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

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Cover Sheet

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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 2018). 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

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
ac	acre(s)
ACS	American Community Survey
ADT	average daily vehicle trip
AEI	Area of Environmental Interest
ALARA	as low as reasonably achievable
APCS	Abandonment of Panel Closures in the South
ARIES	Advanced Recovery and Integrated Extraction System
AROD	Amended Record of Decision
ATSDR	Agency for Toxic Substances and Disease Registry
ATWIR	Annual TRU Waste Inventory Report
BLM	Bureau of Land Management
BMP	best management practice
C&P	characterization and packaging
CAA	Clean Air Act
CBFO	(DOE) Carlsbad Field Office
CCC	criticality control container
CCO	criticality control overpack
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CH-TRU	contact-handled transuranic
Ci	curie(s)
cm	centimeter(s)
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
CRA	Compliance Recertification Application
CRMP	Cultural Resources Management Plan
CSWTF	Central Sanitary Wastewater Treatment Facility
dBA	A-weighted decibel
DD&D	deactivation, decontamination, and decommissioning
DHF	Drum Handling Facility
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DSA	documented safety analyses
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act

FGR	Federal Guidance Report
FM	Farm-to-Market (Road)
FR	*Federal Register*
ft	foot (feet)
ft^3	cubic foot (feet)
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
g	acceleration due to gravity
g	gram(s)
gal	gallon(s)
gal/yr	gallon(s) per year
GHG	greenhouse gas
gpd	gallon(s) per day
gpm	gallon(s) per minute
GWP	global warming potential
HAP	hazardous air pollutant
HEPA	high-efficiency particulate air (filter)
HEU	highly enriched uranium
hr	hour(s)
HVAC	Heating, ventilation, and air-conditioning
in.	inch(es)
IPCC	Intergovernmental Panel on Climate Change
KAC	K-Area Complex
KBI	K-Area bounding isotopic
kg	kilogram(s)
KIS	K-Area Interim Storage
km	kilometer(s)
L	liter(s)
LANL	Los Alamos National Laboratory
lb	pound(s)
LCF	latent cancer fatality
LLW	low-level (radioactive) waste
LOS	level of service
LSC	Logistical Support Center
LWA	Land Withdrawal Act
m	meter(s)
m/s	meter(s) per second
m^3	cubic meter(s)
MACCS	MELCOR Accident Consequence Code System
MAR	material at risk
MEI	maximally exposed individual
MFFF	Mixed Oxide Fuel Fabrication Facility

mi	mile(s)
MLLW	mixed low-level radioactive waste
MOX	mixed oxide
mpg	mile(s) per gallon
mph	mile(s) per hour
mrem	millirem
MT	metric ton(s)
MVA	mega volt amp(s)
MW	megawatt(s)
MWh	megawatt-hour(s)
MWh/yr	megawatt-hour(s) per year
NAAQS	National Ambient Air Quality Standard
NDA	nondestructive assay
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPMP	non-pit metal processing
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
ODS	ozone-depleting substances
ORR	Oak Ridge Reservation
OST	NNSA Office of Secure Transportation
PA	Programmatic Agreement
Pantex	Pantex Plant
PCB	polychlorinated biphenyl
pCi	picocurie(s)
PDC	pit disassembly and conversion
PDCF	Pit Disassembly and Conversion Facility
PDP	pit disassembly and processing
PEIS	programmatic environmental impact statement
PF-4	Plutonium Facility-4
PGA	peak ground acceleration
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
psig	pounds per square inch gauge
Pu	plutonium

PuE	plutonium-239 dose equivalent
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man
RH-TRU	remote-handled transuranic
RLUOB	Radiological Laboratory/Utility/Office Building
RLWTF	Radioactive Liquid Waste Treatment Facility
ROD	Record of Decision
ROI	region of influence
s	second(s)
S&D	storage and disposition
SA	supplement analysis
SC	South Carolina
SCDHEC	South Carolina Department of Health and Environmental Control
SEIS	supplemental environmental impact statement
SHPO	State Historic Preservation Office(r)
SNL	Sandia National Laboratories
SO_2	sulfur dioxide
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
SR	State Route
SRPPF	Savannah River Plutonium Processing Facility
SRS	Savannah River Site
SWEIS	Site-Wide Environmental Impact Statement
SWPPP	stormwater pollution prevention plan
SWSP	Sanitary Wastewater System Plant
SWTP	Sanitary Wastewater Treatment Plant
T	ton(s)
TA	Technical Area
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCP	Traditional Cultural Property
TDEC	Tennessee Department of Environment and Conservation
TRU	transuranic
TRUPACT-II	Transuranic Package Transporter Model-II
TSCA	Toxic Substances Control Act
TWF	Transuranic Waste Facility
U.S.	United States
U.S.C.	United States Code

USGS	United States Geological Survey
VOC	volatile organic compound
VTR	Versatile Test Reactor
WAC	Waste Acceptance Criteria
WebTRAGIS	Web Transportation Routing Analysis Geographic Information System
WG	weapons-grade
WIPP SEIS	*Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement*
WIPP	Waste Isolation Pilot Plant
WSB	Waste Solidification Building
Y-12	Y-12 National Security Complex
yd^3	cubic yard(s)
yr	year(s)

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.

APPENDIX A

RELATED NATIONAL ENVIRONMENTAL POLICY ACT REVIEWS AND DECISION DOCUMENTS

This appendix includes a summary of National Environmental Policy Act (NEPA; 42 U.S.C. § 4321 et seq.) reviews related to this *Surplus Plutonium Disposition Program Environmental Impact Statement* (SPDP EIS). Section A.1 covers NEPA reviews and decision documents specific to the Surplus Plutonium Disposition Program (SPDP); Section A.2 covers other related U.S. Department of Energy NEPA reviews for activities that support the SPDP; and Section A.3 provides the references cited in this appendix.

A.1 Surplus Plutonium Disposition NEPA Reviews

Table A-1 describes NEPA reviews and decision documents that have been developed in support of decisions related to long-term storage and disposition of surplus plutonium.

Table A-1. NEPA Reviews Developed in Support of Decisions Related to Long-Term Storage and Disposition of Surplus Plutonium

NEPA Review	Overview	Decision Document(s)
[1996] DOE/EIS-0229: *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (DOE 1996b)	Evaluated the environmental consequences of alternative strategies for the long-term storage and disposition of surplus plutonium and HEU. The following four SAs were issued: **[1998] DOE/EIS-0229-SA-1**: *Supplement Analysis for Storing Plutonium in the Actinide Packaging and Storage Facility and Building 105-K at the Savannah River Site* (DOE 1998c) **[2002] DOE/EIS-0229-SA-2**: *Supplement Analysis for Storage of Surplus Plutonium Materials in the K-Area Material Storage Facility at the Savannah River Site* (DOE 2002) **[2003] DOE/EIS-0229-SA-3**: *Supplement Analysis – Fabrication of Mixed Oxide Fuel Lead Assemblies in Europe* (DOE 2003b) **[2007] DOE/EIS-0229-SA-4**: *Supplement Analysis – Storage of Surplus Plutonium Materials at the Savannah River Site* (DOE 2007b)	**[1997] 62 FR 3014** ROD: DOE decided to pursue a dual-path strategy for plutonium disposition; immobilization and MOX fuel. Both waste forms would be emplaced in a geologic repository. Plutonium would be immobilized in glass or ceramic material along with high-level radioactive waste. Other surplus plutonium would be fabricated into MOX fuel, irradiated in domestic commercial reactors, and the spent MOX fuel would be disposed of in a deep geologic repository. DOE also decided to implement the Preferred Alternative to provide storage for weapons-usable fissile materials, including plutonium and HEU. **[1998] 63 FR 43386** AROD: DOE decided to proceed with accelerated shipment of non-pit surplus plutonium from the Rocky Flats Environmental Technology Site and the Hanford Site to SRS before completion of the Actinide Packaging and Storage Facility. **[2001] 66 FR 7888** AROD: DOE decided to cancel the Actinide Packaging and Storage Facility. **[2002] 67 FR 19432** AROD: DOE decided to (1) cancel the immobilization portion due to budgetary constraints, (2) select the alternative of immediate implementation of consolidated long-term non-pit surplus plutonium storage at SRS, and (3) adjust the manner in which surplus plutonium pits will be stored at the Pantex Plant. **[2007] 72 FR 51807** AROD: DOE decided to consolidate long-term storage of non-pit surplus plutonium from the Hanford Site, LANL, and Lawrence Livermore National Laboratory at SRS.

NEPA Review	Overview	Decision Document(s)
[1998] DOE/EA-1207: *Pit Disassembly and Conversion Demonstration Environmental Assessment and Research and Development Activities* (DOE 1998a)	Evaluated the environmental consequences of the ARIES, a pit disassembly and conversion demonstration project at LANL. Plutonium oxide produced from the ARIES system was designated for disposition via MOX fuel.	**[1998] 63 FR 44851** FONSI: DOE concluded that no significant environmental consequences would result from implementation of the proposed action.
[1999] DOE/EIS-0283: *Surplus Plutonium Disposition Final Environmental Impact Statement* (SPD EIS; DOE 1999d)	Tiered from **[1996] DOE/EIS-0229** (DOE 1996b); evaluated the environmental consequences from several plutonium disposition pathways, including fabrication of MOX fuel for use in existing domestic commercial nuclear power reactors. The following SAs were issued: **[2003] DOE/EIS-0283-SA1**: *Changes Needed to the Surplus Plutonium Disposition Program, Supplement Analysis and Amended Record of Decision* (DOE 2003a). Evaluated disposal of 34 MT of plutonium by fabricating it into MOX fuel. **[2008] DOE/EIS-0283-SA-2***: Supplement Analysis for Construction and Operation of a Waste Solidification Building at the Savannah River Site* (DOE 2008c). Evaluated construction and operation of the Waste Solidification Building at SRS to treat liquid waste generated from the MFFF and Pit Disassembly and Conversion Facility. **[2012] DOE/EIS-0283-SA-03***: Supplement Analysis: Transportation of Depleted Uranium Hexafluoride for Conversion to Depleted Uranium* (DOE 2012c). Evaluated transportation of depleted uranium hexafluoride from Piketon, Ohio, to Richland, Washington, for conversion to depleted uranium	**[2000] 65 FR 1608** ROD: DOE decided to disposition up to 50 MT of plutonium at SRS using a hybrid approach that involves both the ceramic can-in-canister immobilization approach and the MOX fuel approach. DOE decided to construct and operate a MFFF, a Pit Disassembly and Conversion Facility, and an Immobilization Facility at SRS. **[2002] 67 FR 19432** AROD: DOE decided to cancel the immobilization portion of the disposition strategy, select the alternative of immediate implementation of consolidated long-term storage of surplus plutonium at SRS, and adjust the manner of surplus plutonium storage at Pantex. **[2003] 68 FR 20134** AROD: DOE decided to fabricate 6.5 MT of surplus weapons-grade plutonium, originally intended for immobilization, into MOX fuel, including the material transferred from the Rocky Flats Environmental Technology Site to SRS for storage. DOE also changed the amount of surplus plutonium to be fabricated into MOX fuel from 33 MT to 34 MT. **[2003] 68 FR 64611, [2008] 73 FR 75088** AROD: DOE decided to construct and operate the Waste Solidification Building in close proximity to the MFFF and Pit Disassembly and Conversion Facility in F-Area at SRS. **[2020] 85 FR 53350** AROD: DOE decided to prepare and dispose of an additional 7.1 MT of non-pit surplus plutonium as CH-TRU waste at the WIPP facility using the dilute and dispose strategy. DOE also decided that non-pit metal processing may be performed at either LANL or SRS.

