
Volume					
Liters	0.26417	gallons	gallons	3.7854	liters
Liters	0.035316	cubic feet	cubic feet	28.316	liters
Liters	0.001308	cubic yards	cubic yards	764.54	liters
Cubic meters	264.17	gallons	gallons	0.0037854	cubic meters
Cubic meters	35.315	cubic feet	cubic feet	0.028317	cubic meters
Cubic meters	1.3079	cubic yards	cubic yards	0.76456	cubic meters
Cubic meters	0.0008107	acre-feet	acre-feet	1,233.49	cubic meters

Metric to English			English to Metric		
Multiply	**by**	**to get**	**Multiply**	**by**	**to get**
Weight/Mass					
Grams	0.035274	ounces	ounces	28.35	grams
Kilograms	2.2046	pounds	pounds	0.45359	kilograms
Kilograms	0.0011023	tons (short)	tons (short)	907.18	kilograms
Metric tons	1.1023	tons (short)	tons (short)	0.90718	metric tons
English to English					
Acre-feet	325,850.7	gallons	gallons	0.000003046	acre-feet
Acres	43,560	square feet	square feet	0.000022957	acres
Square miles	640	acres	acres	0.0015625	square miles

(a) This conversion is only valid for concentrations of contaminants (or other materials) in water.
Note: Conversion factors have been rounded to an appropriate number of significant digits for each conversion given the order of magnitude of the conversion.

S.1 Introduction

The National Nuclear Security Administration (NNSA), a semi-autonomous agency organized in 2000 within the United States (U.S.) Department of Energy (DOE),[1] works to prevent nuclear weapon proliferation and reduce the threat of nuclear and radiological terrorism around the world. The agency endeavors to prevent the development of nuclear weapons and the spread of materials or knowledge needed to create them. NNSA is engaged in a program to disposition U.S. surplus weapons-grade plutonium (referred to in this Surplus Plutonium Disposition Program Environmental Impact Statement [SPDP EIS] as "surplus plutonium"). NNSA has prepared this document (DOE/EIS-0549) pursuant to the *National Environmental Policy Act* of 1969 (NEPA) (42 United States Code 4321 et seq.), to evaluate the potential environmental impacts of the disposition of plutonium that is surplus to the defense needs of the U.S.

> "Disposition" for radiological materials is defined as the process of disposal, which results in conversion to a form that is substantially and inherently more proliferation-resistant than the original form.

In 1994, after the end of the Cold War, the President of the U.S. declared 52.5 metric tons (MT) of plutonium to be surplus to the defense needs of the Nation. In 2007, the U.S. declared an additional 9 MT of plutonium to be surplus. In 2000, discussions that had begun in the 1990s culminated in the U.S. and the Russian Federation signing the *Agreement between the Government of the United States of America and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation* (Plutonium Management and Disposition Agreement) (United States of America and Russian Federation 2000). The two nations agreed to each dispose of no less than 34 MT of weapons-grade plutonium in forms unusable for nuclear weapons. Despite Russia's purported unilateral suspension of the Plutonium Management and Disposition Agreement, the U.S. remains committed to the safe and secure disposition of 34 MT of surplus weapons-grade plutonium, so it can never again be used for nuclear weapons (IPFM 2016; DOS 2020; DOS 2021). The 34 MT of surplus plutonium evaluated for disposition in this SPDP EIS is a subset of the 61.5 MT of surplus plutonium described above (52.5 MT plus 9 MT).

> **Weapons-grade plutonium** is largely plutonium-239, and contains no more than 7 percent plutonium-240, as defined in the DOE Factsheet, "Additional Information Concerning Underground Nuclear Weapon Test of Reactor-Grade Plutonium." A different range is used in the Agreement between the Government of the United States of America and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation: a ratio of plutonium-240 to plutonium-239 no greater than 0.10; approximately equal to 9 percent plutonium-240.
>
> **Surplus plutonium** has no identified programmatic use and does not fall into any of the national security reserve categories.

The surplus plutonium that NNSA plans to disposition includes material sourced from both pit and non-pit plutonium. A pit is the central core of a nuclear weapon that principally contains plutonium or enriched uranium. The plutonium contained in the pit is termed "pit plutonium." Non-pit surplus

[1] In this SPDP EIS, DOE's NNSA is referred to as NNSA for the sake of brevity.

plutonium may be in metal or oxide form or may be associated with other materials that were used in manufacturing and fabricating plutonium for use in nuclear weapons.

Since the 52.5 MT of plutonium was declared surplus in 1994, DOE and NNSA have studied many methods and prepared several NEPA reviews to evaluate alternative means of assuring that surplus plutonium would never again be used for nuclear weapons. Table S-1 provides an overview of the previous NEPA reviews and decisions. A list with detailed descriptions of these NEPA reviews is provided in Appendix A.

Table S-1. Overview of *National Environmental Policy Act* Reviews and Decisions Related to Surplus Plutonium Disposition

Year	NEPA Reviews and Decisions	Summary
1996	DOE/EIS-0229 - Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement	Evaluation of dispositioning up to 50 MT of surplus plutonium
1997	62 FR 3014	ROD to pursue immobilization and MOX fuel approaches for disposition
1999	DOE/EIS-0283 - Surplus Plutonium Disposition Final Environmental Impact Statement	Evaluation of dispositioning up to 50 MT of surplus plutonium
2000	65 FR 1608	ROD to disposition up to 50 MT of surplus plutonium at Savannah River Site and construct a MOX Fuel Fabrication Facility, a Pit Disassembly and Conversion Facility, and an Immobilization Facility
2002	67 FR 19432	AROD to cancel the Immobilization Facility
2003	68 FR 20134	AROD to change the amount of surplus plutonium to be fabricated into MOX fuel from 33 MT to 34 MT
2015	DOE/EIS-0283-S2 - Surplus Plutonium Disposition Supplemental Environmental Impact Statement	Evaluation of dispositioning surplus plutonium (13.1 MT) not previously assigned a disposition path; updated analyses for surplus plutonium (34 MT) previously decided to be fabricated into MOX fuel
2016	81 FR 19588	ROD to implement the dilute and dispose strategy to prepare 6 MT of non-pit surplus plutonium (part of the 13.1 MT) for disposal at the WIPP facility
2016-2019	DOE 2018c; DOE 2018d; NNSA 2018; NRC 2019	In response to an independent cost estimate for the MOX Fuel Fabrication Facility, the Secretary of Energy halted construction of the MOX fuel project in May 2018. On October 10, 2018, NNSA issued a Notice of Termination to CB&I AREVA MOX Services, LLC. The notice terminated the contract for construction of MFFF and began the process of ceasing construction operations and preserving MFFF and associated structures. On February 8, 2019, the U.S. Nuclear Regulatory Commission terminated the construction license for MFFF.
2020	DOE/EIS-0283-SA-4 - Supplement Analysis for Disposition of Additional Non-Pit Surplus Plutonium (DOE 2020a)	Evaluation of the dilute and dispose strategy to prepare an additional 7.1 MT of non-pit surplus plutonium for disposal at the WIPP facility

Year	NEPA Reviews and Decisions	Summary
2020	85 FR 53350	AROD to implement the dilute and dispose strategy to prepare 7.1 MT of non-pit surplus plutonium for disposal at the WIPP facility
Present	DOE/EIS-0549 - Surplus Plutonium Disposition Program Environmental Impact Statement	Evaluation of the dilute and dispose strategy to prepare 34 MT surplus plutonium for disposal at the WIPP facility

AROD = Amended Record of Decision; FR = Federal Register; LLC = Limited Liability Company; MFFF = MOX Fuel Fabrication Facility; MOX = mixed oxide; NEPA = *National Environmental Policy Act*; NNSA = National Nuclear Security Administration; ROD = Record of Decision; WIPP = Waste Isolation Pilot Plant.

This SPDP EIS is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (S&D Programmatic EIS [DOE 1996]), the *Surplus Plutonium Disposition Final Environmental Impact Statement* (SPD EIS [DOE 1999]), and the *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (2015 SPD Supplemental EIS or 2015 SPD SEIS [DOE 2015]).

In 2020, NNSA issued the *Supplement Analysis for Disposition of Additional Non-Pit Surplus Plutonium* (DOE 2020a). In this document NNSA determined that proposing to disposition 7.1 MT of non-pit surplus plutonium was not a substantial change in the action analyzed in the 2015 SPD SEIS to disposition 7.1 MT of pit plutonium, and that the environmental impacts had been sufficiently analyzed. On August 28, 2020, NNSA amended its previous decision in the April 2003 Amended Record of Decision (AROD) for the SPD EIS (68 FR 20134) to include preparation of an additional 7.1 MT of non-pit surplus plutonium for disposal as contact-handled (CH) transuranic (TRU) waste at the Waste Isolation Pilot Plant (WIPP) (85 FR 53350). NNSA based the AROD on the analysis in the 2015 SPD SEIS as described in the 2020 Supplemental Analysis. The 7.1 MT of non-pit surplus plutonium to be sent to the WIPP facility as CH-TRU waste is part of the 34 MT of surplus plutonium that NNSA had decided to disposition by fabricating it into mixed oxide (MOX) fuel for use in commercial reactors. The disposition of that 34 MT is the subject of this SPDP EIS. In the same 2020 AROD, NNSA also decided that non-pit metal processing (NPMP) may be performed at either Los Alamos National Laboratory (LANL) or Savannah River Site (SRS).

S.2 Purpose and Need for Action

NNSA's purpose and need for action is to safely and securely disposition plutonium that is surplus to the Nation's defense needs so that it is not readily usable in nuclear weapons.

Since the end of the Cold War in the early 1990s and the Presidential declarations of surplus fissile materials, DOE has been charged with the disposition of surplus plutonium. Over the last 25 years, NNSA has studied many alternative technologies and locations for plutonium disposition.

NNSA needs to disposition 34 MT of surplus plutonium in a safe and secure manner and in a reasonable time frame at a cost consistent with fiscal realities. To achieve this, NNSA must use mature methods and proven technologies that are based on processes requiring minimal research and engineering development.

S.3 Public Involvement

Scoping is a process required for preparation of an EIS, which helps to determine the scope of issues for analysis in an EIS, including identifying significant issues and eliminating nonsignificant issues from detailed study (40 CFR Part 1501). Scoping provides an opportunity for the public, governmental entities including Native American Tribes, and other stakeholders to provide comments directly to the Federal agency about the alternatives and issues to be addressed in the EIS.

On December 16, 2020, NNSA published a Notice of Intent in the Federal Register (85 FR 81460) announcing a 45-day public scoping period ending February 1, 2021 for this SPDP EIS. The Notice of Intent also provided information regarding NNSA's overall NEPA strategy related to fulfilling the purpose and need to disposition 34 MT of surplus plutonium. NNSA held virtual public scoping meetings on January 25th and 26th, 2021, to discuss the SPDP EIS and to receive comments on the potential scope of the SPDP EIS. A moderator facilitated the scoping meetings to direct and clarify discussions and comments. A court reporter made a transcript of the proceedings and a record of formal comments. In addition to the scoping meetings, NNSA encouraged members of the public to provide comments via U.S. postal mail, email, or telephone.

On February 2, 2021, NNSA notified the U.S. Environmental Protection Agency that it was extending the comment period until February 18, 2021. NNSA announced the extension on the NNSA NEPA website, in a press release, and notified members of the public, who had previously asked to be placed on the project mailing list, via email.

NNSA received 279 comment documents related to the project scope during the public scoping process. A comment document is defined as a single submittal of comments received by mail, email, or phone message transcript. In addition, the transcripts of verbal comments made during the public scoping meetings are each counted as a comment document. Email and mail comment documents included submittals related to two campaigns (one in support of the proposed action and one in opposition to it), many of which contained identical form letters. All comment documents were systematically reviewed to identify individual comments. Where possible, comments about similar or related topics were grouped under the following comment issue categories as a means of consolidating and summarizing the comments:

- Process comments
  - the NEPA process
  - purpose and need and the proposed action
  - the Preferred Alternative
  - the No Action Alternative
  - other alternatives
  - disposal at the WIPP facility

- Resource impact comments
  - radiological health
  - socioeconomics
  - waste management
  - environmental justice
  - transportation
  - cumulative impacts
- Other types of comments
  - general comments in support of this SPDP EIS or NNSA
  - general comments in opposition to this SPDP EIS or NNSA
  - comments not related to the purpose of this SPDP EIS.

NNSA considered all comments received during the public scoping process including some received after the close of the comment period, when preparing this Draft SPDP EIS. The summary of the comments, including an indication of how NNSA addressed the comments, is included along with a more detailed discussion of the public scoping process in Appendix F of this document. Figure S-1 illustrates the NEPA process with opportunities for public participation indicated with red asterisks.

Figure S-1. The NEPA Process

In accordance with NEPA regulations, this Draft SPDP EIS is being provided to the public for comment. NNSA will hold public hearings to present preliminary findings and to provide stakeholders and members of the public with the opportunity to comment on this Draft SPDP EIS. NNSA intends to hold public hearings at locations near the sites with the greatest potential for impacts: LANL, SRS, and the WIPP facility. NNSA will consider comments received on the Draft SPDP EIS during the public comment period when preparing the Final SPDP EIS. NNSA will provide responses to comments in the Final SPDP EIS.

S.4 Proposed Action

NNSA proposes to implement the dilute and dispose strategy for 34 MT of surplus plutonium to safely and securely disposition the surplus plutonium such that it could never again be readily used in a nuclear weapon. The dilute and dispose strategy includes processing surplus plutonium to plutonium oxide, diluting it with an adulterant to inhibit plutonium recovery, and disposing the resulting CH-TRU waste at the WIPP facility. Studies conducted over the last several years have identified the dilute and dispose strategy as being a technically mature and cost-effective alternative for surplus plutonium disposition (DOE 2014; Hart et al. 2015; Mason 2015). DOE's Plutonium Disposition Working Group in its report, *Analysis of Surplus Weapon Grade Plutonium Disposition Options* (DOE 2014), indicated that although the dilute and dispose strategy does not change the isotopic composition of the plutonium, it does meet two of the attributes for minimizing accessibility and reuse through physical and chemical barriers. The physical barrier is its placement 2,150 ft below the Earth's surface in an underground salt formation at the WIPP facility and the chemical barrier is the adulterant.