NEPA Review	Overview	Decision Document(s)
	oxide, followed by shipment of the depleted uranium oxide to SRS. **[2020] DOE/EIS-0283-SA-4**: *Supplement Analysis for Disposition of Additional Non-Pit Surplus Plutonium* (DOE 2020c). Evaluated preparation of up to 7.1 MT of non-pit surplus plutonium for disposal at the WIPP facility.	
[1999] DOE/EIS-0283-S1: *Supplement to the Surplus Plutonium Disposition Draft Environmental Impact Statement* (SPD Draft EIS; DOE 1999c)	Evaluated the environmental consequences of using MOX fuel in six specific reactors as well as other program changes made since the issuance of the SPD Draft EIS (DOE/EIS-0283 [DOE 1999d]).	**[2000] 65 FR 1608** ROD: DOE decided to immobilize approximately 17 metric tons of surplus plutonium and use up to 33 metric tons of surplus plutonium as MOX fuel.
[2005] DOE/EA-1538: *Environmental Assessment for the Safeguards and Security Upgrades for Storage of Plutonium Materials at the Savannah River Site* (DOE 2005a)	Evaluated the environmental consequences of installation and operation of the K-Area Container Surveillance and Storage Capability for non-pit surplus plutonium surveillance and stabilization, and packaging of plutonium from F-Area in DOE-STD-3013 containers for storage in K-Area, and installation of safeguards and security upgrades in K-Area and the Advanced Tactical Training Area at SRS.	**[2005] FONSI** (DOE 2005b): DOE concluded that safety and security enhancements for storage of plutonium-bearing materials at SRS did not constitute a major Federal action significantly affecting the quality of the human environment.
[2005] NRC NUREG-1767: *Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina* (NRC 2005a)	Evaluated the environmental consequences of the construction and operation of the MFFF. Supports the analysis of construction of the PDP capability in F-Area for the **All SRS Sub-Alternative** capability.	**[2005] Construction Authorization** (NRC 2005b): Authorization to construct a MFFF at SRS.
[2015] DOE/EIS-0283-S2: *Surplus Plutonium Disposition Supplemental*	Evaluated the environmental consequences of dispositioning 13.1 MT of surplus plutonium for which a disposition path was not assigned. DOE also	**[2015] 80 FR 80348** ROD: DOE decided the Preferred Alternative is to prepare the 6 MT of non-pit surplus plutonium for eventual disposal at the WIPP facility.

NEPA Review	Overview	Decision Document(s)
Environmental Impact Statement (SPD Supplemental EIS; DOE 2015)	updated the analyses for the 34 MT of surplus plutonium analyzed in the SPD EIS and analyzed options for pit disassembly and conversion and the use of MOX fuel in Tennessee Valley Authority reactors. Supports the **PDP – LANL, Dilute – SRS, and C&P – SRS** capabilities. The following Interim Actions were issued during the development of DOE/EIS-0283-S2 (DOE 2015): **[December 2008] Processing of Plutonium Materials from the DOE Standard 3013 Surveillance Program in H-Canyon at the Savannah River Site** (DOE 2008b): Decision to process approximately 180 kg of plutonium materials that would be removed from DOE-STD-3013 containers as required by the surveillance program. DOE found DOE/EIS-0220 analyses (DOE 1995a) to be representative of impacts. **[September 2009] Processing of Plutonium Materials in H-Canyon at the Savannah River Site** (DOE 2009a): Decision to process up to 420 kg of plutonium materials in H-Canyon for vitrification in the Defense Waste Processing Facility. DOE found DOE/EIS-0220 (DOE 1995a) analyses to be representative of impacts. **[March 2011] Disposition of Plutonium Materials from the DOE Standard 3013 Surveillance Program at the Savannah River Site (SRS)** (DOE 2011a): Amended the 2008 Determination by adding WIPP disposal as a second alternative. Proposal to dispose of approximately 85 kg of plutonium materials that would be removed from DOE-STD-3013 containers as required by the surveillance program. DOE found the	**[2016] 81 FR 19588** ROD: DOE decided to prepare 6 MT of non-pit surplus plutonium for disposal at the WIPP facility.

NEPA Review	Overview	Decision Document(s)
	analyses in DOE/EIS-0220 (DOE 1995a) and DOE/EIS-0217 (DOE 1995b) to be representative of impacts. **[April 2011] Flexible Manufacturing Capability for the MFFF** (DOE 2011d): Proposal to modify MFFF design to allow the flexibility necessary to manufacture fuel for a variety of reactor designs. DOE found that impacts would be bounded by DOE/EIS-0283 (DOE 1999d) analyses. **[October 2011] Disposition of Certain Plutonium Materials Stored at the Savannah River Site** (DOE 2011c): Proposal to dispose of approximately 500 kg of surplus, non-pit surplus plutonium materials at the WIPP facility. DOE found the analyses in DOE/EIS-0220 (DOE 1995a) and DOE/EIS-0217 (DOE 1995b) to be representative of impacts. **[June 2012] Use of H-Canyon/HB-Line to Prepare Feed for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site** (DOE 2012b): Proposal to prepare up to 2.4 MT of plutonium metal and oxide as feed material for MFFF using the H-Canyon/HB-Line. DOE found that the impacts of processing these materials would be significantly less than the historical levels of operating the H-Canyon/HB-Line facilities. **[April 2013] K-Area Materials Storage (KAMS) Area Expansion at the Savannah River Site (SRS)** (DOE 2013b): Decision to expand plutonium storage into the Final Storage Area and Presentation Room of the K-Area Complex. DOE found that there would be no significant impacts on the environment.	

NEPA Review	Overview	Decision Document(s)
	[October 2013] Disposition of Certain Plutonium Materials at the K-Area Complex, Savannah River Site (DOE 2013a): Amends the 2011 decision by adding a second SRS facility (K-Area Complex) to prepare surplus plutonium for disposal at the WIPP facility. DOE found the analyses in DOE/EIS-0220 (DOE 1995a) and DOE/EIS-0217 (DOE 1995b) to be representative of impacts.	
2017 Categorical Exclusion 017321: Construction of Concrete Storage Pad with Soft Enclosure, K-Area (DOE 2017a)	Evaluated the proposal for the construction of a concrete storage pad with soft enclosure for C&P of diluted surplus plutonium in K-Area at SRS and determined that the proposed action meets the requirements for a categorical exclusion. Supports the **C&P – SRS** capability.	NA
2018 Memorandum for the Installation and Operation of Gloveboxes for Plutonium Processing at K-Area, Savannah River Site (DOE 2018b)	Evaluated the proposal to install and operate three additional gloveboxes in K-Area at SRS. DOE found that the analysis in DOE/EIS-0283-S2 (DOE 2015) coupled with documentation demonstrating the timing and throughput assumption of the three gloveboxes and ROD (81 FR 19588) acknowledging the need for additional glovebox capability are sufficient and no additional NEPA review is required. Supports the **Dilute – SRS** capability.	NA
[1995] DOE/EIS-0220: *Final Environmental Impact Statement Interim Management of Nuclear Materials* (DOE 1995a)	Evaluated alternatives for stabilization of nuclear materials stored at SRS. The following SAs were issued: **[1996] DOE/EIS-0220-SA-05 (formerly identified as DOE/EIS-0220-SA-00)**: Supplemental Analysis of Seismic Activity on F-Canyon (DOE 1996c): Evaluated new information regarding the effect of a severe earthquake on F-Canyon at SRS and compared the new information with the evaluation of earthquake accident impacts presented in the IMNM EIS.	**[1995] 60 FR 65300** ROD: DOE decided to initiate actions to stabilize SRS materials that represent vulnerabilities in their current storage condition or may present a vulnerability in the next 10 years, and continue to manage stable materials. **[1996] 61 FR 6633** Supplemental ROD: DOE decided to initiate actions to stabilize additional SRS materials including Mark-16 and Mark-22 fuels, as well as other aluminum-clad targets.

NEPA Review	Overview	Decision Document(s)
	[1997] DOE/EIS-0220-SA-03 (formerly identified as DOE/EIS-0220-SA-01): Supplemental Analysis of Seismic Activity on H-Canyon (DOE 1997c): Incorporated up-to-date seismic data, including a detailed evaluation of the likelihood of a severe earthquake and the estimated resulting structural damage of H-Canyon. This evaluation indicated that a severe earthquake capable of producing structural damage comparable to that described in the IMNM EIS would not occur more frequently than once in 5,500 years. That is less frequent than the severe earthquake occurrence assumed in the IMNM EIS. **[1997] DOE/EIS-0220-SA-04**: Supplement Analysis for Stabilization of TRR Fuel (DOE 1997b): Evaluated stabilizing the TRR fuel by the Processing to Metal alternative in the IMNM EIS. **[2009] DOE/EIS-0220-SA-01**: Supplemental Analysis Interim Management of Nuclear Materials Final Environmental Impact Statement (DOE 2009): Evaluated chemically processing and vitrifying in SRS facilities approximately 5 kgs of low assay plutonium material received from the Hanford Site. **[2016] DOE/EIS-0220-SA-02**: Supplement Analysis of the Mark-18A Target Material Recovery Program at the Savannah River Site (DOE 2016a): Evaluated processing 65 Mark-18A targets stored at Savannah River National Laboratory to recover isotopes needed for nonproliferation and medical purposes.	**[1996] 61 FR 48474** Supplemental ROD: DOE decided to stabilize additional SRS materials including plutonium-239 solutions, and neptunium-237 solution and targets. **[1997] 62 FR 17790** Supplemental ROD: DOE decided to stabilize the remaining TRR spent nuclear fuel located in the RBOF at SRS, using the F-Canyon and FB-Line facilities. **[1997] 62 FR 61099** Supplemental ROD: DOE decided to (1) add an additional method, Processing and Storage for Vitrification in the Defense Waste Processing Facility, to those being implemented for the management of plutonium and uranium stored in vaults; and (2) amend its September 6, 1996, ROD to stabilize the plutonium-239 and neptunium-237 solutions stored in H-Canyon and obsolete neptunium-237 targets stored in K-Reactor to oxide forms using H-Canyon. **[2001] 66 FR 7888** AROD: DOE decided to cancel the Actinide Packaging and Storage Facility and instead install the stabilization and packaging capability in Building 235–F, an existing plutonium storage and processing facility at SRS. DOE also decided to use existing SRS vault storage space, including space in Building 235–F, to store plutonium (and other nuclear material) pending disposition. **[2001] 66 FR 55166** AROD: DOE canceled the Building 235–F Plutonium Packaging and Stabilization project and the F-Canyon Americium/Curium Vitrification project. To establish the capability to package plutonium in accordance with the plutonium storage standard, DOE will modify existing furnaces, or install new ones, and install an outer can welding capability within the FB-Line facility, in Building 221–F. To stabilize the F-Canyon Americium/Curium solution, DOE will implement the Processing and Storage for Vitrification in the Defense Waste Processing Facility Alternative. **[2002] 67 FR 45710** Supplemental ROD: DOE decided to implement the Processing and Storage for Vitrification in the Defense Waste Processing