> Adulterant - The dilution process combines the plutonium oxide with an adulterant that contains nonhazardous inorganic materials to form a chemically stable matrix suitable for plutonium disposition. The multi-component adulterant is designed to impede recovery of the surplus plutonium such that the waste form complies with DOE requirements for termination of safeguards.

NNSA evaluated this alternative in the 2015 SPD SEIS (DOE 2015) and decided to use the process to prepare 6 MT of non-pit surplus plutonium for disposal as CH-TRU waste at the WIPP facility (81 FR 19588). NNSA also decided to use the process to prepare an additional 7.1 MT of non-pit surplus plutonium (85 FR 53350) for disposal as CH-TRU waste at the WIPP facility based on the analysis in the 2015 SPD SEIS as described in the 2020 Supplement Analysis (DOE 2020a).

To provide a comprehensive analysis in this SPDP EIS, NNSA included the 7.1 MT of non-pit surplus plutonium using the dilute and dispose strategy, for which NNSA has already made a decision, as announced in the 2020 AROD (85 FR 53350). The 7.1 MT of non-pit surplus plutonium is also considered here as part of the 34 MT of surplus plutonium and is analyzed for the Preferred Alternative. However, because the impacts of dispositioning the 7.1 MT of non-pit surplus plutonium have already been analyzed and a disposition pathway was assigned in the 2020 AROD, the 7.1 MT of non-pit surplus plutonium is also analyzed in this SPDP EIS as part of the No Action Alternative.

S.5 Alternatives for Disposition of Surplus Plutonium

S.5.1 Alternatives Considered for Detailed Analysis in this SPDP EIS

As discussed in Section S.1, NNSA prepared a programmatic environmental impact statement (PEIS) in 1996 (DOE 1996) that was followed by several NEPA reviews that tiered from the PEIS to evaluate alternative means of assuring that surplus plutonium can never again be readily used in a nuclear weapon. The most recent document tiered from the PEIS was published in 2020 (DOE 2020a).

The analyses in the S&D PEIS (DOE 1996), SPD EIS (DOE 1999), and the 2015 SPD SEIS (DOE 2015) evaluated multiple alternatives for the dispositioning of surplus plutonium. Some alternatives, including MOX fuel and immobilization, were eliminated as viable alternatives. These alternatives are not reevaluated in this EIS because of the absence of significant new circumstances or information that would change the results of the previous evaluations (see Section S.5.2). The analysis related to the consideration of alternatives that is presented in the PEIS and subsequent tiered documents is incorporated by reference in this SPDP EIS, which concentrates on issues specific to the dilute and dispose strategy.

Two alternatives are analyzed in detail in this SPDP EIS—the Preferred Alternative, consisting of four sub-alternatives, and the No Action Alternative. Both alternatives use the dilute and dispose strategy and both address up to 7.1 MT of non-pit surplus plutonium that NNSA previously decided to dispose of (85 FR 53350) using the dilute and dispose strategy. NNSA's Preferred Alternative is to use the dilute and dispose strategy for 34 MT of surplus plutonium comprised of both pit and non-pit plutonium, as shown in Figure S-2. The No Action Alternative is continued management of the 34 MT of both pit and non-pit plutonium, including the disposition of up to 7.1 MT of non-pit plutonium using the dilute and dispose strategy based on a previous NNSA decision (85 FR 53350).

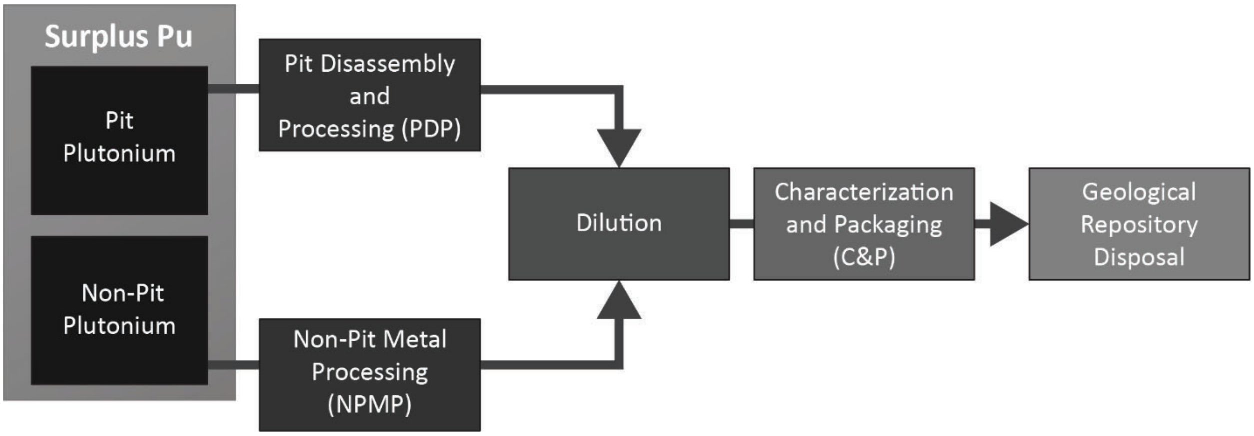

Figure S-2. High-Level Overview of Dilute and Dispose Strategy Process

The approach of diluting plutonium oxide with an adulterant and disposing the resultant CH-TRU waste at the WIPP facility was previously demonstrated during the closure of the Rocky Flats Environmental Technology Site (Mason 2015|p. 26|). The dilute and dispose strategy was also evaluated as a viable approach for dispositioning 13.1 MT of surplus plutonium in the SPD Supplemental EIS (2015 SPD SEIS; DOE 2015). The strategy was selected and is currently being used to disposition 6 MT of non-pit surplus plutonium (81 FR 19588) and 7.1 MT of non-pit surplus plutonium (85 FR 53350).

The dilute and dispose strategy is described below. The Preferred Alternative requires all the steps, and the No Action Alternative does not require the first three steps (pit packaging and shipping; pit disassembly and processing [PDP]; and decontamination, oxidation, and shipment of highly enriched uranium [HEU]).

Pit packaging and shipping – Surplus plutonium pits are packaged at Pantex Plant (Pantex) and shipped for processing to either LANL in New Mexico, or SRS in South Carolina. This only occurs for the Preferred Alternative.

PDP – Surplus plutonium pits are disassembled to segregate the plutonium from other materials. The plutonium metal is oxidized in furnaces located in gloveboxes to form plutonium oxide. Some pit plutonium has already been processed into oxide (DOE 2008|p. 2-62|; LANL 2022|Section 2.12.1.2|). PDP only occurs under the Preferred Alternative.

Decontamination, oxidation, and shipment of HEU – HEU from pit disassembly is decontaminated, oxidized, packaged, and shipped to the Y-12 National Security Complex (Y-12) in Tennessee (LANL 2022 |Sections 1.1.2.1, 2.15.1.2.2|). This only occurs under the Preferred Alternative.

NPMP – Non-pit surplus plutonium in a metal form is processed by oxidation in furnaces located in gloveboxes to form plutonium oxide. Processing the non-pit surplus plutonium can take place in the same gloveboxes or in different gloveboxes from the processing of the pit plutonium. Some of the non-pit surplus plutonium is already in an oxide form and does not need to be processed prior to dilution. This and the remaining steps occur for both the Preferred and No Action Alternative.

Preparation and packaging of plutonium oxide – The plutonium oxide from PDP and/or NPMP is either moved to a second set of gloveboxes at the same site for dilution or it may be packaged and shipped to another site for dilution.

Dilution of plutonium oxide – The plutonium oxide from PDP and/or NPMP is diluted in a set of gloveboxes by blending the plutonium oxide with an adulterant to reduce the plutonium concentration and inhibit plutonium recovery. The dilution process combines the plutonium oxide with an adulterant that contains nonhazardous inorganic materials to form a chemically stable matrix suitable for plutonium disposition. The multi-component adulterant is designed to impede recovery of the surplus plutonium (NNSA 2022).

Characterization, packaging, and shipment of diluted plutonium oxide CH-TRU waste[1] – After dilution, the composition of the adulterated plutonium oxide mixture (CH-TRU waste) is analyzed or "characterized" using radiography and nondestructive assay analysis. The purpose of the characterization process is to verify that the resulting diluted plutonium oxide, which is packaged as CH-TRU waste, complies with the WIPP facility Waste Acceptance Criteria (WAC) for disposal. DOE will verify that the TRU waste stream is of defense origin and that the TRU waste meets the WIPP WAC by performing nondestructive assay and evaluating acceptable knowledge (information related to how the TRU waste stream was created and managed). A waste certification audit will be scheduled and conducted by the DOE's Carlsbad Field Office and technical assistant contractor at the appropriate time, with approval of the final audit report by the New Mexico Environment Department. The U.S. Environmental Protection Agency will also perform an inspection. If the SPDP diluted plutonium oxide CH-TRU waste packaging program passes the audit, then the waste can be certified to indicate that it meets the WIPP WAC before it is shipped to the WIPP facility.

Preparation and packaging of job control waste – Job control wastes of various kinds are packaged for shipment and disposal. This includes gloves or other materials used in the above processes that become contaminated with TRU material. The CH-TRU job control waste must also meet the WIPP WAC.

Disposal of job control and diluted plutonium oxide CH-TRU waste at the WIPP facility – The CH-TRU waste that is disposed at the WIPP facility is tracked by Nuclear Quality Assurance-approved procedures and processes.

S.5.1.1 Preferred Alternative

The Preferred Alternative is to disposition 34 MT of surplus plutonium using the dilute and dispose strategy described in Section S.4. This 34 MT consists of both surplus pit and non-pit forms of plutonium. As discussed in Section S.4, some of the non-pit and pit plutonium is already in oxide form and a portion of the 34 MT has an existing Record of Decision (ROD) for disposal. NNSA has already decided to disposition up to 7.1 MT of non-pit surplus plutonium using the dilute and dispose strategy (85 FR 53350). The exact amounts of pit and non-pit forms of plutonium that compose the 34 MT are safeguarded, so they cannot be delineated further. Therefore, to bound the impacts, the analysis in this SPDP EIS evaluates the impacts of dispositioning 34 MT of surplus plutonium in pit form and the impacts of dispositioning 7.1 MT of non-pit surplus plutonium. These amounts were selected so that the analysis of impacts would cover the full environmental effects of dispositioning the 34 MT regardless of the final

[1] The WIPP facility is authorized to accept TRU waste that was generated from atomic energy defense activities. All CH-TRU wastes described in this SPDP EIS are defense-related wastes. Throughout this SPDP EIS, the defense-related TRU wastes described as shipped from LANL or SRS to WIPP are referred to as CH-TRU waste.

proportion of surplus pit plutonium or non-pit plutonium. By evaluating the impacts of dispositioning 34 MT of surplus pit plutonium and 7.1 MT of non-pit plutonium, NNSA will provide a conservative assessment of the impacts of completing the 34 MT mission.

> To bound the impacts, the analysis in this SPDP EIS evaluates the impacts of dispositioning 34 MT of pit plutonium and 7.1 MT of non-pit plutonium. However, there is only 34 MT of surplus plutonium to be dispositioned.

The activities that are part of the Preferred Alternative would occur at five different DOE sites—Pantex in Texas, LANL in New Mexico, SRS in South Carolina, Y-12 in Tennessee, and the WIPP facility in New Mexico (see Figure S-1).

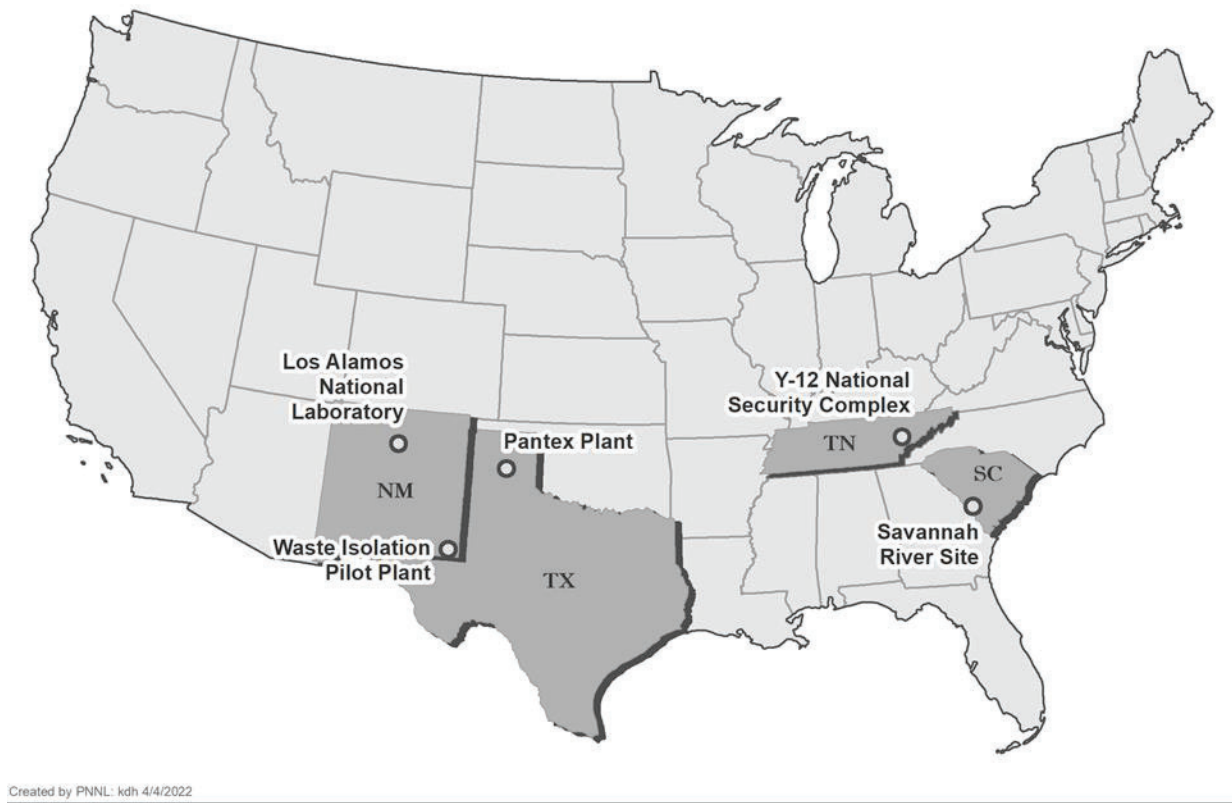

Figure S-3. Locations of Major Facilities Included in this SPDP EIS

S.5.1.1.1 Overview of Preferred Alternative by Sub-Alternative

NNSA has developed four sub-alternatives for the Preferred Alternative based on the location of the activities, as described below and shown in Figure S-4 through Figure S-7. In the figures, the arrows between storage and processing or between the processing steps indicate movement of material or waste between sites (e.g., Pantex to LANL) or between different capabilities or facilities for each of the sub-alternatives. Table S-2 illustrates the activities that occur at each site under each of the four sub-alternatives that are considered in this SPDP EIS. For all sub-alternatives, pits are stored at Pantex prior to their disassembly and processing. The sub-alternatives were defined so that the analyses presented in this EIS bound the impacts that would occur from processing a portion of the 34 MT at either LANL or SRS and the remainder of the 34 MT at the other site.