NEPA Review	Overview	Decision Document(s)
		Facility Alternative as well as the Process to Oxide Alternative previously selected for the H-Canyon plutonium solutions. **[2003] 68 FR 44329** AROD: DOE decided to dispose of as waste the majority of one type and a small portion of a second type of nuclear materials analyzed in the IMNM EIS. **[2018] 83 FR 9847** AROD: DOE decided to process 65 Mark-18A targets stored at Savannah River National Laboratory to recover plutonium-244 and other valued isotopes.

ARIES = Advanced Recovery and Integrated Extraction System; AROD = Amended Record of Decision; C&P = characterization and packaging; CH-TRU = contact-handled transuranic; DOE = U.S. Department of Energy; EA = Environmental Assessments; EIS = environmental impact statement; FONSI = Finding of No Significant Impact; FR = *Federal Register;* HEU = highly enriched uranium; IMNM = Interim Management of Nuclear Materials; KAMS = K-Area Materials Storage; LANL = Los Alamos National Laboratory; NA = not applicable because there is no associated decision document; NEPA = *National Environmental Policy Act*; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; PDP = pit disassembly and processing; RBOF = Receiving Basin for Offsite Fuels; ROD = Record of Decision; SA = supplement analysis; SPD = Surplus Plutonium Disposition; SRS = Savannah River Site; TRR = Taiwan Research Reactor; WIPP = Waste Isolation Pilot Plant.

A.2 Other Related NEPA Reviews

Table A-2 describes additional NEPA reviews for activities that support carrying out the SPDP as described in this SPDP EIS. Descriptions for applicable NEPA reviews in Table A-1 are not repeated in Table A-2.

Table A-2. Summary of Other Related DOE NEPA Reviews

NEPA Review	Overview	Decision Document(s)
[1996] DOE/EIS-0225: *Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components*	Evaluated the environmental consequences related to storage, including storage of up to 20,000 pits at Pantex. Supports the **Pit Storage – Pantex** capability. The following six SAs were issued: **[1998] DOE/EIS-0225-SA-01**: *Supplement Analysis for: Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components – AL-R8 Sealed Insert Container* (DOE 1998b) **[2000] DOE/EIS-0225-SA-02**: *Final Supplement Analysis for Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapons Components Hazardous Waste Treatment and Processing Facility* (DOE 2000a) SA-03 through SA-06 were prepared in accordance with DOE's NEPA implementing procedures, which require evaluation of its site-wide EISs at least every 5 years by preparation of a SA. **[2003] DOE/EIS-0225/SA-03**: *Supplement Analysis for the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE 2003c) **[2008] DOE/EIS-0225/SA-04**: *Supplement Analysis for the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE 2008d)	**[1997] 62 FR 3880** ROD: DOE decided to implement the Preferred Alternative, including storage of up to 20,000 pits at Pantex.

NEPA Review	Overview	Decision Document(s)
	[2012] DOE/EIS-0225-SA-05: *Supplement Analysis for the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE 2012a) **[2018] DOE/EIS-0225-SA-06**: *Final Supplement Analysis for the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapons Components* (DOE 2018a)	
[1999] DOE/EIS-0293: *Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico* (DOE 1999a)	On November 26, 1997, Congress passed Public Law 105-119, the *Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act*, 1998 (the Act). This Act, in part, directs the Secretary of Energy to convey to the Incorporated County of Los Alamos, New Mexico (the County), or its designee, and transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso, parcels of land under the jurisdictional administrative control of the Secretary at LANL.	**[2000] 65 FR 14952** ROD: DOE selected the Preferred Alternative; seven tracts will be conveyed or transferred in full, and three tracts will be conveyed or transferred in part, based on DOE's continuing or future need for an individual tract, or a portion of the tract, to meet the national security mission support function at the LANL. **[2002] 65 FR 45495** AROD: NNSA amended the previous ROD to reflect that NNSA would no longer need to retain an 8 ac portion located at the western end of the Airport Tract. Additionally, two portions of the White Rock Y Tract comprising about 74 ac of highway easement are no longer required as health and safety buffer areas. **[2005] 70 FR 48378** AROD: NNSA amended the previous ROD to reflect that NNSA no longer needs to retain a 32.3 ac portion of the Airport Tract located along the south side of State Road 502 as a health and safety buffer area. **[2012] 77 FR 3257** AROD: NNSA amended the previous ROD to reflect that NNSA no longer needs to retain the remaining acreage of LANL's Technical Area 21 Tract (about 245 ac) and the remaining acreage of the Airport Tract (about 55 ac).

NEPA Review	Overview	Decision Document(s)
[2008] DOE/EIS-0380: *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2008a)	Site-Wide EIS that updated the 1999 Site-Wide EIS (DOE/EIS-0238 [DOE 1999b]) and evaluated the environmental consequences associated with the continued operation of LANL, including the production of plutonium oxide. Supports the **PDP – LANL** capability. **[2018] DOE/EIS-0380-SA-05**: *Supplement Analysis of the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory* (DOE 2018d). This analysis was prepared in accordance with DOE's NEPA implementing procedures, which require evaluation of its site-wide EISs at least every 5 years by preparation of an SA. **[2020] DOE/EIS-0380-SA-06**: *Final Supplement Analysis of the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory for Plutonium Operations* (DOE 2020b). NNSA determined that no further NEPA analysis is required prior to implementing elements of the Expanded Operations Alternative, as needed, to produce a minimum of 30 pits per year during 2026 and to implement surge efforts to exceed 30 pits per year.	**[2008] 73 FR 55833** ROD: DOE selected the No Action Alternative, continued operation, including the ability to produce plutonium oxide onsite, and to ship such materials from LANL to other sites within the DOE Complex. **[2009] 74 FR 33232** ROD: DOE decided to proceed with seismic upgrades to the Plutonium Facility in Technical Area 55 at LANL. **[2020] 85 FR 54544** AROD: DOE decided to implement elements of the 2008 LANL Site-Wide EIS Expanded Operations Alternative needed to produce a minimum of 30 pits per year during 2026 and to implement surge efforts to exceed 30 pits per year.
[1980] DOE/EIS-0026: *Final Environmental Impact Statement for the Waste Isolation Pilot Plant* (DOE 1980)	Evaluated environmental consequences of managing waste generated in the national defense program, including the development, operation, and transportation activities associated with the WIPP facility. Supports the **WIPP Disposition** capability.	**[1981] 46 FR 9162** ROD: DOE decided to proceed with the WIPP project.

NEPA Review	Overview	Decision Document(s)
[1990] DOE/EIS-0026-S1: *Final Supplement Environmental Impact Statement Waste Isolation Pilot Plant* (DOE 1990)	Evaluated new geological and hydrological information and information/assumptions used to analyze environmental consequences. Supports the **WIPP Disposition** capability.	**[1990] 55 FR 25689** ROD: DOE decided to continue the phased development of the WIPP facility to demonstrate the safe disposal of post-1970 TRU waste.
[1997] DOE/EIS-0026-S-2: *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997d)	Evaluated the environmental consequences of ways to dispose of TRU waste at the WIPP facility and how much TRU waste to dispose of at the WIPP facility. Supports the **WIPP Disposition** capability. The following SAs support operations related to disposal of diluted plutonium oxide CH-TRU waste: **[2005] DOE/EIS-0026-SA05**: *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE 2005c). This analysis was prepared in accordance with DOE's NEPA implementing procedures, which require evaluation of its site-wide EISs at least every 5 years by preparation of an SA. **[2009] DOE/EIS-0026-SA-07**: *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE 2009b). This analysis was prepared in accordance with DOE's NEPA implementing procedures, which require evaluation of its site-wide EISs at least every 5 years by preparation of an SA. **[2014] DOE/EIS-0026-SA-09**: *Supplement Analysis for a Proposal to Temporarily Store Defense Transuranic Waste Prior to Disposal at the Waste Isolation Pilot Plant* (DOE 2014). This analysis examined a proposal to temporarily store a limited amount of TRU waste at the Waste Control Specialists, LLC facility in Andrews, Texas. Based on the analyses, DOE concluded that neither a supplemental EIS nor an amended ROD were necessary.	**[1998] 63 FR 3624** ROD: DOE will dispose of up to 175,600 m^3 (6.2 million ft^3) of TRU waste generated by defense activities at the WIPP facility after preparation (i.e., treatment, as necessary, including packaging) to meet WIPP's waste acceptance criteria.

NEPA Review	Overview	Decision Document(s)
	[2016] DOE/EIS-0026-SA-10: *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE 2016b). This analysis evaluated the proposed action to resume the transportation of TRU waste to the WIPP facility by truck and the operation of the WIPP facility for the disposal of TRU waste. **[2017] DOE/EIS-0026-SA-11**: *Supplement Analysis for the New Permanent Ventilation System* (DOE 2017b). This analysis evaluated construction and operation of the proposed Permanent Ventilation System. **[2021] DOE/EIS-0026-SA-12**: *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operation* (DOE 2021). This analysis evaluated the excavation of two underground replacement panels for the disposal of TRU waste.	
[1995] DOE/EIS-0217: *Savannah River Site Waste Management Final Environmental Impact Statement* (DOE 1995b)	Evaluated the environmental consequences of a site-wide approach to managing present and future wastes generated at SRS. Supports the **Waste Management** capabilities.	**[1995] 60 FR 55249** ROD: DOE decided to implement the moderate treatment configuration alternative. **[2001] 66 FR 34431** AROD: DOE decided to use exemptions granted consistent with the requirements of DOE Order 435.1, *Radioactive Waste Management*, to treat and dispose of some SRS wastes at commercial facilities or other DOE facilities.
[1997] DOE/EIS-0200: *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a)	Programmatic EIS that evaluated the environmental consequences of managing five types of waste generated by past, present, and future nuclear defense and research activities. Supports the **Waste Management** capabilities. **[2000] DOE/EIS-0200-SA-01**: *Supplement Analysis and Determination for the Proposed Characterization for Disposal of Contact-Handled Transuranic Waste at the Waste Isolation Pilot Plant (WIPP)* (DOE 2000b)	**[1998] 63 FR 3629** ROD: DOE designated DOE sites for preparation and storage of TRU waste prior to disposal. **[1998] 63 FR 41810** ROD: DOE decided to continue to use offsite facilities for treatment of major portions of non-wastewater hazardous waste. **[2000] 65 FR 82985** Revision of the ROD: DOE decided to establish the capability at the WIPP facility to prepare for disposal up to 1,250 m^3 of CH-TRU waste.

NEPA Review	Overview	Decision Document(s)
		[2000] 65 FR 10061 ROD: DOE decision on treatment and disposal of low-level waste and mixed low-level waste. **[2001] 66 FR 38646** Revision of the ROD: DOE decided to transfer 300 m^3 of CH-TRU to the WIPP facility.
[1996] DOE/EIS-0240: *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* (DOE 1996a)	Evaluated the environmental consequences associated with the disposition of surplus U.S.-origin HEU. This supports the disposition of **HEU recovered during PDP**. **[2007] DOE/EIS-0240-SA1**: *Supplement Analysis – Disposition of Surplus Highly Enriched Uranium* (DOE 2007a)	**[1996] 61 FR 40619** ROD: DOE decided to implement a HEU Disposition Program to render surplus HEU non-weapons-usable by blending the HEU down to low-enriched uranium. **[2011] 76 FR 51358** AROD: DOE decided to increase the quantity of HEU available for down-blending and continue down-blending operations beyond the 20 years anticipated in the 1996 HEU EIS.
[2011] DOE/EIS-0387: *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (DOE 2011b)	The Y-12 SWEIS analyzed the potential environmental impacts of alternatives for ongoing and foreseeable future operations and activities at Y-12, including impacts associated with radioactive materials transported from Y-12 to multiple offsite locations. **[2018] DOE/EIS-0387-SA-03**: *Supplement Analysis for the Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (DOE 2018c). This analysis was prepared in accordance with DOE's NEPA implementing procedures, which require evaluation of its site-wide EISs at least every 5 years by preparation of an SA.	**[2011] 76 FR 43319** ROD: DOE decided to continue operation of Y-12 and construct and operate a capability-sized UPF. **[2019] 84 FR 53133** AROD: DOE decided to continue to implement on an interim basis a revised approach for meeting EU requirements by upgrading existing EU processing buildings and constructing a new UPF.
[2020] DOE/EIS-0541: *Final Environmental Impact Statement for Plutonium Pit Production at the Savannah River Site in South Carolina* (DOE 2020a)	Evaluated the potential environmental impacts of producing plutonium pits at SRS at a rate of at least 50 pits per year and developing a short-term surge capacity to enable production at a rate of at least 80 pits per year, beginning in 2030.	**[2020] 85 FR 70601** ROD: DOE decided to repurpose the Mixed-Oxide Fuel Fabrication Facility to produce a minimum of 50 pits per year at SRS for the nuclear weapons stockpile, and to develop the ability to implement a short-term surge capacity at a rate of not less than 80 pits per year beginning in 2030.

AROD = Amended Record of Decision; CH-TRU = contact-handled transuranic; DOE = U.S. Department of Energy; EIS = environmental impact statement; EU = enriched uranium; FR = *Federal Register;* HEU = highly enriched uranium; LANL = Los Alamos National Laboratory; NEPA = *National Environmental Policy Act*; NNSA = National Nuclear Security Administration; ROD = Record of Decision; PDP = pit disassembly and processing; SA = Supplemental Analysis; SRS = Savannah River Site; SWEIS = Site-Wide Environmental Impact Statement; TRU = transuranic; UPF = Uranium Processing Facility; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

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APPENDIX B

FACILITIES DESCRIPTION

In this *Surplus Plutonium Disposition Program Environmental Impact Statement* (SPDP EIS), the National Nuclear Security Administration (NNSA) evaluates the impacts of two alternatives related to the disposition of 34 metric tons (MT) of surplus plutonium—the Preferred Alternative and the No Action Alternative. These alternatives are described in Section 2.0 of this SPDP EIS. However, this appendix describes, in greater detail than Section 2.0, the existing, modified, and new facilities where activities associated with the alternatives are proposed.
Table B-1 lists the facilities or areas associated with each alternative and provides the duration of any construction or modification activities necessary before operations commence. Proposed modifications to existing facilities and designs for new facilities are in various stages of design, and final designs may differ from those presented here. Changes in the final design and/or activities associated with these facilities will be compared to the impacts analyzed in this SPDP EIS. If new or significant impacts emerge, these impacts will be considered and analyzed in a subsequent environmental review.

Table B-2 provides the throughput (i.e., processing rate) of surplus plutonium, the total processing duration, and the total amount of plutonium processed for the Preferred Alternative and the No Action Alternative. Activities will be integrated with continuing operations at the Pantex Plant (Pantex), Los Alamos National Laboratory (LANL), Y-12 National Security Complex (Y-12), Savannah River Site (SRS), and the Waste Isolation Pilot Plant (WIPP) facility. The U.S. Department of Energy (DOE) Office of Environmental Management (DOE-EM) Strategic Vision: 2022-2032 (DOE 2022) states that "WIPP is currently anticipated to operate beyond 2050". Therefore, NNSA has chosen fiscal year 2050 as a planning assumption for this EIS and has estimated operational durations such that the 34 MT mission would be complete before fiscal year 2050. Throughput rates are based on currently available planning data including operating experience and estimates of the capability of new or modified equipment. However, throughput rates could change based on program funding, NNSA priorities, design changes, safety considerations, and other factors.

Table B-1. Duration of Construction and Modification Activities

Process Step in Facility and/or Area	Years for Preferred Alternative Construction/Modification	Years for No Action Alternative Construction/Modification
LANL – PDP in TA-55 (Modifications to PF-4)[(a)]	8	NA
LANL – NPMP in TA-55 (PF-4)[(a)]	Included in PDP construction	No construction[(b)]
LANL – Dilution in TA-55 (Modifications to PF-4)[(a)]	2[(c)]	NA
LANL – Logistical Support Center, TA-55[(a)]	2	NA
LANL – Office Building, TA-52[(a)]	2	NA
LANL – Weather Enclosure, TA-55[(a)]	2	NA
LANL – Warehouse, TA-52[(a)]	2	NA
LANL – Security Portal, TA-55[(a)]	2	NA
LANL – C&P in TA-55 (Drum Handling Facility)	2	NA

Process Step in Facility and/or Area	Years for Preferred Alternative Construction/Modification	Years for No Action Alternative Construction/Modification
SRS – PDP and NPMP in F-Area (modifications to Building 226-F and construction of various support buildings)[d]	8	NA
SRS – PDP and NPMP in K-Area (modifications to Building 105-K and construction of various support buildings)[a][e]	8	NA
SRS – NPMP in K-Area in Building 105-K[a]	6[f]	6[f]
SRS – NPMP in K-Area Modular System	Would be fabricated and tested offsite - 1 year for site preparation and installation	NA
SRS – Dilution in K-Area (in Building 105-K)[a][g]	Ongoing - Anticipated completion in 2027	Ongoing - Anticipated completion in 2027

C&P = characterization and packaging; EIS = Environmental Impact Statement; LANL = Los Alamos National Laboratory; NA = not available; NPMP = non-pit metal processing; PDP = pit disassembly and processing; PF-4 = Plutonium Facility; SPD = Surplus Plutonium Disposition; SRS = Savannah River Site; TA = Technical Area.

(a) These structures will support multiple process steps.
(b) No construction in PF-4 would be needed for NPMP under the No Action Alternative.
(c) The 2-year duration for development of the dilution capability in PF-4 is based on the duration for constructing the Drum Handling Facility. It is assumed that both activities would occur concurrently.
(d) An 8-year construction duration was assumed based on similar activities described in a preconceptual study for PDP and NPMP in K-Area (SRNS 2021|Section 3.1, item 4|).
(e) An 8-year construction duration was based on a preconceptual study for PDP and NPMP in K-Area (SRNS 2021|Section 3.1, item 4|).
(f) The 6-year period for construction for the NPMP capability in Building 105-K includes 3 years for the design of the NPMP project, which occurs concurrently with the dismantlement and removal of existing equipment, and 3 years to construct the capability.
(g) A description of the dilution capability construction activities can be found in the 2015 SPD Supplemental EIS (DOE 2015|B.1.2.5|).

Sources: LANL 2022b|Section 1.3|; SRNS 2022|Section 2, 12.2|; SRNS 2021|Section 3|.