Table S-2. Location Summary of Activities in Each Sub-Alternative of the Preferred Alternative

	Base Approach	SRS NPMP	All LANL	All SRS
Pit Packaging and Shipping	Pantex	Pantex	Pantex	Pantex
PDP	LANL	LANL	LANL	SRS
Decontamination, oxidation, and shipment of HEU to Y-12	LANL	LANL	LANL	SRS
NPMP	LANL	SRS	LANL	SRS
Preparation, packaging, and inter-site shipment of plutonium oxide	LANL	LANL	NA	NA
Dilution of plutonium oxide	SRS	SRS	LANL	SRS
C&P of diluted plutonium oxide CH-TRU waste for shipment to the WIPP facility	SRS	SRS	LANL	SRS
Packaging and shipment of CH-TRU job control waste to the WIPP facility	LANL and SRS	LANL and SRS	LANL	SRS
Disposal of diluted plutonium oxide CH-TRU waste and CH-TRU job control waste	WIPP	WIPP	WIPP	WIPP

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; HEU = highly enriched uranium; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; Pantex = Pantex Plant; PDP = pit disassembly and processing; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

BASE APPROACH SUB-ALTERNATIVE

Under the Base Approach Sub-Alternative (Figure S-4), NNSA evaluates the impacts of shipping 34 MT of pit plutonium from Pantex to LANL and disassembling and processing the 34 MT of pit plutonium at LANL with subsequent shipment of the decontaminated and oxidized HEU to Y-12. In the Base Approach Sub-Alternative, NNSA also evaluates the impacts of processing 7.1 MT of non-pit surplus plutonium in the same capability used for PDP at LANL. This sub-alternative relies on expanding existing capabilities at LANL in the Plutonium Facility (PF-4) for PDP and NPMP. The resulting plutonium oxide from the surplus pit and non-pit plutonium would be shipped to K-Area at SRS, where it would be diluted and characterized and packaged as CH-TRU waste for shipment to and disposal at the WIPP facility.

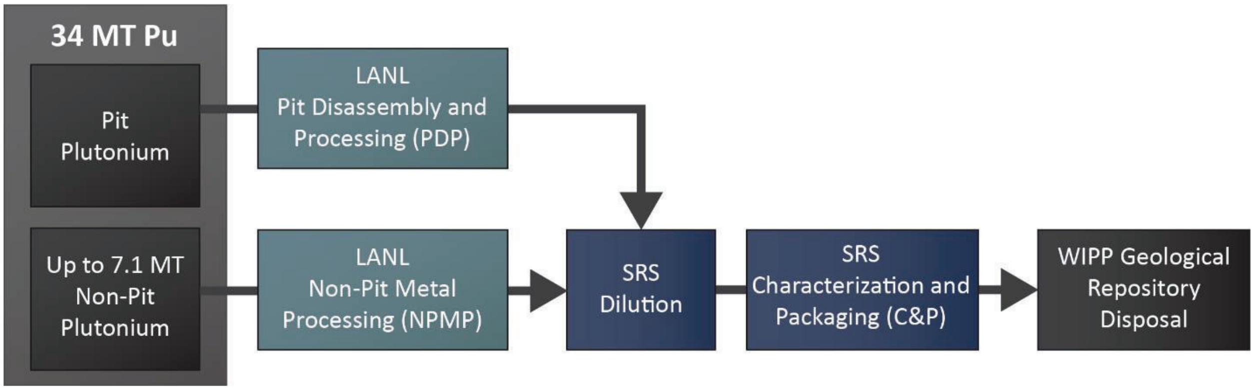

Figure S-4. **Preferred Alternative – Base Approach Sub-Alternative**

SRS NPMP SUB-ALTERNATIVE

The SRS NPMP Sub-Alternative is shown in Figure S-5. This sub-alternative is similar to the Base Approach Sub-Alternative. NNSA analyzes the impacts of shipping 34 MT of pit plutonium from Pantex to LANL and disassembly and processing of the 34 MT of pit plutonium in an expanded existing facility (PF-4) at LANL. In the SRS NPMP Sub-Alternative, NNSA also analyzes the subsequent shipment of the decontaminated and oxidized HEU to Y-12. PDP is followed by shipment of the resulting plutonium oxide to SRS (K-Area). Unlike the Base Approach Sub-Alternative, the SRS NPMP Sub-Alternative does not analyze NPMP at LANL. Instead, it evaluates the processing of 7.1 MT of non-pit surplus plutonium at SRS's K-Area either in Building 105-K or in a modular system adjacent to the building. Similar to the Base Approach Sub-Alternative, the SRS NPMP Sub-Alternative considers the impacts of dilution and C&P of the diluted plutonium oxide CH-TRU waste in SRS's K-Area for shipment to and disposal at the WIPP facility.

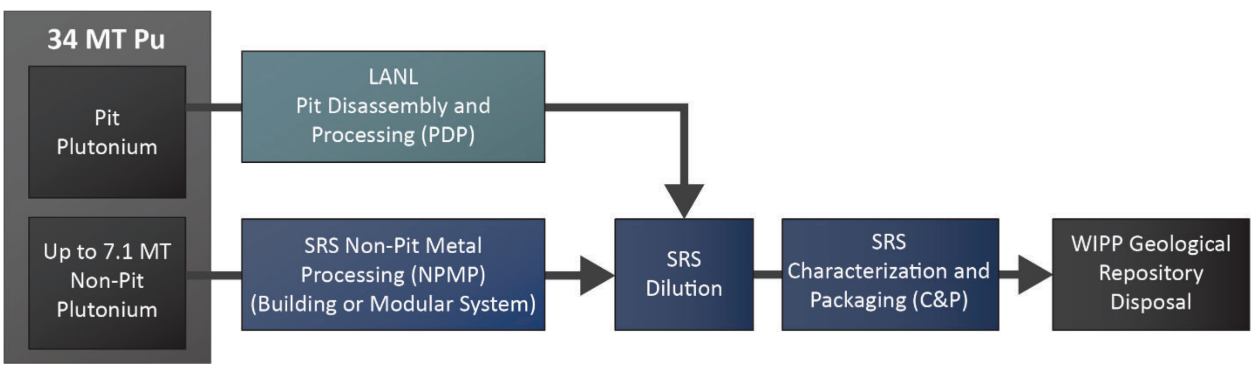

Figure S-5. Preferred Alternative – SRS NPMP Sub-Alternative

ALL LANL SUB-ALTERNATIVE

The All LANL Sub-Alternative is shown in Figure S-6. This sub-alternative considers only capabilities at LANL for the entire disposition pathway. Similar to the Base Approach Sub-Alternative, under the All LANL Sub-Alternative, NNSA analyzes the impacts of shipping 34 MT of pit plutonium from Pantex to LANL and disassembly and processing of the 34 MT of pit plutonium in an expanded existing facility

(PF-4) at LANL with subsequent shipment of the decontaminated and oxidized HEU to Y-12. In the All LANL Sub-Alternative, NNSA also evaluates the impacts of processing 7.1 MT of non-pit surplus plutonium at LANL in PF-4. Unlike the Base Approach Sub-Alternative, the resulting plutonium oxide would remain at LANL for dilution and C&P before shipment to and disposal at the WIPP facility as CH-TRU waste.

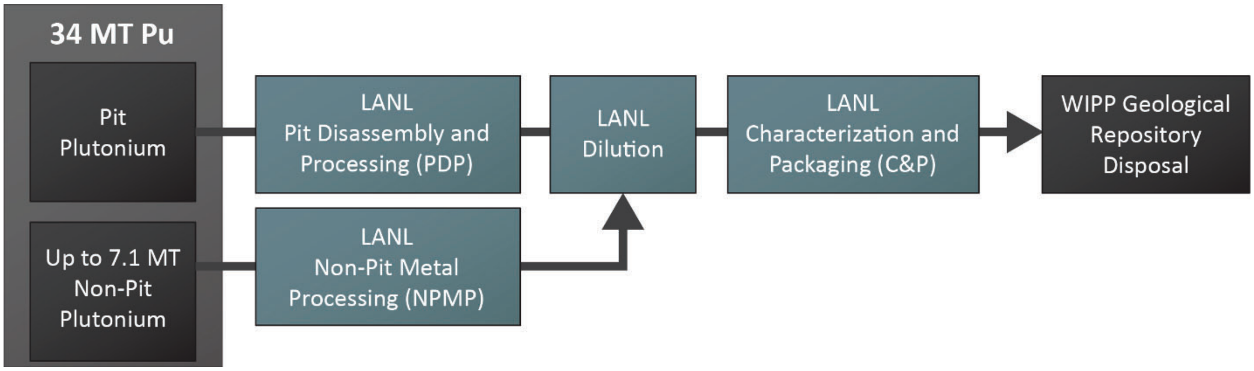

Figure S-6. Preferred Alternative – All LANL Sub-Alternative

ALL SRS SUB-ALTERNATIVE

The All SRS Sub-Alternative is shown in Figure S-7. NNSA would only use capabilities at SRS. Under this sub-alternative, NNSA analyzes the impacts of shipping 34 MT of pit plutonium from Pantex to SRS and the disassembly and processing of the 34 MT of pit plutonium in a new capability installed at SRS in either K-Area or F-Area. In the All SRS Sub-Alternative, NNSA also analyzes the subsequent shipment of the decontaminated and oxidized HEU to Y-12 as well as the impacts of processing 7.1 MT of non-pit surplus plutonium at SRS using the same new capability used for PDP. The resulting plutonium oxide would remain at SRS for dilution and C&P before shipment to and disposal at the WIPP facility as CH-TRU waste.

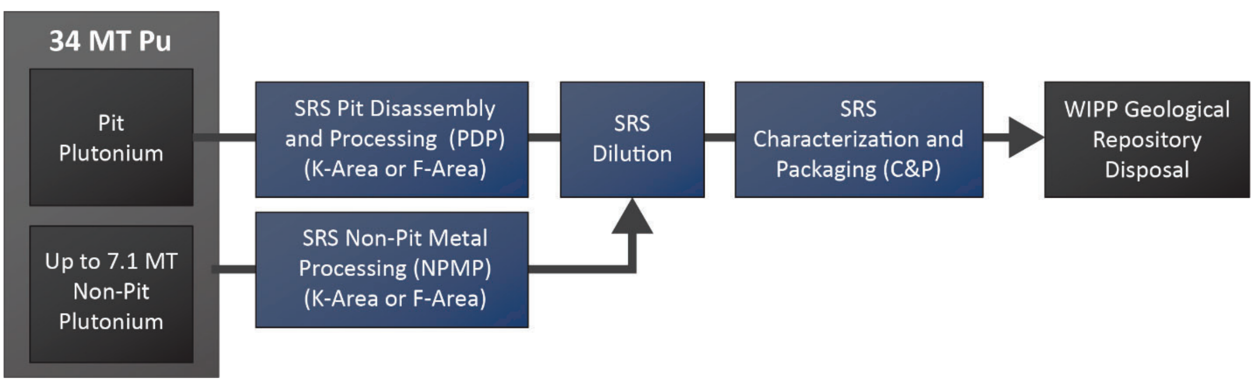

Figure S-7. Preferred Alternative – All SRS Sub-Alternative

S.5.1.1.2 Overview of the Preferred Alternative by Site

The operational activities in each step of the Preferred Alternative are described in the following sections, organized by site. These sections also describe the construction or modification activities that would be necessary to build the operational capabilities. Some of the capabilities at LANL and SRS are in an early planning stage. As such, the analyses in this EIS are based on the best available information. A discussion of the transportation that occurs between each site follows at the end of this section.

PANTEX

NNSA decided to consolidate the storage of surplus pit plutonium at Pantex (e.g., 62 FR 3014; 62 FR 3880; 67 FR 19432). Transportation of surplus plutonium to consolidated storage at Pantex is discussed in *The Final Supplement Analysis for the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE 2018b), incorporated herein by reference. Under the Preferred Alternative, pits stored at Pantex would be packaged in Type B packages[1] for shipment (CNS 2019), via the NNSA's Office of Secure Transportation (OST) transporter, to either LANL or SRS for disassembly and processing. Integration of additional packaging line(s), if needed, would occur in existing facilities at Pantex to support planned pit packaging and shipping rates. Packaging of pits for shipment to LANL or SRS is a continuation of ongoing activities that were previously reviewed (DOE 2018b) and is not reanalyzed in this SPDP EIS.

LOS ALAMOS NATIONAL LABORATORY

The activities that could occur at LANL for the Preferred Alternative are summarized in Table S-3 for the Base Approach and SRS NPMP Sub-Alternatives. No activities occur at LANL in the All SRS Sub-Alternative aside from the transportation activities described at the end of this section.