Table B-2. Maximum Annual Plutonium Throughput, Duration of Operations, and Total Amount Processed

Process Step in Facility	Preferred Alternative Maximum Annual Pu Throughput (MT/yr)[a]	Preferred Alternative Years of Operations[a]	Preferred Alternative Total Pu Processed (MT)	No Action Alternative Maximum Annual Pu Throughput (MT/yr)[a]	No Action Alternative Years of Operations[a]	No Action Alternative Total Pu Processed (MT)
Pantex – Pit Packaging	2.5[b]	27[b]	34	NA	NA	NA
LANL – PDP in PF-4	2[c]	27[c]	34	NA	NA	NA
LANL – NPMP in PF-4	(d)	(d)	(d)	0.4[e]	13[e]	7.1[e]
LANL – Dilution in PF-4	2[c]	27[c]	34	NA	NA	NA
LANL – C&P in PF-4	2[c]	27[c]	34	NA	NA	NA

Process Step in Facility	Preferred Alternative Maximum Annual Pu Throughput (MT/yr)[a]	Preferred Alternative Years of Operations[a]	Preferred Alternative Total Pu Processed (MT)	No Action Alternative Maximum Annual Pu Throughput (MT/yr)[a]	No Action Alternative Years of Operations[a]	No Action Alternative Total Pu Processed (MT)
SRS – PDP and NPMP in F-Area	2.5 [f]	13[f]	34	NA	NA	NA
SRS – PDP and NPMP in K-Area	2.5[g]	15[g]	34	NA	NA	NA
SRS – NPMP in K-Area in Building 105-K	0.4[e]	13[e]	7.1[e]	0.4[e]	13[e]	7.1[e]
SRS – NPMP in K-Area Modular System	0.6[h]	13[h]	7.1[h]	NA	NA	NA
SRS – Dilution in K-Area	2.5[i]	27[i]	34[i]	0.4[j]	13[j]	7.1[j]
SRS – C&P in K-Area	2.5[k]	27[k]	34[k]	0.4[l]	13[l]	7.1[l]
WIPP facility – Receipt for disposal of CH-TRU waste	2 (LANL)[m] 2.5 (SRS)[n]	28	34	NA	NA	NA

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; NA = not available; NEPA = *National Environmental Policy Act;* NNSA = National Nuclear Security Administration; NPMP = non-pit metal processing; Pantex = Pantex Plant; PDP = pit disassembly and processing; PF-4 = Plutonium Facility; Pu = plutonium; SPD = Surplus Plutonium Disposition; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

(a) Maximum annual throughput rates and durations are presented as rounded maximums for analysis. Actual throughput rates and durations vary as the capability ramps up. The rates may also fluctuate based on NNSA priorities, safety considerations, and other factors.

(b) The 2.5 MT/yr annual pit packaging throughput rate and duration for Pantex are assumed to be the maximum annual throughput rate for PDP at SRS.

(c) The throughput rate for PDP at LANL of 34 MT of pits is assumed to be 0.4 MT/yr by year 4 of the project and 2 MT/yr by year 19 of the project. Dilution would begin at 0.1 MT/yr in year 8 of the project and increase to 2 MT/yr by year 15 of the project (LANL 2022b|Section 2.12.1.2|). Maximum throughput for C&P is assumed to match the maximum throughput for dilution. A surge of 2.5 MT for a nominal year is also analyzed in this SPDP EIS for PDP, dilution, and C&P.

(d) The throughput rate for NPMP in PF-4 is bounded by the throughput and duration for PDP in PF-4 in the row above.

(e) The NPMP of 400 kg of non-pit surplus plutonium over a period of 13 years does not complete processing of the full 7.1 MT non-pit surplus plutonium. However, a portion of the 7.1 MT has already been processed and is in oxide form, as discussed in Section 2.1. Even without a decision on this document, LANL still has NEPA coverage to allow processing of up to 400 kg/yr of actinides (DOE 2008|p. 2-62|).

(f) A throughput of 2.5 MT/yr is assumed for PDP and NPMP in Building 226-F at SRS. This throughput rate assumes that some surplus plutonium is already in oxide form, as discussed in Section 2.1.

(g) Throughput is assumed to be equivalent to assumptions for PDP in F-Area. A 15-year operating duration was based on a preconceptual study (SRNS 2021|Section 3.1, item 5|).

(h) NPMP throughput using the modular system is 0.6 MT/yr (SRNS 2022|Section 12.5|). A portion of the 7.1 MT non-pit surplus plutonium has already been processed and is in oxide form.

(i) Dilution at SRS is based on an assumed maximum of 2.5 MT/yr in three gloveboxes in the SPD dilute capability. The maximum process rate will not occur for all 27 years of operations.

(j) Dilution of the plutonium oxide resulting from NPMP for the No Action Alternative assumes the same throughput rate and duration as for the NPMP in the Preferred Alternative. However, the dilution processing will start a year after the NPMP begins and end a year after the NPMP ends.

(k) The throughput rate and duration for C&P in the Preferred Alternative are assumed to be the same as for dilution (SRNS 2022|Section 20.3|).

(l) The throughput rate and duration for C&P in the No Action Alternative are assumed to be the same as for dilution.
(m) WIPP facility receipt of CH-TRU waste shipped from LANL matches the C&P rate of 2.0 MT/yr, with a potential surge for a nominal year to 2.5 MT/yr.
(n) WIPP facility receipt of CH-TRU waste shipped from SRS matches the C&P rate of 2.5 MT/yr.

B.1 Preferred Alternative

The Preferred Alternative involves the use of existing, modified, and new facilities at Pantex, LANL, SRS, and the WIPP facility. Figure B-1 shows the potential flow of material and waste between different facilities. The different pathways were the basis of the definition of the sub-alternatives for the Preferred Alternative. Each sub-alternative alone would not use all of the facilities illustrated.

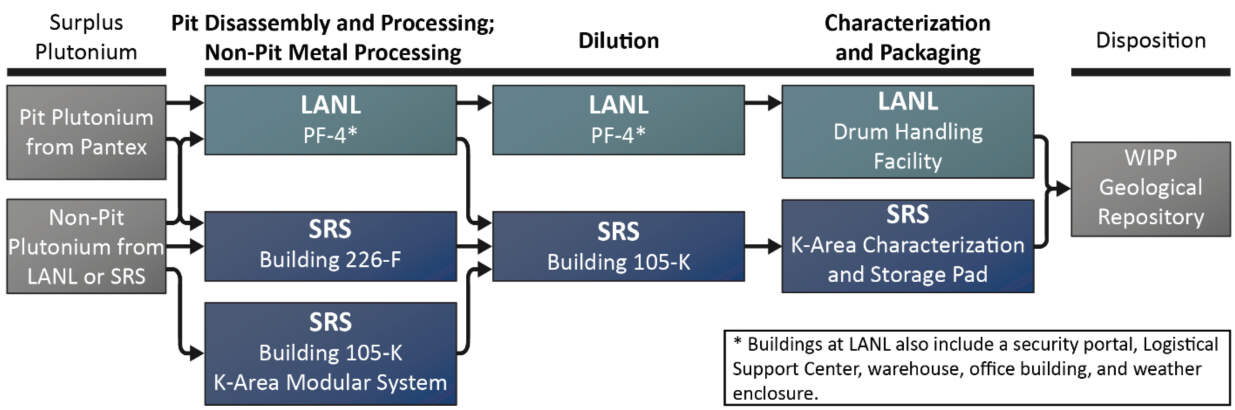

Figure B-1. Total Process Steps and Facilities Analyzed for the Sub-Alternatives under the Preferred Alternative

B.1.1 Capabilities at Pantex

Pantex is located near Amarillo, Texas. Pantex's location, affected environment, and its operations, including storage of surplus plutonium, are described 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). Pantex is the primary facility for final assembly, maintenance, and dismantlement of nuclear weapons in the United States. Pits are stored at Pantex. Surplus pits have been packaged at Pantex and shipped to LANL periodically since 1999 for processing by the Advanced Recovery and Integrated Extraction System (ARIES), a demonstration project to develop the technology that is needed for disassembly of pits and processing of the plutonium from the pit into an oxide form (LANL 2022b|Section 1.1.2, Table 2-15|; ARQ 2008|p. 2|). Under the Preferred Alternative, the integration of additional packaging line(s), if needed to support the packaging of pits and their preparation for shipping to LANL or SRS, would occur in existing facilities as a continuation of ongoing activities that were the subject of previous *National Environmental Policy Act* (NEPA) reviews (DOE 2018b) and are therefore not reanalyzed in this SPDP EIS. Surplus pits would be packaged in Type B[1] packages in packaging lines for shipment to LANL or SRS (CNS 2019; DOE 2018b). A brief discussion of Pantex's location and affected environment can be found in Section 3.1.

[1] Type B packages are designed in accordance with Federal regulations (49 CFR Parts 100-177) governed by the U.S. Nuclear Regulatory Commission for transporting materials that could be a radiation hazard to the environment or the public if the contents were released.

B.1.2 Capabilities at LANL

LANL is located in Los Alamos, New Mexico. A discussion of LANL's location and affected environment can be found in Section 3.2.

As discussed in Section 2.1.1, for the Preferred Alternative's Base Approach Sub-Alternative and All LANL Sub-Alternative, pit disassembly and processing (PDP) and non-pit metal processing (NPMP) would occur at LANL, the only site that has an existing capability. PDP but not NPMP would occur at LANL for the SRS NPMP Sub-Alternative. Dilution of plutonium oxide and its characterization and packaging (C&P) for shipment to the WIPP facility would only occur at LANL under the All LANL Sub-Alternative. These activities would be conducted in existing, modified, and new facilities at LANL located in Technical Area (TA)-55 and in TA-52. These areas are described in Section 3.0 and are shown in Figure 3-1. The proposed locations of the new facilities are presented in Section 2.0 in Figures 2-6 and 2-7.

Adequate storage capacity would be maintained to provide a buffer for approximately 4 months for inbound surplus plutonium, 18 months for outbound surplus plutonium as oxide for shipment to SRS, and approximately 2 years for plutonium as oxide if a dilution capability is developed at LANL (LANL 2022b|Sections 1.1.2.1, 1.1.2.2|). Support facilities for the Preferred Alternative would be in TA-50, TA-55, and TA-63. The facilities in TA-50 and TA-63 currently exist and no modifications are anticipated (LANL 2022b|Sections 1.7.2, 1.7.4|).

B.1.2.1 Pit Disassembly and Processing and Non-Pit Metal Processing

The operational activities associated with PDP and NPMP would occur in the existing Plutonium Facility (PF-4). LANL would build a Logistical Support Center (LSC), a warehouse building, an office building, a security portal, and a weather enclosure in TA-52 and TA-55 to support operational activities (LANL 2022b|Section 1.1.2|). PDP and NPMP operations would occur on a single shift (LANL 2022b|Section 1.1.2.1|).

<u>Plutonium Facility</u>

PF-4 is located in the main complex at TA-55 (DOE 2008|Section 2.4.15|). Building PF-4 would be the primary facility for PDP and NPMP (LANL 2022b|Section 1.1.2|). PF-4 started operations in 1978 and was built to withstand credible seismic events at that time, as well as winds of up to 200 mph (NNSA 2016). Structural upgrades at PF-4 were started in 2010 and are ongoing in order to reduce the risks that could occur during a seismic event and to meet the DOE seismic code requirements (LANL 2022b|Section 2.6.2|; LANL 2019|p. 1|).

PF-4 currently houses multiple programs or projects (LANL 2022a), which include:

- The production of plutonium components for defense-related programs, including pits for the nuclear weapons stockpile with a current mission of producing 30 pits a year
- The radioisotope power systems program that supports DOE and the National Aeronautics and Space Administration in the design, surveillance, development, and surveillance of power and heat sources for use in remote and challenging environments
- DOE Isotope Program to separate and recover americium-241 from residues resulting from plutonium purification operations at LANL

- The 3013 Surveillance and Monitoring program to safely store plutonium-bearing materials across DOE Complex
- The ARIES program to disassemble plutonium pits and convert the resulting weapons-usable plutonium to oxide for disposition. This program has been operating since 1999 (LANL 2022).

The ARIES operations would be expanded to support the disposition of surplus plutonium under the Preferred Alternative. Existing rooms and systems in PF-4 would be modified and new or modified equipment would be installed to increase the production capacity to support the disassembly and processing of 34 MT of surplus plutonium. This expansion would include installation of 14 new gloveboxes and 6 material entry hoods and would increase the current space used for PDP from 5,200 ft^2 to 6,800 ft^2 without impact to other programs (LANL 2022b|Section 1.1.2|).[1] Direct metal oxidation and muffle furnaces located in the gloveboxes would be used to convert plutonium metal to oxide. NNSA anticipates that lathes or pit cutters would be replaced every 15 years and direct metal oxidation furnaces and muffle furnaces would be refurbished/replaced every 10 years (LANL 2022b|Section 1.1.2.1|). Gloveboxes would be interconnected to allow for movement of material between process steps (LANL 2022b|Section 1.1.2|). The gloveboxes would remain completely sealed and operate independently, except during material transfer operations. The gloveboxes would be maintained at lower pressure than that in the surrounding areas so that any potential leaks of gaseous or suspended particulate matter would be contained and filtered appropriately (LANL 2022b|Section 1.1.2|). In addition, the exhaust air from gloveboxes would be continuously monitored to detect any unplanned releases of radioactive contamination (LANL 2022b| Section 1.1.2|). An area would be designated for interim storage of the plutonium oxide in SAVY 4000 containers within PF-4 (LANL 2022b|Section 1.1.2.2|).

Logistical Support Center

The LSC would be constructed on previously disturbed land in TA-55 separate from, but adjacent to, PF-4 to provide offices, meeting areas, and locker rooms for the staff required to support PDP (LANL 2022b|Section 1.1.2|). The LSC would be an approximately 21,600 ft^2 two-story facility with a building footprint of about 10,800 ft^2 (0.25 ac) (LANL 2022b|Section 2.8.1|). The building would be constructed with a steel frame and steel siding and have rooftop heating, ventilation, and air-conditioning (HVAC) units. The LSC would not contain or process special nuclear material[2] (LANL 2022b|Section 1.1.2|).

Office Building

A two-story office building would be constructed on undisturbed land at TA-52 just south of Puye Road (LANL 2022b|Section 1.1.2, Figure 1-12|). The office building footprint would be approximately 12,000 ft^2 (0.3 ac). Two parking areas would be constructed, an 11,500 ft^2 (0.3 ac) parking area and a 600 ft^2 (0.1 ac) road extension north of the office building and an 8,000 ft^2 (0.2 ac) parking area and 460 ft^2 (0.01 ac) road extension south of the building (LANL 2022b|Section 2.8.1|).

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[1] The variation in the amount of equipment that would be used during processing activities at LANL and SRS is also reflected in the number of staff and number of shifts anticipated at each site.

[2] "Special nuclear material" is defined by Title I of the *U.S. Atomic Energy Act* of 1954 as "plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission [U.S. Nuclear Regulatory Commission] pursuant to the provisions of section 51, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material."

Security Portal

A new 4,620 ft^2 (0.1 ac) security portal for vehicle and pedestrian traffic would be constructed on disturbed land on the west side of TA-55. Road widening for a parking area and a road extension near the security portal would occupy approximately 3,000 ft^2 (0.09 ac) and 6,000 ft^2 (0.14 ac), respectively (LANL 2022b|Figure 1-11, Section 2.8.1|).

Warehouse

A new warehouse approximately 180 ft by 100 ft and 20 ft tall would occupy 18,000 ft^2 (0.4 ac) on undisturbed land in TA-52 just south of Puye Road (LANL 2022b|Figure 1-12, Section 2.8.1|). A laydown area and staging/parking area near the warehouse would occupy 10,200 ft^2 (0.2 ac) and 27,500 ft^2 (0.6 ac), respectively. A road extension of 750 ft^2 (0.02 ac) would be added from Puye Road to the northwest entrance of the warehouse parking area (LANL 2022b|Figure 1-12|).

Weather Enclosure

A new approximately 4,000 ft^2 (0.1 ac) weather enclosure would be installed at the PF-4 loading dock to allow for continuation of operations regardless of the weather (LANL 2022b|Sections 1.1.2, 2.8.1|).

B.1.2.2 Dilution of Plutonium Oxide

The operational activities associated with the dilution of oxidized plutonium would occur within PF-4. PF-4 would be modified to support this capability. Interim storage of the oxide would be in SAVY 4000 containers in PF-4 (LANL 2022b|Section 1.1.2.2|). Eleven additional gloveboxes would be dedicated to diluting the plutonium oxide. The modifications would increase the floor space from an existing 5,200 ft^2 to 8,400 ft^2 (LANL 2022b). Dilution activities would operate with two 10-hour shifts, 4 days a week. Mixers would be installed in the gloveboxes to uniformly mix the plutonium oxide with an adulterant preloaded into the blend cans (LANL 2022b|Section 1.1.2.2|).

B.1.2.3 Characterization and Packaging

The operational activities associated with C&P of diluted plutonium oxide as contact-handled transuranic (CH-TRU) waste (also referred to as defense CH-TRU waste)[1] would occur in a new 20,000 ft^2 (0.5 ac) Drum Handling Facility (DHF) located on an existing 41,000 ft^2 (0.9 ac) laydown area in the northwest corner of TA-55 (LANL 2022b|Sections 1.1.2.2, 2.8.2|). This area was previously disturbed and is not being used. The road extension for entry and exit roadways would occupy 7,000 ft^2 (0.2 ac) (LANL 2022b| Section 2.8.2|). Characterization of the diluted plutonium oxide CH-TRU waste in criticality control overpack (CCO) containers would be performed in the DHF to verify that the waste meets WIPP Waste Acceptance Criteria (WAC), prior to loading them into approved waste containers (e.g., Transuranic Package Transporter Model-II [TRUPACT-II]) for transport to the WIPP facility (LANL 2022b|Section 1.1.2.2|). The DHF would provide capabilities for waste staging, characterization to meet WIPP WAC, and loading of the diluted plutonium oxide CH-TRU waste for transport in TRUPACT-II containers. Neutron counters, radiography, gamma spectrometers, and an integrated waste assay

[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.

system would be installed to assay the diluted plutonium oxide CH-TRU waste before shipment to the WIPP facility (LANL 2022b|Section 1.1.2.2|).

B.1.2.4 Support Facilities at LANL

Existing LANL facilities that would support Preferred Alternative activities include a Radioactive Liquid Waste Treatment Facility, Radiological Laboratory/Utility/Office Building, and Transuranic Waste Facility, as described below.

- **Radioactive Liquid Waste Treatment Facility (RLWTF).** The RLWTF, located in TA-50, is currently the principal facility for collecting, storing, treating, and disposing of radioactive liquid waste at LANL. The small amounts of liquid waste that would be produced during PDP at LANL would be processed through the RLWTF (LANL 2022b|Section 2.16.1.2, Tables 1-5, 2-15, 2-17|). The RLWTF capabilities will be upgraded under a separate project to support site-wide needs, including construction of two replacement facilities, to provide for disposal of up to 1.3 million gal/yr of liquid low-level radioactive waste (LLW) and industrial wastewater (LANL 2022b|Section 2.18|).
- **Radiological Laboratory/Utility/Office Building (RLUOB).** The RLUOB, located in TA-55, is an administrative and support function building, and office space will be provided in this building for the SPDP project. No modifications are needed to the RLUOB to support the surplus plutonium disposition activities discussed in this SPDP EIS. However, it may be reconfigured for other projects, and if so, the space could be used for equipment for analytical chemical and materials characterization capabilities that could support the PDP, the NPMP, and the dilution process (LANL 2022b|Section 1.8, Table 1-5|; DOE 2018a).
- **Transuranic Waste Facility (TWF).** The TWF, located in TA-63, is used for storing, processing, and shipping transuranic (TRU) waste (LANL 2022b|Section 1.8|). LANL would not use services from the TWF for the diluted plutonium oxide CH-TRU waste but would use the TWF for CH-TRU job control waste (LANL 2022b|Section 1.8|). CH-TRU job control waste would be staged at the TWF prior to shipment to the WIPP facility for disposal. As described in Section B.1.2.3, the DHF would be used for storing, processing, and shipping the diluted plutonium oxide CH-TRU waste (LANL 2022b|Section 1.8|).

B.1.3 Capabilities at SRS

SRS is located near Aiken, South Carolina. A discussion of SRS's location and affected environment can be found in Section 3.3.

For the Preferred Alternative's All SRS Sub-Alternative, PDP and NPMP could occur in Building 226-F (Savannah River Plutonium Processing Facility [SRPPF]) in F-Area at SRS, or in Building 105-K in K-Area, specifically using the disassembly basin area. In SRS NPMP Sub-Alternative, NPMP could occur in either Building 105-K (not the disassembly basin area) or in a modular system installed adjacent to Building 105-K in K-Area.

In all sub-alternatives except the All LANL Sub-Alternative, dilution would occur in a portion of Building 105-K that is currently being modified to support dilution of plutonium oxide. C&P of the diluted plutonium oxide CH-TRU waste would occur on an existing enclosed storage pad in the K-Area Complex.

B.1.3.1 Pit Disassembly and Processing and Non-Pit Metal Processing

This SPDP EIS analyzes two different locations at SRS for the capability for PDP and NPMP as part of the All SRS Sub-Alternative. One option is modification of Building 226-F (SRPPF) in F-Area and a second option is modification of Building 105-K in K-Area.

<u>Building 226-F in F-Area</u>

Construction of Building 226-F (SRPPF) as the Mixed Oxide Fuel Fabrication Facility (MFFF) began in August 2007. Construction ceased on October 10, 2018, when DOE terminated the contract for the MFFF. The MFFF was designed to safety and security standards (including Seismic Performance Category 3+) to meet U.S. Nuclear Regulatory Commission requirements. The exterior walls and roof have been designed and constructed to resist all credible manmade and natural phenomena hazards. Design changes are currently being evaluated for modifying Building 226-F (SRPPF) for the primary function of pit production, as discussed in a recent EIS (DOE 2020).