Table S-3. Activities that Could Occur at LANL in Each Sub-Alternative of the Preferred Alternative

Activities	Base Approach	SRS NPMP	All LANL	All SRS
PDP	**Yes**	**Yes**	**Yes**	No
Decontamination, oxidation, and shipment of HEU to Y-12	**Yes**	**Yes**	**Yes**	No
NPMP	**Yes**	No	**Yes**	No
Preparation and packaging and shipment of plutonium oxide to SRS	**Yes**	**Yes**	No	No
Dilution of plutonium oxide	No	No	**Yes**	No
C&P of diluted plutonium oxide CH-TRU waste for shipment to the WIPP facility	No	No	**Yes**	No
Packaging and shipment of CH-TRU job control waste to the WIPP facility	**Yes**	**Yes**	**Yes**	No

[1] Type B packages are designed in accordance with Federal Regulations (49 CFR Parts 100-177) for transporting materials and wastes that could be a radiation hazard to the environment or the public if the contents were released.

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; HEU = highly enriched uranium; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

Construction at Los Alamos National Laboratory

The Preferred Alternative would include construction and modification activities to expand the existing PDP capability (DOE's Advanced Recovery and Integrated Extraction System Oxide Production Program) in the PF-4 building located in LANL's Technical Area 55 (TA-55). The construction and modification activities would include the addition of new or modified gloveboxes, material entry hoods, and other upgrades to increase throughput. These activities would occur largely inside the PF-4 building and would expand the current space used for PDP from 5,200 ft^2 to 6,800 ft^2 without impact to other programs (LANL 2022).

NNSA would construct new facilities to support the increased activities in PF-4 for the Base Approach Sub-Alternative, the SRS NPMP Sub-Alternative, and the All LANL Sub-Alternative. These facilities include a Logistical Support Center, a separate office building, a warehouse, a security portal, and a weather enclosure at the loading dock of PF-4 (LANL 2022|Section 1.1.2|). The office building and warehouse would be built on undisturbed land in TA-52. The other structures would be built in industrial areas in TA-55. The All LANL Sub-Alternative would require modifications to PF-4 to increase throughput for PDP and install the dilution capability. The expansion would increase the floor space from the existing 5,200 ft^2 to 8,400 ft^2 (LANL 2022). NNSA would construct a new Drum Handling Facility (DHF) to support the C&P of diluted plutonium oxide CH-TRU waste for shipment to and disposal at the WIPP facility (LANL 2022|Section 1.1.2.2|). The building functions, size, locations, and acreage of land disturbed in TA-55 and TA-52 are presented in Table S-4. Utilities for the new facilities would also be installed.

Table S-4. New Facilities to Be Constructed and Land Disturbed Under the Preferred Alternative[(a)] at LANL

Structure/Laydown Areas	Function	Location	Facility Footprint or Area Size[(b)] ft^2 (ac)
Drum Handling Facility	Characterization, packaging, shipment to the WIPP facility	TA-55	20,000 (0.46)
Warehouse	Storage	TA-52	18,000 (0.41)
Staging/Parking area	Parking by warehouse	TA-52	27,500 (0.63)
Security portal	Vehicle/pedestrian security checkpoint	TA-55	4,620 (0.11)
Parking area	Parking by security portal	TA-55	3,000 (0.069)
Road extension	Access to security portal, parking area, and Drum Handling Facility	TA-55	13,000 (0.30)
Road extension	Access to office building and Warehouse	TA-52	3,410 (0.078)
Weather enclosure	Weather covering for the loading dock of PF-4 in TA-55	TA-55 adjacent to PF-4	4,100 (0.094)
Laydown areas in TA-55	Laydown areas would contain portable office trailers, construction	Various locations in TA-55	123,000 (2.8)

Structure/Laydown Areas	Function	Location	Facility Footprint or Area Size[(b)] ft² (ac)
	equipment, supplies, and infrastructure		
Laydown areas in TA-52	Laydown areas	Various locations in TA-52	10,200 (0.23)
Logistical Support Center	Offices, meeting rooms, and locker rooms	TA-55 separate from, but adjacent to, PF-4	10,800 (0.25)/floor (2 floors)[(c)]
Office Building	Offices	TA-52	12,000 (0.28)/floor (2 floors)[(c)]
Parking area	Parking by office building	TA-52	19,500 (0.45) (2 parking areas)

LANL = Los Alamos National Laboratory; PF-4 = Plutonium Facility; SRS = Savannah River Site; TA = Technical Area; WIPP = Waste Isolation Pilot Plant.

(a) No construction or land disturbance would occur at LANL under the All SRS Sub-Alternative.

(b) Conversions from square feet to acres may not equate because of rounding.

(c) Structures with multiple floors only have the area listed for one floor, because land disturbance is based on the footprint rather than total cumulative area.

Source: LANL 2022|Figures 1-11, 1-12, Sections 1.1.2, 2.8.1, 2.8.2|.

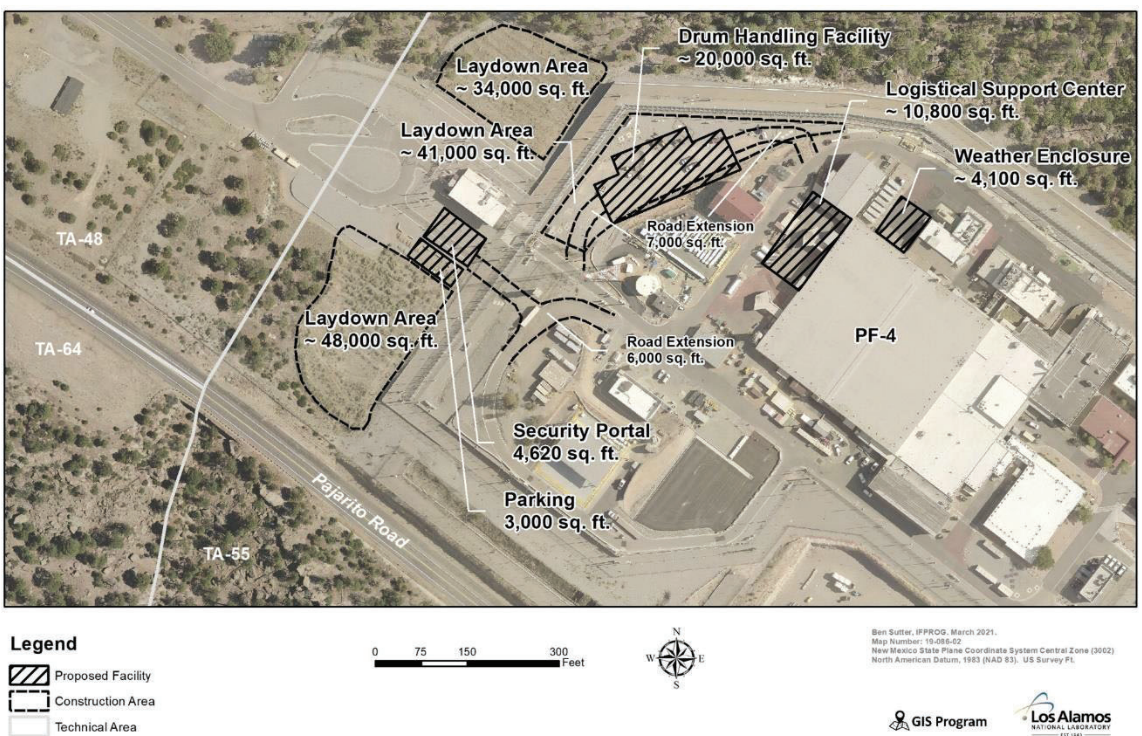

Figure S-8. Potential Facility and Laydown Area Locations at TA-55 (LANL 2022)[1]

[1] The Drum Handling Facility would be constructed only for the All LANL Sub-Alternative.

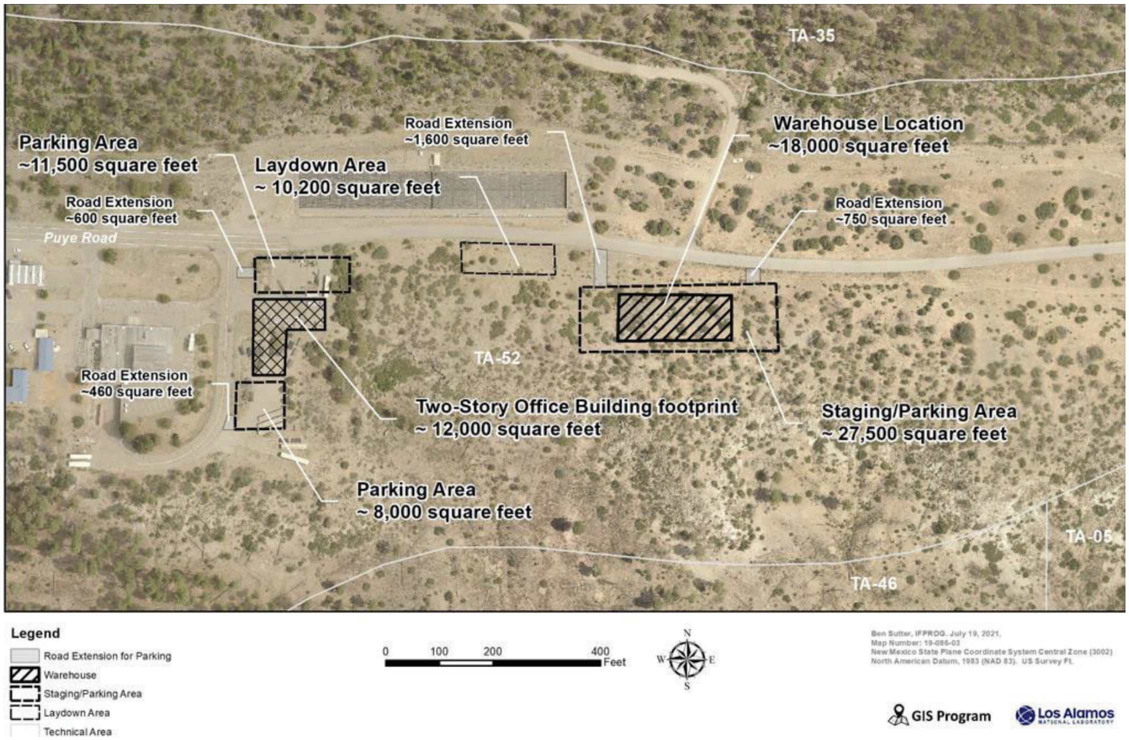

Figure S-9. Potential Facility and Laydown Area Location at TA-52 for the Office Building and Warehouse (LANL 2022)

Operations at Los Alamos National Laboratory

The operations activities for all three sub-alternatives occurring at LANL under the Preferred Alternative would include PDP in PF-4. Pit disassembly would be conducted in a series of gloveboxes (Figure S-10) using a pit cutter or a lathe.

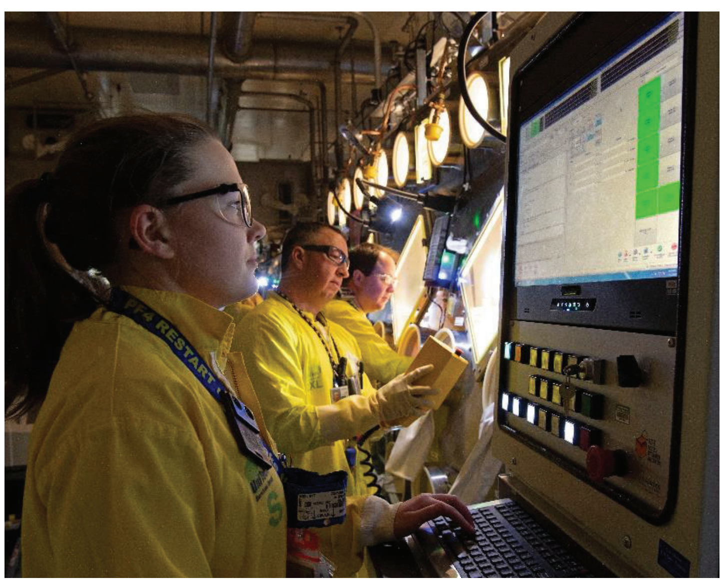

Figure S-10. Gloveboxes

Processing activities would also occur in gloveboxes and use furnaces to heat up the plutonium until it turns into an oxide. Similar PDP activities already occur in PF-4 for smaller amounts of plutonium (DOE 2008|p. 2-62|; LANL 2022|Section 2.12.1.2|). HEU recovered during pit disassembly would be decontaminated, oxidized, and prepared for shipment to DOE's Y-12 at Oak Ridge, Tennessee (LANL 2022|Sections 1.1.2.1, 2.15.1.2.2|). For the Base Approach Sub-Alternative and the All LANL Sub-Alternative, NPMP would occur in gloveboxes installed as part of the PDP capability in PF-4.

For the Base Approach and NPMP Sub-Alternatives, after processing, the resulting plutonium oxide would be packaged in PF-4 into Type B packages and loaded into an appropriate OST Transporter (LANL 2022|Sections 2.15.1.2.2, 2.15.1.2.3|) for shipment to SRS. Some of the job control waste, specifically waste such as gloves from gloveboxes and other waste from inside gloveboxes, would be classified as CH-TRU waste and packaged for shipment in the Transuranic Waste Facility at LANL and shipped to the WIPP facility for disposal.

In the All LANL Sub-Alternative, plutonium oxide would be diluted in PF-4 (LANL 2022|Section 1.1.2.2|). The oxide could be a product of processing activities at LANL or could be from material that already exists in oxide form. The oxide would be blended with an adulterant in blend cans (Figure S-11) within dedicated gloveboxes to reduce the plutonium concentration and inhibit plutonium recovery.

Figure S-11. Blending of Plutonium Oxide and Adulterant in a Blend Can

Mixers would be used to assure uniform mixing and dilution within the blend cans. After blending with the multicomponent adulterant, the resulting mixture would be placed in a shielded container and the lid would be press fit. Compressing the blended adulterant and plutonium oxide mixture into the shielding container helps to minimize the container size and the mass of shielding required (NNSA 2022). After dilution, the plutonium oxide is considered to be defense TRU waste. The container of diluted plutonium oxide CH-TRU waste would be removed from the glovebox and packaged in a can/bag/can configuration inside a convenience can (Figure S-12).