There is currently no formal conceptual design for the modification of Building 226-F (SRPPF) at SRS to provide capabilities for PDP and NPMP. This SPDP EIS assumes that adequate space is available for processing as well as for interim storage of incoming and outgoing materials in addition to that required for pit production operations. However, the total square footage and percentage of the building that may be available are not known at this time. Additional areas for support activities, including office spaces, change rooms, mechanical shops, an emergency generator to supply power to critical safety systems in the event of a power outage, a warehouse, waste storage, and parking, would be needed. Additional support systems would include an active confinement ventilation, HVAC, 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. Some of these systems may be shared with other activities occurring in Building 226-F (SRPPF) (DOE 2012|Section 2.4.1.2|).

PDP and NPMP in F-Area were analyzed in the 2015 surplus plutonium disposition (SPD) Supplemental EIS (2015 SPD SEIS; DOE 2015) as occurring in a stand-alone building in F-Area to convert surplus pit and non-pit plutonium to an oxide form that would be suitable for feed for mixed oxide fuel, immobilization, or disposal at the WIPP facility. However, the concept of using Building 226-F for PDP and NPMP in this SPDP EIS has more in common with the 2015 SPD SEIS analysis of PDP and NPMP in an existing building in K-Area. Because a conceptual design for PDP and NPMP in an existing building in F-Area does not exist, the assumptions for modification of Building 226-F are based on PDP and NPMP in K-Area from the 2015 SPD SEIS (DOE 2015), with some adjustments to more realistically reflect the construction and modification activities that are anticipated to occur in F-Area. For example, approximately 20 ac of previously disturbed land are assumed to be needed in F-Area for buildings, parking areas, and temporary construction and laydown areas, based on the ability to use existing infrastructure.

Operations for PDP and NPMP in F-Area would be similar to those described previously for PDP and NPMP at PF-4 in LANL in Section 2.1.1.2.2, although they are assumed to occur on a 24-hour, 7-days-a-week schedule using five shifts. Plutonium oxide produced during operations in F-Area would be loaded into an appropriate NNSA Office of Secure Transportation transporter for the 7.6 mi transport to Building 105-K in K-Area where dilution would occur.

Building 105-K in K-Area

The second option for the PDP and NPMP at SRS is the modification of the existing Building 105-K in K-Area. Building 105-K was constructed as K-Reactor in the 1950s for the purpose of producing tritium and plutonium. K-Reactor was initially shut down in 1988 and then underwent seismic and structural upgrades for its restart in 1991. K-Reactor was operated last in 1992 and placed in cold-standby condition in 1993 and then shut down in 1996 and subsequently deactivated. Nuclear fuel and equipment needed for reactor operation were removed, as were irradiated materials stored in the disassembly basin. The structure and security at the K-Area Complex have been upgraded for plutonium storage. Surveillance capabilities have also been upgraded. Building 105-K is also used for storage of heavy water that has been excessed from reactors at SRS (DOE 2015|Section B.1.2|).

A conceptual design for PDP and NPMP in K-Area does not exist, but this analysis assumes that the disassembly basin area in Building 105-K would be used for the installation of the PDP and NPMP capability based on a preconceptual study (SRNS 2021b). Necessary modifications would include removal of existing components and or scrap and removal of water that currently exists in Building 105-K disassembly basins, using an evaporation process similar to that used during decommissioning at two other reactor facilities at SRS, including C- and P-Reactors. Once the water is removed, grout would be poured into the basins to form a floor. Support buildings such as a ventilation building and a diesel generator building, would be built adjacent to or in the vicinity of Building 105-K. Additional support facilities such as a waste-staging building, a warehouse, an office building, and parking lots may be placed in K-Area to support PDP and NPMP (SRNS 2013). Similar to the F-Area option, approximately 20 ac are also assumed to be available in K-Area for buildings, parking areas, temporary construction, and laydown areas.

Operations for PDP and NPMP in K-Area would be similar to those described previously for PDP and NPMP at PF-4 in LANL, as described in Section 2.1.1.2.2, but plutonium oxide produced in K-Area would be fed into the dilution capability that would be located in the same building.

B.1.3.2 Non-Pit Metal Processing

Two options are considered in this SPDP EIS for stand-alone NPMP capabilities (not combined with PDP as discussed in the previous section) for the SRS NPMP Sub-Alternative. These two options could occur in the K-Area: inside Building 105-K or in a modular system adjacent to Building 105-K.

Building 105-K

If a NPMP capability is not developed as part of a PDP capability in Building 226-F (SRPPF), then a separate NPMP capability could be installed at Building 105-K in K-Area for the SRS NPMP Sub-Alternative.

Adding a stand-alone NPMP capability at Building 105-K would involve installation of one or more gloveboxes containing a furnace along with other equipment. The K-Area Interim Storage (KIS) facility in Building 105-K, which is currently being used for downblending 6 MT of non-pit surplus plutonium (81 FR 19588) and 7.1 MT of non-pit surplus plutonium (85 FR 53350), would be modified to provide a capability for NPMP. This could occur after the SPD) dilute capability that is currently being constructed in K-Area becomes operational (SRNS 2022|Section 3.1|). Once the SPD dilute capability is operational, the KIS glovebox and support systems would be dismantled, removed, and the installation of equipment for NPMP in the KIS portion of the facility could begin. Support systems such as HVAC, electrical, and fire protection would be installed within the footprint that currently exists for similar support systems. No conceptual design for the NPMP capability exists, but based on preliminary estimates, a total of 816 ft^2 is available in the KIS portion of the facility for the processing equipment. An additional 816 ft^2 are needed for the support systems. The NPMP capability could likely locate the HVAC system on the roof of the KIS facility in the same manner that the KIS HVAC systems are currently located on the roof. A new diesel generator would be installed to supply power during a loss of normal power. Features would be installed to control releases of airborne contaminants, control releases of waterborne contaminants, prevent criticality, provide safeguards, and provide fire protection (SRNS 2022|Section 3.1|).

K-Area Modular System

A second option for a stand-alone NPMP capability is a modular system that could be constructed and tested offsite and then assembled within the boundaries of the K-Area Complex. The modular system would comply with DOE regulations as part of a Hazardous Category 2 facility and would be located inside the K-Area Perimeter Intrusion Detection and Assessment System area adjacent to Building 105-K. The modular system would include physical barriers and appropriate safeguards and security components. Because there is currently no conceptual design for this option, the decision has not been made about the exact location. The modular units would require full concrete pads totaling approximately 4,500 ft^2. The entire land area required for the modules and a perimeter security barrier, would be approximately 14,450 ft^2 in a 170 ft by 85 ft perimeter configuration (SRNS 2022|Section 3.2|).

The modular units would be constructed out of approximately 20 ft by 8 ft by 8 ft intermodal shipping containers. These units would be modified as needed to include HVAC systems, power, and insulation, and would include features such as additional steel wall thicknesses and rock wool insulation for additional security and fire protection. The modular units would be constructed of steel exteriors that are certified for load stacking, as needed, for transportation by truck, sea, or air. The overall area is estimated to be approximately 37 ft × 81 ft and would include a surrounding security fence (SRNS 2022|Section 3.2|).

There would be approximately twelve 20 ft modular units on the first level and three 20 ft modules on the second level. These modules would be interconnected physically to enhance the rigidity of the overall modular structure. The modular units would support the processing activities, as well as storage, receipt and packaging, air locks, safeguards and security, and would provide utilities, including the electrical distribution, HVAC and high-efficiency particulate air filters, and exhaust fans (SRNS 2022-|Section 3.2|).

B.1.3.3 Dilution of Plutonium Oxide

The operational activities associated with the dilution of plutonium oxide are occurring in Building 105-K in K-Area. NNSA is diluting the 7.1 MT non-pit surplus plutonium discussed in the Record of Decision (ROD) issued on August 28, 2020 (85 FR 53350) and the 6 MT non-pit surplus plutonium discussed in the ROD issued on April 5, 2016 (81 FR 19588) in one glovebox. Three additional gloveboxes are being installed and the operations would occur on a 24-hour, 7-days-a-week schedule.[1] This additional dilution capability is being installed in close proximity to the KIS section of the facility that is discussed in Section B.1.3.2. The installation of the additional dilute capability is ongoing pursuant to previous NEPA analyses (DOE 2015) and the ROD for disposition of the 6 MT (81 FR 19588). The proposed dilution

[1] The variation in the amount of equipment that would be used during processing activities at LANL and SRS is also reflected in the number of staff and number of shifts anticipated at each site.

activities in K-Area would be functionally identical to the dilution process currently being conducted in the KIS section of Building 105-K. The dilution process is described in Section 2.1.1.2.2 and would occur on a 24-hour, 7-days-a-week schedule (SRNS 2021a|Table 3|).

B.1.3.4 Characterization and Packaging

The operational activities associated with C&P would occur on a 24-hour, 7-days-a-week schedule (SRNS 2021a|Table 3) at the K-Area Characterization and Storage Pad, an existing concrete storage pad under a soft enclosure in K-Area (SRNS 2017a; SRNS 2017b; SRNS 2022|Section 1|). This storage pad was completed in 2021. Loaded CCO containers would be transferred to the storage pad in K-Area, where characterization would verify compliance with WIPP WAC (DOE 2016). CCO containers would then be packaged into approved TRU waste transport containers (e.g., TRUPACT-II) and loaded for shipment to the WIPP facility (SRNS 2022|Section 1, 20.3|). Capacity for storing approximately 1 years' worth of diluted plutonium oxide CH-TRU waste would be maintained as part of the C&P capability (SRNS 2022|Section 1|).

B.1.3.5 Support Facilities

The E-Area Solid Waste Management Facility provides waste management capabilities for CH-TRU waste, LLW, and mixed LLW at SRS. CH-TRU job control waste generated during pit disassembly and processing, NPMP, or dilution would be sent to E-Area before being shipped to the WIPP facility (|p. B-27|; (SRNS 2022|Section 20.3|). There is no mixed LLW anticipated from this SPDP proposed action. The LLW may be disposed of in E-Area facilities (SRNS 2022|Section 20.3|) or offsite facilities.

B.1.4 Capabilities at the WIPP facility

The WIPP facility, located in southeastern New Mexico, is the only facility authorized to dispose of TRU waste generated by *U.S. Atomic Energy Act* defense activities. As discussed in Section 2.1.1.1, diluted plutonium oxide CH-TRU waste and CH-TRU job control waste generated under the Preferred Alternative would be disposed at the WIPP facility. The WIPP repository is located in ancient salt beds, 2,150 ft below the ground surface (DOE 2015|p. B-30|). The *WIPP Land Withdrawal Act* (Public Law No. 102-579) authorized the disposal of up to 175,600 m^3 of TRU waste generated by the nation's atomic energy defense activities. The disposal of TRU waste from the DOE Complex at the WIPP facility is analyzed in the 1990 Final Supplement EIS, WIPP (DOE 1990), the 1997 *WIPP Disposal Phase Final Supplemental EIS* (DOE 1997), and subsequent supplement analyses.