Figure S-12. Diluted Plutonium Oxide CH-TRU Waste Packaged in a Can/Bag/Can

Neutron counters and gamma spectrometers would be used to assay the diluted plutonium oxide CH-TRU waste in the convenience can. After the assay is completed, two convenience cans would be placed in a criticality control container. The criticality control container would be loaded into a criticality control overpack (CCO) container (LANL 2022|Section 2.15.2.2|) (Figure S-13). In addition, integrated assay systems would be used (LANL 2022|Section 1.1.2.2|) for assay of CH-TRU job control waste.

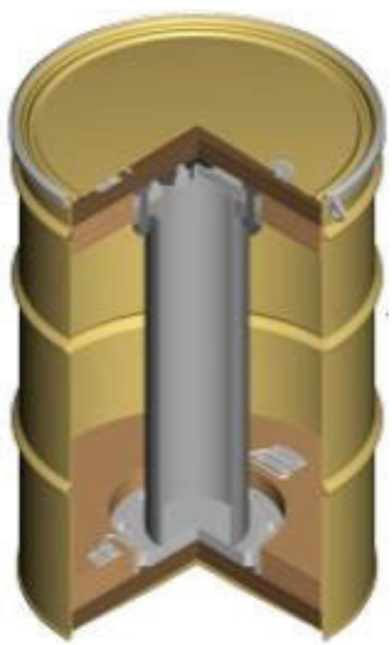

Figure S-13. CCO

In the All LANL Sub-Alternative, plutonium in diluted oxide form would be characterized and packaged in a newly constructed DHF at LANL for shipment to and disposal at the WIPP facility (LANL 2022|Section 1.1.2.2|). C&P of small amounts of diluted plutonium oxide CH-TRU waste could occur in PF-4 until the DHF becomes operational (LANL 2022|Section 1.1.2.2|). Once the DHF is operational, these processes could be transferred, and the C&P rate would be increased. However, for analysis, it is assumed that the CCOs containing the diluted plutonium oxide CH-TRU waste would be moved to the new DHF for C&P. The characterization process is conducted to verify that the diluted plutonium oxide CH-TRU waste complies with the WIPP WAC (DOE 2020b) for disposal as CH-TRU waste at the WIPP facility. Waste characterization includes radiography and nondestructive assay analysis of each loaded CCO. Characterization is conducted by personnel certified by the WIPP facility. After characterization, CCOs would be packaged in approved TRU waste transportation containers (e.g., Transuranic Package Transporter Model-II [TRUPACT-II]) (Figure S-14 and Figure S-15) and shipped to the WIPP facility for disposal. Each TRUPACT-II can be loaded with up to 14 CCOs (LANL 2022|Section 2.12.2|). Three TRUPACT-II containers can be loaded on a TRUPACT-II transporter (SRNS 2022|Section 20.1). CH-TRU job control waste could also be packaged and transported to the WIPP facility from the Transuranic Waste Facility (see Section B.1.2.4 in Appendix B) for disposal (LANL 2022|Section 2.12.1.2|).

Figure S-14. Drums Loaded into a TRUPACT-II for Transport

Figure S-15. TRUPACT-II Transporter Used for Shipping CH-TRU Waste to the WIPP Facility

SAVANNAH RIVER SITE

The activities that could occur at SRS for the Preferred Alternative are summarized in Table S-5. No activities occur at SRS under the All LANL Sub-Alternative aside from transportation activities.

Table S-5. Activities that Could Occur at SRS in Each Sub-Alternative of the Preferred Alternative

Activities	Base Approach	SRS NPMP	All LANL	All SRS
PDP	No	No	No	**Yes**
Decontamination, oxidation, and shipment of HEU to Y-12	No	No	No	**Yes**
NPMP	No	**Yes**	No	**Yes**
Preparation, packaging, and intra-site shipment of plutonium oxide between F-Area and K-Area	No	No	No	**Yes**
Dilution of plutonium oxide	**Yes**	**Yes**	No	**Yes**
C&P of diluted plutonium oxide CH-TRU waste for shipment to the WIPP facility	**Yes**	**Yes**	No	**Yes**
Packaging and shipment of CH-TRU job control waste to the WIPP facility	**Yes**	**Yes**	No	**Yes**

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; HEU = highly enriched uranium; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

Construction at Savannah River Site

The dilution and C&P capabilities in the Base Approach Sub-Alternative of the Preferred Alternative do not require any construction activities at SRS. The construction activities for the dilution capability were evaluated in the 2015 SPD SEIS (DOE 2015) and are not considered to be a part of the action evaluated in this SPDP EIS. Construction of the K-Area Characterization and Storage Pad was analyzed as a separate action (DOE 2017) to support C&P of the 6 MT of surplus plutonium DOE already decided to dilute and dispose of at the WIPP facility (81 FR 19588). Construction was categorically excluded from further NEPA review (SRNS 2022|Section 1|), and therefore, is not evaluated in this SPDP EIS.

For the SRS NPMP Sub-Alternative, two options are being considered. The first option involves modifications in Building 105-K in K-Area to install capabilities for NPMP (SRNS 2022|Section 1|). Because the modifications would occur inside Building 105-K, no land-disturbing activities are anticipated. The second option is a modular system that would be constructed and tested offsite and then assembled adjacent to Building 105-K. The modular system would be placed on concrete pads that are approximately 4,500 ft^2 and are located close to Building 105-K. The land required for the modular system, including a perimeter security barrier, is 14,450 ft^2 (0.33 ac) in a 170 ft by 85 ft perimeter configuration within a previously disturbed industrial area (SRNS 2022|Section 3.2|).

For the All SRS Sub-Alternative, two options are also being considered. Construction activities at SRS could take place to install PDP and NPMP capabilities at SRS in either Building 226-F (the Savannah River Plutonium Processing Facility [SRPPF]) located in F-Area or in Building 105-K located in K-Area. Plans for construction activities at both sites are in the early stages, and the exact locations within the buildings are not known. For this EIS analysis, NNSA assumes that adequate space is available in F-Area for PDP and NPMP as well as interim storage for incoming and outgoing surplus plutonium. However, because the facility design is incomplete, available total square footage in Building 226-F (SRPPF) is not known at this time. Additional support systems within the building would include active confinement ventilation; heating, ventilation, and air-conditioning; radiation monitoring; criticality alarm system; safeguards and security system; electrical; fire detection; suppression and water collection system; compressed gas and air systems; and gas supply.

Based on a preliminary study for the K-Area option, NNSA assumes that the processing equipment would be installed in the disassembly basin area in Building 105-K. To prepare the disassembly basin area for installation of equipment and support systems, a process similar to the one used for decommissioning the disassembly basin in C-Reactor would be used (SRNS 2013). The radioactive water that is currently in the disassembly basin would be removed using forced evaporation, which requires pumping the water to multiple diesel-fired evaporators where it would be heated and vaporized. Existing components and scrap would remain in the basin along with the evaporation equipment once dewatering has been completed. The disassembly basin would be filled with structured grout, which would form the floor for the installation of the processing equipment and gloveboxes. Additional support systems similar to those listed above for PDP and NPMP in F-Area would also be installed.

Construction of additional support facilities such as warehouses or office buildings outside of Building 226-F or Building 105-K would be needed to support PDP and NPMP capabilities in F-Area or K-Area. The number of buildings is not known at this time for either F- or K-Area but would likely include warehouses, mechanical shops, equipment storage and waste storage locations, parking lots, and emergency generator buildings to supply power to critical safety systems in the event of a power outage. In total, approximately 20 ac of previously disturbed land in F- or K-Areas would be used for buildings as well as any needed temporary construction and laydown areas. Total building footprints for support facilities in F-Area or K-Area are assumed to be 10 ac (not including the existing Buildings 226-F or 105-K).

Operations at Savannah River Site

PDP at SRS is only considered for the All SRS Sub-Alternative. The other sub-alternatives rely on LANL's capability for completion of the PDP activities. In the All SRS Sub-Alternative, PDP and NPMP would occur at SRS in either Building 226-F (SRPPF) located in F-Area or in Building 105-K in a manner similar to that described previously for LANL.

In the Base Approach Sub-Alternative, plutonium oxide from PDP and NPMP would arrive from LANL and be placed in Building 105-K in preparation for the dilution step (SRNS 2022 |Section 1|). After unpacking, the plutonium oxide would be transferred to gloveboxes (Figure S-11) to be diluted.

In the SRS NPMP Sub-Alternative, PDP would occur at LANL, so plutonium oxide from the processing of pits would arrive from LANL in the same manner as discussed for the Base Approach. However, NPMP would occur at SRS instead of LANL. The processing of non-pit surplus plutonium in gloveboxes could be located in two possible locations at SRS: Building 105-K in K-Area (SRNS 2022|Section 1|) or in a modular system placed adjacent to Building 105-K. After NPMP, the resulting plutonium oxide would be removed from the furnace and placed in a convenience can and removed safely from the NPMP glovebox and then introduced into the dilution glovebox (SRNS 2022|Section 3.1|).

The gloveboxes for dilution would also be located in Building 105-K. The plutonium oxide would be blended with an adulterant, as previously described for LANL. The diluted plutonium oxide CH-TRU waste would be characterized and packaged in K-Area at the existing Characterization and Storage Pad. The C&P and shipment process would be identical to that described previously for LANL. CH-TRU job control waste would be processed through existing facilities in E-Area.

Y-12 NATIONAL SECURITY COMPLEX

During PDP, surplus plutonium pits would be disassembled to segregate the plutonium from other materials such as HEU. HEU would be decontaminated, oxidized, and shipped to the Y-12 National Security Complex in Oak Ridge, Tennessee. The storage and disposition of weapons-grade fissile materials, such as HEU, occur at Y-12 and are discussed in the *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (DOE 2011), incorporated herein by reference.

WASTE ISOLATION PILOT PLANT

The WIPP facility is the only waste repository authorized for permanent disposal of TRU waste generated by *Atomic Energy Act* defense activities in the U.S. The TRU and mixed TRU wastes must meet WIPP WAC before they can be shipped to and disposed of at the WIPP facility (DOE 2020b).

Activities following the transportation of the CH-TRU waste to the WIPP facility include receiving, unloading, waste transfer, and disposal. These activities are described and analyzed in the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997|Section 3.1.3|) and are not reevaluated in this document. Similar activities would occur at the WIPP facility until it reaches capacity or closes, regardless of whether waste from the activities discussed in this SPDP EIS is sent to the WIPP facility. The DOE Office of Environmental Management Strategic Vision: 2022-2032 states that "WIPP is currently anticipated to operate beyond 2050" (DOE 2022a). NNSA has chosen to use fiscal year 2050 as a planning assumption for this EIS and has estimated operational durations based upon anticipated throughputs (as discussed in Appendix B) to complete the

34 MT mission before fiscal year 2050. Throughput rates are based on operating experience and estimates of the capability of new or modified equipment.

TRANSPORTATION

Offsite transportation is described separately because the impacts from these activities would not occur at one specific site, but instead would occur along the transportation route. Transportation methodologies are further described in Appendix E. The following offsite transportation routes are analyzed for the sub-alternatives considered in the Preferred Alternative:

- **Shipping construction materials to LANL and SRS**. Materials to support construction and modification activities would generally be shipped from locations within 30 mi of the site under all sub-alternatives.
- **Shipping adulterant to LANL or SRS**. Adulterant would be shipped from a commercial vendor to either LANL or SRS. The shipping distance is assumed to be 3,000 mi under all sub-alternatives.
- **Shipping pits from Pantex to LANL or SRS**. Pits would be shipped from Pantex to LANL under the Base Approach, SRS NPMP, or All LANL Sub-Alternatives. Pits would be shipped from Pantex to SRS under the All SRS Sub-Alternative.
- **Shipping non-pit surplus plutonium from SRS to LANL or LANL to SRS**. Non-pit surplus plutonium including non-pit metal and some previously processed non-pit oxide would be shipped between sites as appropriate for processing and/or dilution.
- **Shipping plutonium oxide from LANL to SRS**. Plutonium oxide from pit processing would be shipped from LANL to SRS for dilution under the Base Approach and SRS NPMP Sub-Alternatives. Plutonium oxide from the processing of non-pit surplus plutonium at LANL would also be shipped to SRS under the Base Approach Sub-Alternative.
- **Shipping HEU from LANL or SRS to the Y-12 National Security Complex**. After PDP at LANL or SRS, HEU would be shipped to Y-12 under all sub-alternatives.
- **Shipping byproduct material from SRS to LANL**. After PDP at SRS, byproduct material would be shipped to LANL under the All SRS Sub-Alternative.
- **Shipping diluted plutonium oxide CH-TRU waste from LANL or SRS to the WIPP facility**. After C&P, the diluted plutonium oxide CH-TRU waste would be shipped from LANL or SRS to the WIPP facility as CH-TRU waste under all sub-alternatives.
- **Shipping CH-TRU job control waste from LANL and SRS to the WIPP facility**. CH-TRU job control waste would also be shipped from SRS and LANL to the WIPP facility. CH-TRU job control waste would be shipped from LANL to the WIPP facility under the Base Approach, SRS NPMP, and All LANL Sub-Alternatives. CH-TRU job control waste would be shipped from SRS to the WIPP facility under the Base Approach, SRS NPMP, and All SRS Sub-Alternatives.
- **Shipping low-level waste (LLW), mixed low-level waste (MLLW) and other job control wastes from LANL and SRS to offsite locations**. LLW generated at SRS would be disposed of onsite at SRS (SRNS 2022|Section 20.3|). LLW and MLLW generated at LANL could be shipped to commercial disposal facilities, such as EnergySolutions in Utah or Waste Control Specialists in Texas or to the DOE Nevada National Security Site (NNSS) near Las Vegas, Nevada (LANL 2022|Section 2.12.3|). The analysis of impacts for transportation assumed use of the disposal facility located at the greatest distance from the LANL site. A similar assumption was made in the 2015 SPD SEIS (DOE 2015).

S.5.1.2 No Action Alternative

NNSA's No Action Alternative for dispositioning 34 MT of surplus plutonium, shown in Figure S-16, is the continued management of 34 MT of surplus plutonium. This includes (1) continued storage of pits at Pantex, (2) the continued plutonium mission at LANL to process up to 400 kg of actinides (including surplus plutonium) a year (DOE 2008|p. 2-62|), and (3) disposition of up to 7.1 MT of non-pit surplus plutonium for which the disposition decision, using the dilute and dispose strategy, was announced in NNSA's 2020 AROD (85 FR 53350).

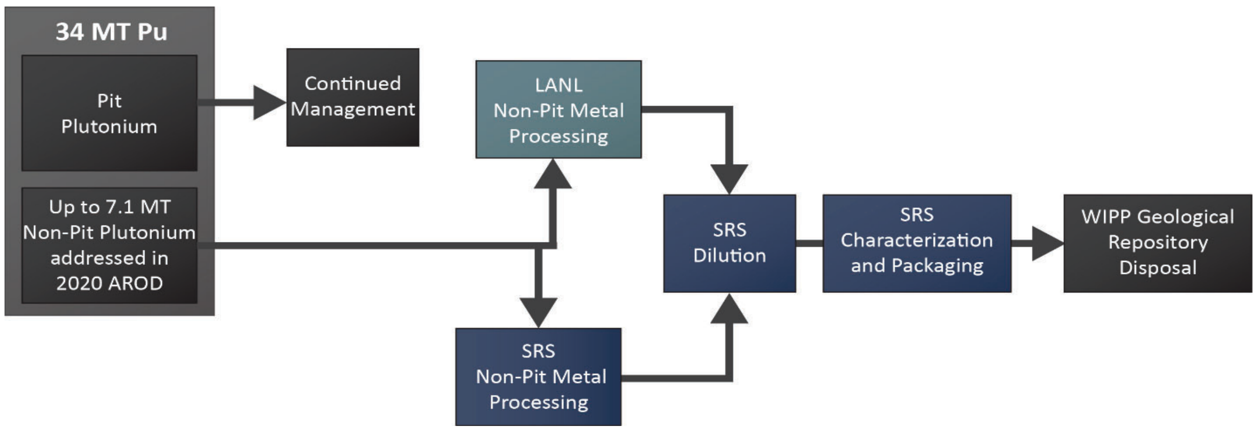

Figure S-16. No Action Alternative

NPMP of up to 7.1 MT could be performed in the existing furnaces installed in gloveboxes at LANL's PF-4 or in a NPMP capability that would be built at Building 105-K in K-Area at SRS. If NPMP occurs at LANL, the resulting plutonium oxide would be shipped to SRS for dilution and C&P. Shipments of plutonium oxide would be packaged in Type B packages and loaded into an OST Transporter for shipment to SRS (LANL 2022|Section 2.15.1.2.3|). If processing occurs at SRS, the resulting plutonium oxide would be transferred to a glovebox in Building 105-K for dilution.

After dilution, CCOs of diluted plutonium oxide CH-TRU waste would be characterized and packaged at SRS in approved TRU waste transportation containers (e.g., TRUPACT-II) and shipped from K-Area to the WIPP facility for disposal (SRNS 2022|Section 20.1|). CH-TRU job control waste, including waste such as gloves from gloveboxes and other waste from inside gloveboxes, would be classified as CH-TRU waste and packaged and transported through E-Area at SRS for disposal at the WIPP facility (SRNS 2022 |Section 20.3|).

The activities that could occur at LANL or SRS under the No Action Alternative are summarized in Table S-6. The operational activities in each step of the No Action Alternative are described in the following sections, organized by site. These sections also describe the construction or modification activities that would be necessary to build the operational capabilities. Additional details about the facilities are in Appendix B.

Table S-6. Location Summary of Activities under the No Action Alternative

Activities	NPMP at LANL Option	NPMP at SRS Option
NPMP	LANL	SRS
Preparation, packaging, and shipment of plutonium oxide to SRS	LANL	NA
Dilution of plutonium oxide	SRS	SRS
C&P and shipment of diluted plutonium oxide CH-TRU waste to the WIPP facility	SRS	SRS
Packaging and shipment of CH-TRU job control waste to the WIPP facility	LANL/SRS	SRS
Disposal of diluted plutonium oxide CH-TRU waste and CH-TRU job control waste	WIPP	WIPP

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

S.5.1.2.1 Pantex

Under the No Action Alternative, surplus plutonium pits at Pantex would remain in storage under its existing management plan. The No Action Alternative does not affect the ongoing shipping from Pantex to LANL to support the ongoing processing of up to 400 kg/yr of actinides (includes plutonium) at PF-4 at LANL (DOE 2008|p. 2-62|).

S.5.1.2.2 Los Alamos National Laboratory

Construction of new facilities at LANL would not be required for the No Action Alternative.

Operations at LANL for the No Action Alternative would be similar to those described for the Preferred Alternative for NPMP (Section S.5.1.1.2). NPMP would be performed in existing gloveboxes in PF-4, which is in TA-55, using existing furnaces. Plutonium oxide would be packaged in Type B packages and loaded into an OST Transporter adjacent to PF-4 for shipment to SRS (LANL 2022|Sections 1.1.2.1, 2.15.1.2.3|). CH-TRU job control waste resulting from NPMP would be packaged and loaded for shipment to the WIPP facility for disposal.

S.5.1.2.3 Savannah River Site

NPMP at SRS would be conducted in a new NPMP capability installed at Building 105-K in K-Area. No new land-disturbing construction activities would occur at SRS to support NPMP (SRNS 2022|Section 11|). However, activities to replace, modify, or install equipment currently in K-Area would occur, as necessary.

NPMP in Building 105-K in K-Area would be conducted using furnaces, as discussed in Section S.5.1.1.2. The resulting plutonium oxide would be placed in appropriate containers (DOE 2018a) and transported to the dilution capability gloveboxes located in Building 105-K. The dilution and C&P processes and locations used for plutonium oxide from LANL or SRS would be the same as those described for the Preferred Alternative. After characterization, CCOs would be packaged in approved TRU waste transportation containers (e.g., TRUPACT-II) and shipped from SRS to the WIPP facility for disposal. CH-TRU job control waste would also be packaged and transported to the WIPP facility for disposal through E-Area.

S.5.1.2.4 Waste Isolation Pilot Plant

As discussed in Section S.5.1.1.2, the WIPP facility is the only waste repository authorized for permanent disposal of TRU waste generated by *Atomic Energy Act* defense activities. TRU and mixed TRU wastes must meet WIPP WAC before they can be shipped to and disposed of at the WIPP facility (DOE 2020b).

Activities following the transportation of the CH-TRU waste to the WIPP facility, including receiving, unloading, and waste transfer and disposal, are described and analyzed in the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997|Section 3.1.3|), and are not reevaluated in this document.

S.5.1.2.5 Transportation

Offsite transportation is described separately because the impacts from these activities would not occur at one specific site, but instead would occur along the transportation route. Transportation methodologies are further described in Appendix E. The following offsite transportation routes are analyzed for the No Action Alternative:

- **Shipping adulterant to SRS**. Adulterant would be shipped from a commercial vendor assumed to be located 3,000 mi from SRS.
- **Shipping non-pit surplus plutonium from SRS to LANL or LANL to SRS**. Non-pit surplus plutonium, including non-pit metal and some previously processed non-pit oxide, would be shipped between sites as appropriate for processing and/or dilution.
- **Shipping plutonium oxide from LANL to SRS**. If processing of the 7.1 MT of non-pit surplus plutonium occurred at LANL, then the resulting plutonium oxide would be shipped from LANL to SRS for dilution.
- **Shipping diluted plutonium oxide CH-TRU waste from SRS to the WIPP facility**. After C&P, diluted plutonium oxide CH-TRU waste would be shipped from SRS to the WIPP facility.
- **Shipping CH-TRU job control waste from LANL and SRS to the WIPP facility**. CH-TRU job control waste would be shipped from LANL and SRS to the WIPP facility.
- **Shipping LLW, MLLW, and other job control wastes from LANL and SRS to offsite locations**. LLW generated at SRS would be disposed of onsite at SRS (SRNS 2022|Section 20.3|). LLW and MLLW generated at LANL could be shipped to commercial disposal facilities such as EnergySolutons in Utah or Waste Control Specialists in Texas or to NNSS, a Federal site in Nevada. The analysis of impacts for transportation assumed use of the disposal facility located at the greatest distance from the LANL site. A similar assumption was made in the 2015 SPD SEIS (DOE 2015).

S.5.2 Alternatives Considered and Dismissed from Detailed Study

NNSA has considered many alternatives for the dispositioning of surplus plutonium in studies, technology reviews and previous NEPA analyses. Most were ultimately dismissed from detailed study in those analyses. Table S-7 describes such alternatives and the reasons DOE dismissed them in the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (S&D Programmatic EIS; DOE 1996). Similarly, Table S-8 describes such alternatives considered in the *Surplus Plutonium Disposition Final Environmental Impact Statement* (SPD EIS; DOE 1999), and Table S-9 describes the additional alternatives considered in the 2015 SPD SEIS (DOE 2015). The reasons for dismissal given in these tables are those that were given at the time of publication. However, NNSA has reviewed the reasons for dismissal and finds them to be valid today, unless otherwise noted.

Table S-7. Alternatives Considered and Dismissed in the S&D Programmatic EIS

Disposition Alternative[(a)]	Reason for Dismissal from Detailed Study
Radiation barrier alloy for indefinite storage – forming a plutonium-beryllium compound	Unsuitable material form for a civilian waste repository. Requires reconversion of material to remove plutonium and process it into a repository-compatible waste form.
Injection into continental magma	Immature technology. Licensing and regulatory aspects are undefined and uncertain. Environmental safety and health issues exist.
Emplacement in sub-seabed	Immature technology. Licensing and regulatory aspects are undefined and uncertain. Schedule is uncertain. Increased opportunities for vessel accidents in which material could be lost at sea.
Launching to deep outer space	High risk (accidents). Accident risk and potential dispersal of radioactive materials are higher than other options. Chances of recovering material lost during an accident are lower. Expensive and time-consuming to complete.
Direct immobilization with radionuclides in borosilicate glass and use of a retrofitted Defense Waste Processing Facility	Expensive and disruptive. Installing a specifically designed melter for plutonium immobilization would require major retrofitting of the existing equipment in the Defense Waste Processing Facility at SRS because of criticality concerns. This would interfere with the Defense Waste Processing Facility mission to stabilize and treat high-level waste.
Reactor and accelerator options: • Accelerator conversion using a molten salt target • Accelerator conversion using a particle bed target • Accelerator driven using a modular helium reactor • Particle bed reactor • Molten salt reactor	Immature technology. Technical immaturity of options and lengthy development and demonstration effort to bring them to a viable and practical status.
Consuming in modular helium reactors	Immature technology. Less technically mature than other available options for using mixed oxide fuel in operating water-cooled reactor plants.
Advanced liquid metal reactors with pyroprocessing	Expensive and time-consuming. Requires an advanced liquid metal-cooled reactor that has not been developed.
Direct emplacement in HLW repository without immobilization	Unsuitable for a civilian waste repository. A determination of acceptability of this waste in a HLW repository is unlikely because of proliferation concerns. Additional security would be required until the repository is sealed.
Dispose surplus plutonium at the WIPP facility	Regulatory concerns. Assumed that this option would exceed capacity at the WIPP facility and would require amendment of the Waste Isolation Pilot Plant Land Withdrawal Act, associated regulations and regulatory compliance documents and the planning basis for the WIPP WAC.

Disposition Alternative[(a)]	Reason for Dismissal from Detailed Study
	Note: As a result of a WIPP facility permit change that separates the volume of disposal containers from the TRU waste volume allowed by the WIPP Land Withdrawal Act (NMED 2018), the apparent lack of unsubscribed disposal capacity is no longer a constraint. Therefore, in this SPDP EIS, NNSA is evaluating the impacts of disposing diluted plutonium oxide CH-TRU waste at the WIPP facility.
Hydraulic fracturing	Not technically viable; of high risk. No assurance of technical feasibility and no engineered barrier exists to prevent leakage into subsurface aquifers.
Injection of slurry into deep wells	High risk (environmental and health). No engineered barrier to prevent leakage into subsurface aquifers. Would pose unacceptable environmental safety and health risks.
Melting into crystalline rock	Not technically viable. Uncertainties related to criticality and difficulty in assuring enough heat would be available from the spent fuel commingled with surplus plutonium to melt the rock.
Disposal under ice caps	Not technically viable; of high risk. Poses unacceptable environmental health and safety risks because of the instability of ice caps in Greenland and Antarctica. Low likelihood of obtaining an Agreement with Denmark or revising the current international treaty for Antarctica.
Seabed disposal and controlled dilution in oceans	Regulatory, environmental, health, and safety concerns. Contrary to domestic and international laws, treaties, and policies.
Underground nuclear detonation	Regulatory, environmental, health, and safety concerns. Considered unreasonable because compliance with regulatory and licensing requirements is very uncertain. Compliance with environmental safety and health regulations is unlikely and this option may undermine national and international policy related to the Comprehensive Test Ban Treaty.
Naval nuclear fuel – using plutonium fuel in naval reactor plants	Regulatory concerns and time-consuming. Processes and facilities necessary for this option cannot be declassified, thus eliminating the possibility of transparent confirmation of the process or final condition by international inspections as required by DOE international obligations and commitments. Could not be accomplished in a reasonable time frame because the number of new fuel loadings in naval reactor plants is so small.
Reprocessing using plutonium fuel in existing or new evolutionary advance light water reactors with chemical reprocessing of spent fuel	Expensive, time-consuming, and security concerns. Specific stages of the processing and handling are more vulnerable to theft and diversion of the material. Time and cost required to design and construct reprocessing plants is greater than for plants that are available and do not have the vulnerability concerns.
Advanced liquid metal reactor with recycle and reuse of metallic alloy fuel elements	Immature reactor concept. Development of liquid metal reactors/integral fast reactors is no longer being pursued because of the U.S. nonproliferation policy to not develop technologies that rely on plutonium recycling.

Disposition Alternative[a]	Reason for Dismissal from Detailed Study
Glass material oxidation and dissolution system	Immature technology and time-consuming. Time required to complete the necessary research and development is longer than for other alternatives and options.
Euratom mixed oxide fuel reactor use	Institutional complexities and security concerns. Institutional complexities related to transportation, security, and geopolitical factors.

CH-TRU = contact-handled transuranic; DOE = U.S. Department of Energy; EIS = environmental impact statement; HLW = high-level radioactive waste; NNSA = National Nuclear Security Administration; SPDP = Surplus Plutonium Disposition Program; S&D = storage and disposition TRU = transuranic; WAC = Waste Acceptance Criteria; WIPP = Waste Isolation Pilot Plant.

(a) Technologies may have changed with time, but these changes are not addressed in this document.

Source: DOE 1996|p. 2-10 to 2-15|.

Table S-8. Alternatives Considered and Dismissed in the SPD EIS

Disposition Alternative	Reason for Dismissal from Detailed Study
Deep-borehole direct disposition or immobilized disposition	Regulatory and siting concerns. Institutional uncertainties associated with the siting of borehole facilities make timely implementation of this alternative unlikely. New legislation and regulations, or clarification of existing regulations, may be necessary.
Electrometallurgical treatment	Immature technology. The technology is less mature than vitrification or ceramic immobilization.
MOX fuel irradiation in a partially completed light water reactor	Expensive, time-consuming, and regulatory concerns. Offers no advantages over existing reactors for plutonium dispositioning and would involve higher costs, greater regulatory uncertainties, higher environmental impacts from construction, and less timely commencement of dispositioning actions.
MOX fuel irradiation in an evolutionary advanced light water reactor	Expensive, time-consuming, and regulatory concerns. Offers no advantages over existing reactors for plutonium dispositioning and would involve higher costs, greater regulatory uncertainties, higher environmental impacts from construction, and less timely commencement of dispositioning actions.

EIS = environmental impact statement; MOX = mixed oxide; SPD = Surplus Plutonium Disposition.

Sources: DOE 1999|p. 2-11 to 2-13|; 62 FR 3014|p. 3029|.

Table S-9. Alternatives Considered and Dismissed in the 2015 SPD SEIS for 13.1 MT of Surplus Plutonium that Were Not Included in the Previous SPD EIS or the S&D Programmatic EIS

Disposition Alternative	Reason for Dismissal from Detailed Study
Ceramic can-in-canister approach for immobilizing plutonium	The program was cancelled in 2002 because of budgetary constraints. Subsequently, further refinement of the technology was stopped, and DOE infrastructure and expertise associated with this technology have not evolved or matured.
Dispositioning of plutonium using the H-Canyon/HB-Line and Defense Waste Processing Facility	This approach was considered viable for up to 6 MT; however, there was insufficient high-level radioactive waste with the characteristics needed to vitrify the entire amount of surplus plutonium to be dispositioned.
Disposal of plutonium at a secondary repository similar to the WIPP facility	The WIPP facility had sufficient capacity to accommodate dispositioning of the entire amount of surplus plutonium based on the *Annual Transuranic Waste Inventory Report – 2012* (DOE

Disposition Alternative	Reason for Dismissal from Detailed Study
	2012), published after the Draft SPD SEIS was issued; therefore, a secondary repository was not necessary and the 2015 SPD SEIS WIPP Alternative was revived. Further, as a result of a WIPP facility permit change that separates the volume of disposal containers from the TRU waste volume allowed by the WIPP Land Withdrawal Act (NMED 2018), the apparent lack of unsubscribed disposal capacity at the WIPP facility is no longer a constraint. Therefore, in this SPDP EIS, NNSA is evaluating the impacts of disposing diluted plutonium oxide CH-TRU waste at WIPP.
Outsourcing plutonium dispositioning activities to foreign entities	Sending U.S. pits or plutonium from pits to a foreign country would involve significant nonproliferation and national security concerns.
Modification of the MFFF to incorporate pit disassembly and conversion	The 2015 SPD SEIS included an analysis of an alternative that considered plutonium processing (conversion) in a modified MFFF, but did not consider pit disassembly because of security, design, and licensing considerations. Note: Because the MOX project was cancelled, these concerns are no longer considerations. Therefore, in this SPDP EIS, NNSA is reevaluating housing PDP activities in Building 226-F or Building 105-K. This alternative is considered as part of the All SRS Sub-Alternative in this SPDP EIS, as discussed in Section S.5.1.1.1.

CH = contact-handled; DOE = U.S. Department of Energy; EIS = environmental impact statement; MFFF = MOX Fuel Fabrication Facility; MOX = mixed oxide; NNSA = National Nuclear Security Administration; PDP = pit disassembly and processing; SEIS = Supplemental Environmental Impact Statement; SPD = Surplus Plutonium Disposition; SRS = Savannah River Site; S&D = storage and disposition; TRU = transuranic; WIPP = Waste Isolation Pilot Plant.

Source: DOE 2015|pp. 2-14 to 2-19|.

Two additional alternatives were considered but dismissed in this SPDP EIS:

- **Use of plutonium as feedstock for fuel in the Versatile Test Reactor (VTR)** – DOE recently considered the use of surplus plutonium as feedstock for preparation of fuel for the proposed VTR (DOE 2022b). On July 22, 2022, DOE issued a ROD for the VTR EIS. DOE decided to construct and operate a VTR at the Idaho National Laboratory Site (87 FR 47400). DOE has not decided whether to establish VTR driver fuel production capabilities at the Idaho National Laboratory Site, SRS, or a combination of the two sites. DOE is considering the use of surplus plutonium as feedstock for preparation of fuel for the VTR (DOE 2022b). However, the VTR is in the early stages of design, and the details about what facilities, activities, and processes would be required to make surplus plutonium available as a VTR feedstock are not currently known. DOE has also stated that if domestic sources of plutonium cannot be made available for VTR fuel production, DOE has identified potential sources of plutonium in Europe (87 FR 47404, August 3, 2022). In addition, while Congress has authorized funding for the VTR, to date no funds have been appropriated. Therefore, an alternative that considers VTR as a potential disposition path for surplus plutonium would be speculative and is premature at this time. If DOE proposes in the future to make a portion of its surplus plutonium inventory available as feedstock for VTR driver fuel, the VTR Program would be responsible for any technical activities and process changes that may be necessary to accept this source of feedstock. Any changes to allow use of surplus plutonium as feedstock for VTR fuel production would be the subject of future NEPA analysis.

- **Demilitarization and disposal of pits** – This alternative was not considered further because it does not meet the nonproliferation goals set forth in the purpose and need, as described in Section S.2, to safely and securely disposition plutonium that is surplus to the Nation's defense needs so that it is not readily usable in nuclear weapons.

Two additional sub-alternatives to the Preferred Alternative were also considered but dismissed:

- **Pantex Greenfield Sub-Alternative in this SPDP EIS** – NNSA considered a Pantex Greenfield Sub-Alternative for the disposition of surplus plutonium. This sub-alternative would require the construction and operation of greenfield facilities for PDP, NPMP, dilution, and C&P. This sub-alternative was considered, but found to be unreasonable and eliminated for the following reasons:
  - Lack of Adequate Waste Support Facilities – Pantex does not have waste management facilities that can support the amount of LLW and TRU waste that would be generated for PDP, NPMP, dilution, and C&P of 34 MT. The Pantex Supplement Analysis (DOE 2018b) does not include numbers for TRU waste disposal and the quantity of LLW waste currently generated at Pantex is significantly lower than that estimated for SPDP. Support facilities for waste may be needed in addition to the facilities where PDP, NPMP, dilution, and C&P occur.
  - Significant Increase in Staffing Levels – This SPDP EIS estimates between 549 and 844 operations workers would be needed at Pantex (based on the estimated LANL staffing levels in the All LANL Sub-Alternative and estimated SRS staffing levels under the All SRS Sub-Alternative, respectively, for the years when project employment and expenditures are highest). This would be an increase of between 14 and 20 percent over the current Pantex staffing level of 3,800 workers, as shown in the Pantex Supplement Analysis (DOE 2018b). This does not include the additional staff needed for construction.
  - Lack of Plutonium Processing Experience – Pantex does not have experience processing plutonium and would need to build an entirely new capability from the ground up.
  - Insufficient Infrastructure – Significant changes in infrastructure would likely be needed to accommodate the additional staff and the new facilities. This additional site infrastructure would increase the time and cost to complete the project.
  - Design and Construction Timing Challenges – The timeline for design and construction of new facilities is unknown. Based on previous NNSA experience it would extend well beyond the desired schedule for dispositioning the 34 MT.
- **WSB Option for the All SRS Sub-Alternative in this SPDP EIS** – NNSA also considered a third option for the All SRS Sub-Alternative to the Preferred Alternative: use of the WSB at SRS to house the PDP capability. This option was considered but dismissed from further evaluation because costly and time-consuming upgrades to WSB infrastructure would be necessary to support PDP mission capabilities. In addition, none of the infrastructure needed to make the WSB a stand-alone Category 1 security facility exists. The cost to establish that infrastructure would be very high, thus making the use of the WSB fiscally challenging. However, if the decisionmakers were to select the WSB for the PDP mission, the environmental impacts would be similar to those identified in this draft EIS for inclusion of the PDP capabilities in the SRPPF, as both are radiologically clean facilities and are located near each other within F-Area at SRS.

S.6 Decisions to Be Supported by this EIS

Upon completion of this SPDP EIS, NNSA will issue a ROD, proceeding with either the continued management of the 34 MT of surplus plutonium as described under the No Action Alternative, or the disposition of the 34 MT of surplus plutonium using the dilute and dispose strategy as described under the Preferred Alternative. NNSA has analyzed impacts so that it could decide to implement some or all aspects of the Preferred Alternative and its sub-alternatives at one or more sites. This could be accomplished by using strategies such as building similar capabilities at different sites or supplementing activities at one site using a similar capability at another site or at another location within the same site.

S.7 Summary of Environmental Consequences of the Alternatives

This section provides the reader with an understanding of the differences between the Preferred and No Action Alternatives as well as the differences between the sub-alternatives of the Preferred Alternative. Table S-10 summarizes the environmental consequences that would be expected as a result of the alternatives considered in this SPDP EIS. A full discussion of the impacts for all resources is found in Section 4.0 of Volume 1. Appendix C in Volume 2 contains the detailed environmental impacts broken out by activity and site (LANL and SRS), as well as impacts across the sites under each of the alternatives and sub-alternatives.

Table S-10. Comparison of Alternatives - Summary

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[a] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[a] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[b] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[b] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
Land Disturbance (ac)	**Construction**							
	5.6	5.6	5.9	5.6	20	20	0	(c)
	Operations							
	No land disturbance is anticipated during operations.							
Visual	**Construction and Operations**							
	Proposed new facilities would be built away from the site boundaries and would be structurally similar to, and blend in with, the existing viewscapes.							(c)
Geologic Materials Used (sand, gravel, crushed stone) (yd^3)	**Construction**							
	30,000	30,000	30,000	41,000	260,000	260,000	0	(c)
	Operations							
	No geologic materials are used during operations.							
Water Resources	**Construction and Operations**							
	Construction and operations water use at either site is anticipated to be less than 1 percent of the current site water use and less than 3 percent of available capacity. Thus, only minor impacts to groundwater resources are expected for either alternative. Stormwater runoff would be managed at both sites to minimize the effects of construction and operation on surface waters receiving discharge. Treated sanitary wastewater discharge would be less than 4 percent of the expected flow in the receiving stream at LANL and less than 0.5 percent of the flow in the receiving stream at SRS. Thus, only minor impacts to surface water quality are expected for either alternative. At LANL, impacts on the wastewater treatment capacity are minimal with respect to present and ongoing operations. At SRS, site operations associated with all activities under both the Preferred and No Action Alternatives would result in an increase in the annual treated sanitary wastewater discharges that would have the potential to affect the treatment capacity of the K-Area SWTP until the completion of a proposed future activity to tie the K-Area SWTP to the CSWTF.							

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[a] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[a] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[b] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[b] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
	Construction							
Air Quality	Fugitive dust would be generated during construction and construction equipment would generate emissions, including non-radiological HAPs at LANL. No construction would occur at SRS.	Fugitive dust would be generated during construction and construction equipment would generate emissions including non-radiological HAPs at LANL. Minor construction activities and impacts would occur at SRS.		Fugitive dust would be generated during construction and construction equipment would generate emissions including non-radiological HAPs at LANL.	Fugitive dust would be generated during construction and construction equipment would generate emissions including non-radiological HAPs at SRS.		Minor construction activities and impacts would occur at SRS.	No construction activities would occur at either LANL or SRS.
	Operations							
	Operations are not expected to produce additional air emissions at LANL. At SRS emissions would result from the use of diesel generators. Emissions associated with dilution activities are expected to	Operations are not expected to produce additional air emissions at LANL. At SRS emissions would result from the use of diesel generators. Emissions associated with dilution and NPMP activities are expected to produce negligible non-radiological HAPs.		Operations are expected to produce minimal additional air emissions at LANL. No additional diesel generators required for operational activities.	SRS emissions would result from the use of diesel generators. Emissions associated with dilution activities are expected to produce negligible non-radiological HAPs. There is expected to be a minor increase in emissions for PDP due to the use of additional backup diesel generators.		Operations are not expected to produce additional air emissions at LANL. At SRS emissions would result from the use of diesel generators and dilution activities. Emissions associated with dilution activities are expected to produce negligible non-rad HAPs.	

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[a] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[a] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[b] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[b] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
	produce negligible non-radiological HAPs.							
Noise	**Construction and Operations**							
	Construction and Operations noise levels at sites are anticipated to be similar to current operations beyond the site boundaries.							
Ecological Resources	**Construction**							
	Activities have the potential to affect Mexican spotted owl and the Jemez Mountains salamander. LANL would conduct a Section 7 consultation under the Endangered Species Act. No construction activities at SRS.	Activities have the potential to affect Mexican spotted owl and the Jemez Mountains salamander. LANL would conduct a Section 7 consultation under the Endangered Species Act. Construction activities at SRS are minor and would have negligible impact on ecology or on protected species		Activities have the potential to affect Mexican spotted owl and the Jemez Mountains salamander. LANL would conduct a Section 7 consultation under the Endangered Species Act.	Impacts at SRS would occur in previously disturbed areas and are unlikely to affect protected species including the red-cockaded woodpecker or the smooth purple cone flower.		No impact	No impact
	Operations							
	Background noise and light levels could affect Mexican spotted owl but are unlikely to affect habitat for the Jemez Mountains salamander. LANL would conduct a Section 7 consultation under the Endangered Species Act for the Mexican spotted owl and the Jemez Mountains salamander; impacts at SRS would be negligible to			LANL would conduct a Section 7 consultation under the Endangered	Impacts at SRS would be unlikely to affect the red-cockaded woodpecker or the smooth purple cone flower.		No impacts	No impacts

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	ecological resources and would not affect the red-cockaded woodpecker or the smooth purple cone flower.			Species Act for the Mexican spotted owl and the Jemez Mountains salamander.				
Human Health	**Construction - Worker – highest risk of LCF for project duration**							
	0.001	0.001	0.001	0.001	0	0.0001	0.0005	None[c]
	Operations - Worker – highest risk of LCF for project duration							
	0.005	0.007	0.005	0.007	0.005	0.005	0.007	0.007
	Construction - Workforce – total number of LCFs							
	0 (0.008)	0 (0.009)	0 (0.008)	0 (0.01)	0 (0)	0 (0.003)	0 (0.0007)	None[c]
	Operations - Workforce – total number of LCFs							
	2 (2.4)	3 (2.9)	3 (2.5)	2 (1.8)	2 (2.4)	2 (2.4)	1 (0.8)	1 (0.8)
	Construction - Public – MEI total risk of LCF							
	(d)	(d)	(d)	(d)	0	3×10^{-8}	(d)	None[c]
	Operations - Public – MEI total risk of LCF							
	3×10^{-8}	3×10^{-8}	3×10^{-8}	6×10^{-8}	2×10^{-9}	2×10^{-9}	4×10^{-10}	8×10^{-9}
	Construction - Public – Population number of LCFs							
	(d)	(d)	(d)	(d)	0 (0)	0 (0.002)	(d)	None[c]
	Operations - Public – Population number of LCFs							
	0 (0.0001)[e]	0 (0.0002)[e]	0 (0.0002)[e]	0 (0.0002)	0 (0.00008)	0 (0.00008)	0 (0.00002)	0 (0.00004)[e]
	Operations Bounding Accidents – Noninvolved Worker maximum LCFs[f]							
	0.036	0.036	0.052	0.036	0.0039	0.0033	0.0033	0.001

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[a] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[a] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[b] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[b] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
Human Health (continued)	**Operations Bounding Accidents - Public – MEI maximum LCFs[f]**							
	0.0015	0.0015	0.0015	0.0015	0.00016	0.00012	0.00012	0.000062
	Operations Bounding Accidents - Public – Population maximum LCFs[f]							
	0 (0.086)	0 (0.1)	1 (0.62)[g]	0 (0.086)	0 (0.14)	0 (0.1)	0 (0.1)	0 (0.028)
Cultural Resources	**Construction**							
	Activities have the potential to affect archaeological resources and historic buildings. The NHPA Section 106 in the PA and the CRMP, would be followed by the NNSA Los Alamos Field Office and the Archaeological Resource Management Plan and associated Programmatic Agreement at SRS.							No impact because existing equipment is being used.
	Operations							
	There would be no impact on cultural resources during operations. The LANL CRMP and the SRS Archeological Resource Management Plan of the Savannah River Archeological Research Program has controls in place to minimize or mitigate impacts on resources during operations.							
Socio-economics	**Construction – Direct Employment (FTE in Peak Year)**							
	116	186	146	139	525	525	70	(c)
	Operations – Direct Employment (FTE in Peak Year)							
	745	843	778	549	844	844	171	220
	Construction – Total ROI Employment (FTE in Peak Year)							
	221	361	310	263	1,092	1,092	140	(c)
	Operations – Total ROI Employment (FTE in Peak Year)							
	2,332	2,485	2,386	1,794	3,655	3,655	334	519
	Construction – Direct Earnings ($Million in Peak Year)							
	19.4	38.9	26.9	23.2	145.9	145.9	19.5	(c)

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[(a)] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[(a)] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[(b)] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[(b)] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
Socio-economics (continued)	**Operations – Direct Earnings ($Million in Peak Year)**							
	616.9	627.6	620.5	513.7	731.8	731.8	35.1	109.9
	Construction – Total ROI Earnings ($Million in peak year)							
	23.6	50.3	33.7	28.2	200.5	200.5	26.7	(c)
	Operations – Total ROI Earnings ($Million in peak year)							
	870.1	886.5	875.6	703.1	1,116.8	1,116.8	53.5	137.0
	Construction – Direct Output ($Million in peak year)							
	20.3	61.4	29.8	24.2	307.9	307.9	41.1	(c)
	Operations- Direct Output ($Million in peak year)							
	1,719.2	1,748.8	1,729.1	1,428.8	2,022.2	2,022.2	96.7	270.2
	Construction – Total ROI Output ($Million in peak year)							
	36.3	101.7	54.0	43.3	490.4	490.4	65.4	(c)
	Operations – Total ROI Output ($Million in peak year)							
	2,549.2	2,596.0	2,564.8	2,027.7	3,191.6	3,191.6	152.7	398.1
Infrastructure[(h)]	**Construction – Electricity Use (MWh/yr)**							
	160	160	160	160	16,000	16,000	minimal	(c)
	Operations – Electricity Use (MWh/yr)							
	19,000	21,000	21,000	9,400	53,000	53,000	4,200	5,200
	Construction – Electricity Peak Load (MW)							
	0.02	0.02	0.02	0.02	1.8	1.8	minimal	(c)
	Operations – Electricity Peak Load (MW)							
	2.5	2.7	2.8	1.1	3.6	3.6	0.55	0.67

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[a] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[a] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[b] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[b] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
	Construction – Fuel Use (gal/yr)							
	55,000	59,000	56,000	70,000	300,000	540,000	4,000	(c)
	Operations – Fuel Use (gal/yr)							
	7,200	14,000	14,000	0	180,000	180,000	1,500	1,500
	Construction – Water Use (millions of gal/yr)							
Infrastructure[h] (continued)	2.6	3.6	3.1	2.6	1.1	2	1	(c)
	Operations – Water Use (millions of gal/yr)							
	5.3	6.3	6.3	2.5	8.6	8.6	1.8	1.4
	Construction – Sewage Generation (millions of gal/yr)							
	0.055	1.1	0.56	0.055	1.1	1.1	1	(c)
	Operations – Sewage Generation (millions of gal/yr)							
	5.3	6.3	6.3	2.5	8.6	8.6	1.8	1.4
	Construction – CH-TRU Waste (job control waste) (m^3)							
	69	170	69	110	0	0	110	(c)
	Operations – CH-TRU Waste (job control waste) (m^3)							
	2,000	2,200	2,300	1,600	2,000	2,000	170	200
	Construction – LLW (m^3)							
Waste Generation	360	360	360	560	0	12,000	0	(c)
	Operations – LLW (m^3)							
	23,000	25,000	26,000	17,000	23,000	23,000	2,400	2,200
	Construction – MLLW (m^3)							
	4.8	4.8	4.8	7.4	0	210	0	(c)

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Waste Generation (continued)	**Operations – MLLW (m^3)**							
	42	42	42	89	42	42	0	3.7
	Construction – Liquid LLW (m^3)							
	0	0	0	0	0	0	0	(c)
	Operations – Liquid LLW (m^3)							
	65,000	65,000	65,000	65,000	65,000	65,000	0	0
	Construction – Solid Hazardous Waste (m^3)							
	2.4	2.4	2.4	3.1	45	6,600	0	(c)
	Operations – Solid Hazardous Waste (m^3)							
	6.6	6.6	6.6	6.8	6.6	6.6	0.0	0.7
	Construction – Solid Non-Hazardous Waste (m^3)							
	210	280	280	280	1,000	6,900	66	(c)
	Operations – Solid Non-Hazardous Waste (m^3)							
	14,000	16,000	16,000	1,500	14,000	14,000	1,600	1,400
Environmental Justice	**Construction and Operations**							
	No disproportionately high and/or adverse impacts on minority or low-income populations affected by activities at either the LANL or SRS sites are expected.							
Offsite Transportation Impacts[j]	**Construction - Traffic Fatalities Risk from Non-Radioactive Hazardous Waste Construction Materials Shipments**							
	(i)	(i)	(i)	(i)	0.24	0.24	0	0
	Operations - Incident-Free Crew Impact (LCFs) from Operational Radioactive Materials Shipments							
	0 (0.2)	0 (0.2)	0 (0.2)	0 (0.08)	0 (0.2)	0 (0.2)	0 (0.03–0.04)	0 (0.03–0.04)
	Operations - Incident-Free Population Impact (LCFs) from Operational Radioactive Material and Waste Shipments							
	0 (0.2)	0 (0.2)	0 (0.2)	0 (0.08)	0 (0.2)	0 (0.2)	0 (0.03–0.04)	0 (0.04–0.05)

Area of Impact	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP[a] Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP[a] Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[b] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[b] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
Offsite Transportation Impacts (continued)[j]	**Operations - Radiological Accident Impact (LCFs) from Operational Radioactive Material and Waste Shipments**							
	0 (0.0001)	0 (0.0001)	0 (0.0001)	0 (0.000001)	0 (0.00006)	0 (0.00006)	0 (0.00003–0.00005)	0 (0.00005–0.00007)
	Operations - Traffic Fatalities Risk from Operational Radioactive Material and Waste Shipments							
	1 (0.6)	1 (0.6)	1 (0.6)	0 (0.3)	1 (0.6)	1 (0.6)	0 (0.1)	0 (0.1)
	Operations - One-Way Distance Traveled (million km) for Operational Radioactive Material and Waste Shipments							
	12	12	12	6.9	12	12	2-2.2	2.5-2.7
	Operations - Carbon Dioxide Equivalents Associated with Transportation (MT)							
	23,800	23,800	23,800	14,200	24,900	24,900	5,560[k]	

CH-TRU = contact-handled transuranic; CRMP = Cultural Resources Management Plan; CSWTF = Central Sanitary Wastewater Treatment Facility; FTE = full time equivalent (employee); HAP = hazardous air pollutant; LANL = Los Alamos National Laboratory; LCF= latent cancer fatality (the risk of LCF in an individual and the number of LCF in an exposed population); LLW = low-level radioactive waste; MEI = maximally exposed individual; MLLW = mixed low-level radioactive waste; NHPA = National Historic Preservation Act; NNSA = National Nuclear Security Administration; NPMP = non-pit metal processing; PA = Programmatic Agreement; PDP = pit disassembly and processing; ROI = region of influence; SPDP EIS = Surplus Plutonium Disposition Program Environmental Impact Statement; SRS = Savannah River Site; SWTP = Sanitary Wastewater Treatment Plant.

(a) Impacts are presented for PDP and NPMP separately because PDP and NPMP would occur at different sites in the SRS NPMP Sub-Alternative, unlike the other sub-alternatives. The impacts of 34 MT PDP and 7.1 MT NPMP together bound the impacts of the total 34 MT of surplus plutonium that would be processed in the Preferred Alternative.

(b) Both PDP and NPMP would occur in F-Area and K-Area, respectively, in the F-Area PDP Option and K-Area PDP Option.

(c) No construction/modification activities are anticipated.

(d) LCFs to the public and the MEI from construction activities for all sub-alternatives other than the All SRS Sub-Alternative were not calculated because doses and corresponding LCFs to workers at the site were extremely low and the expectation is that a negligible dose and corresponding LCF would be received by noninvolved workers, the MEI, and other members of the public.

(e) Population doses and the resulting LCFs are split between LANL and SRS. The population LCF at any one site will be lower than the total LCF shown.

(f) Beyond-design-basis accidents are not included in this table. See Appendix D for more detail.

(g) The maximum LCF for the population in the vicinity of LANL is 0 and the maximum LCF for the population in the vicinity of SRS is 1.

(h) Differences in electricity are based on the estimated facility needs at the two facilities. Diesel and other fuel types are not expected to be used at LANL as there will be no additional generators required.

(i) The All SRS Sub-Alternative involves the largest quantity of construction material and number of hazardous waste shipments when compared to the other Preferred Alternative sub-alternatives (as discussed in Appendix E of this SPDP EIS). The elements of proposed construction activities are discussed further in Sections 4.1.2 and 4.1.3 of this SPDP EIS. Therefore, the impacts under the other sub-alternatives are less than those provided for the All SRS Sub-Alternative.

(j) The cited operational radioactive material shipments and impacts for the Preferred Alternative are only those related to the processing of the pit plutonium. The shipments and the related impacts for processing non-pit plutonium under the Preferred Alternative are within the bounds cited under the No Action Alternative.

(k) Value based on the maximum number of kilometers traveled for the two No Action Alternative options; see Table 4-33.

Sources: Information is summarized from the applicable subject areas in Section 4 and cross-site tables in Appendix C.

S.8 References

This section provides citations for all references used in this Draft SPDP EIS Summary and includes URLs for references that are available on the Internet at the time of publication. NNSA recognizes that URLs may change or become broken links over time due to the dynamic nature of the Internet. NNSA is committed to maintaining existing links to our NEPA documents and references to the extent possible. If a link to an NNSA document becomes broken, NNSA will endeavor to fix the link in a timely manner. References that are not available online are available from NNSA upon request if NNSA determines that they may be released to the public (e.g., they contain no classified information or otherwise protected materials). Please see the Cover Sheet of this SPDP EIS for details about how to request additional information

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