B.1.5 Capabilities at the Y-12 National Security Complex

As discussed in Section 2.1.1.2.4 under the Preferred Alternative, highly enriched uranium recovered during pit disassembly would be decontaminated, oxidized, and prepared for shipment to Y-12 at Oak Ridge, Tennessee (LANL 2022b|Section 1.1.2.1, 2.15.1.2.2|). Y-12 is the primary site in the Nation for enriched uranium operations, including safe and secure storage and management of special nuclear material and waste from operations and the disposition of surplus materials (DOE 2018c). Any activities that would occur at Y-12 would be a continuation of ongoing activities that were the subject of previous NEPA reviews (DOE 2011; DOE 2018c) and are therefore not reanalyzed in this SPDP EIS.

B.2 No Action Alternative

The No Action Alternative is the continued management of 34 MT of surplus plutonium. It involves the use of existing, modified, and new facilities at Pantex, LANL, SRS, and the WIPP facility.

Under the No Action Alternative, most pits would continue to be stored at Pantex, although the shipment of some pits from Pantex to LANL and the ongoing processing of up to 400 kg/yr of actinides (including surplus plutonium) at PF-4 at LANL would continue (DOE 2008|p. 2-62|), as explained in Section B.1.1. The No Action Alternative includes NPMP, dilution, and C&P of 7.1 MT of non-pit surplus plutonium. The process steps and facilities for processing the non-pit surplus plutonium are shown in Figure B-2.

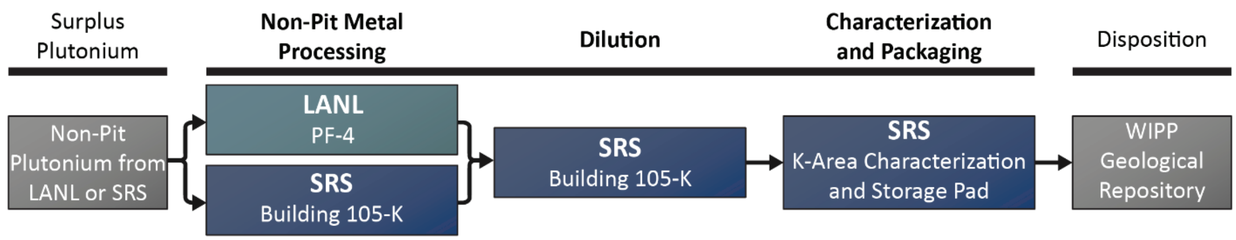

Figure B-2. Process Steps and Facilities Analyzed Under the No Action Alternative

B.2.1 Capabilities at Pantex

Under the No Action Alternative, surplus pits would remain in storage at Pantex under its existing management plan as evaluated 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).

B.2.2 Capabilities at LANL

For the No Action Alternative, NPMP of 7.1 MT of non-pit surplus plutonium could occur at LANL (85 FR 53350).

B.2.2.1 Non-Pit Metal Processing

If NPMP occurs at LANL, the associated operational activities would primarily take place in PF-4. These activities would be conducted using existing equipment located in gloveboxes that are currently being used for the ARIES project described in Section B.1.2.1; thus, no construction or modification activities would be needed. Using existing facilities, plutonium oxide would be packaged and shipped in Type B packages to SRS for dilution (LANL 2022b|Section 2.15.1.2.3|).

B.2.2.2 Support Facilities at LANL

Existing LANL facilities that support NPMP include the RLWTF, RLUOB, and TWF, as described in Section B.1.2.4.

B.2.3 Capabilities at SRS

For the No Action Alternative, NPMP of 7.1 MT of non-pit surplus plutonium could occur at SRS, and dilution and C&P of surplus plutonium would occur at SRS (85 FR 53350). These capabilities would be located in existing and modified facilities within K-Area.

B.2.3.1 Non-Pit Metal Processing, Dilution, and Characterization and Packaging

The operational activities associated with NPMP and dilution for the No Action Alternative could be conducted in Building 105-K, as described in Sections B.1.3.2 and B.1.3.3. The operational activities associated with C&P would be conducted in K-Area, as discussed in Section B.1.3.4.

B.2.3.2 Support Facilities

The only SRS support facility that would support the No Action Alternative is E-Area, as described in Section B.1.3.4.

B.2.4 Capabilities at the WIPP facility

The capabilities at the WIPP facility necessary for the No Action Alternative are the same as those for the Preferred Alternative and are discussed in Section B.1.4.

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APPENDIX C

DETAILED ENVIRONMENTAL CONSEQUENCES TABLES

This appendix contains tables showing the detailed impacts for applicable resource areas in this *Surplus Plutonium Disposition Program Environmental Impact Statement*. The tables for Los Alamos National Laboratory (LANL) are presented in Section C.1. Tables for Savannah River Site are presented in Section C.2. Cross-site tables are presented in Section C.3, followed by references in Section C.4.

Roadmaps are provided as Table C-1 and Table C-13 to assist readers in orienting to the activities that would occur at each site for each of the sub-alternatives of the Preferred Alternative, as well as for the No Action Alternative. The activities shown in gray italicized text in the roadmap figures indicate that the activity does not occur at the site being discussed. The impact tables in this appendix reflect these same activities as being not applicable to the site by identifying them as "NA."

The resource-specific tables that follow display the contributions from each facility or capability. When added together, the contributions from the facilities or capabilities are used to generate the totals presented in Chapter 4 for LANL and SRS for each sub-alternative.

C.1 Los Alamos National Laboratory

Table C-1. Roadmap for Alternative/Sub-Alternative Capabilities Conducted at LANL

Capability	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP Sub-Alternative	Preferred Alternative All LANL Sub-Alternative	No Action Alternative
PDP	LANL	LANL	LANL	*(No PDP)*
NPMP	LANL	*(SRS)*	LANL	LANL
Dilution	*(SRS)*	*(SRS)*	LANL	*(SRS)*
C&P	*(SRS)*	*(SRS)*	LANL	*(SRS)*

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

Table C-2. Land Disturbance at LANL by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach and SRS NPMP Sub-Alternatives[b]	Preferred Alternative[a] All LANL Sub-Alternative	No Action Alternative
Land Disturbance (ac)	PDP	5.6	5.6	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	(e)	NA
	C&P	NA	0.6[f]	NA
	Total	**5.6**	**5.6[f]**	**(d)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not available; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site; TA-55 = Technical Area 55.

(a) A column for the All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The construction/modification impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.

(c) Construction/modification activities for NPMP at LANL are not distinct from PDP construction/modification activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.

(d) No construction/modification activities are anticipated.

(e) Dilution activities occur within PDP facilities and would have no additional impacts from associated building modifications.

(f) The Drum Handling Facility for C&P in the All LANL Sub-Alternative replaces one of the TA-55 laydown areas in the Base Approach Sub-Alternative after it is first used as a laydown area under the All LANL Sub-Alternative, so the total area for the Base Approach and the All LANL Sub-Alternatives are the same.

Note: Values are rounded to the nearest tenth of an acre.

Source: LANL 2022.

Table C-3. Geologic Materials Used at LANL by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
Geologic Materials Used (sand, gravel, crushed stone) (yd^3)	PDP	30,000	30,000	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	(e)	NA
	C&P	NA	11,000	NA
	Total	**30,000**	**41,000**	**(d)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not available; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The construction/modification impacts associated with the Base Approach and the SRS NPMP Sub-Alternatives would be the same.

(c) Construction/modification activities for NPMP at LANL are not distinct from PDP construction/modification activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.

(d) No construction/modification activities are anticipated.

(e) Dilution activities would occur within PDP facilities and would have no additional impacts from associated building modifications.

Note: Values rounded to two significant digits.

Source: LANL 2022|Section 2.13|.

Table C-4. Estimated Annual Criteria Air Pollutant Emissions at LANL During Construction/Modification for the Preferred and No Action Alternatives (T/yr)

	Preferred Alternative[a]	Preferred Alternative	Preferred Alternative	Preferred Alternative	No Action Alternative
	Base Approach and SRS NPMP Sub-Alternatives[b]	All LANL Sub-Alternative	All LANL Sub-Alternative	All LANL Sub-Alternative	
Pollutant	**Process: PDP (includes NPMP)**	**Process: PDP (includes NPMP) and Dilution**	**Process: C&P**	**Total**	**Process: NPMP**
CO	11	11	3.1	14	(c)
NO_x	20	20	5.5	25	(c)
PM_{10}	1.8	1.8	0.50	2.3	(c)
$PM_{2.5}$	1.7	1.7	0.49	2.2	(c)
SO_x	1.7	1.7	0.48	2.2	(c)
VOCs	2.9	2.9	0.81	3.7	(c)

C&P = characterization and packaging; CO = carbon monoxide; LANL = Los Alamos National Laboratory; NO_x = nitrogen oxide; NPMP = non-pit metal processing; PDP = pit disassembly and processing; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxide; SRS = Savannah River Site; VOC = volatile organic compound.

(a) A column for the All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The construction/modification impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.

(c) No construction/modification activities are anticipated.

Note: Values rounded to two significant digits.

Source: Construction emissions are from LANL 2022|Section 2.2| according to the peak construction year (LANL 2022|Section 1.3|).

Table C-5. Radiation Dose and Impacts at LANL by Capability During Construction/Modification for the Preferred and No Action Alternatives

Receptor (Units)	Capability	Preferred Alternative[a] Base Approach and SRS NPMP Sub-Alternatives[b]	Preferred Alternative[a] All LANL Sub-Alternative	No Action Alternative
Worker –Dose Rate (rem/yr)	PDP	0.38	0.38	NA
	NPMP	(c)	(c)	None[d]
	Dilution	NA[e]	0.38	NA[e]
	C&P	NA[e]	0	NA[e]
	Total	**(f)**	**(f)**	**(f)**
Worker –Project Dose (rem and LCF risk)	PDP	2.3 (0.001)	2.3 (0.001)	NA
	NPMP	(c)	(c)	None
	Dilution	NA[e]	0.8 (0.0005)	NA[e]
	C&P	NA[e]	0	NA[e]
	Total	**2.3 (0.001)**	**3.0 (0.002)**	**None**
Workforce – Project Collective Dose (person-rem and number of LCFs)	PDP	13 (0.008)	13 (0.008)	NA
	NPMP	(c)	(c)	None[d]
	Dilution	NA[e]	3.0 (0.002)	NA[e]
	C&P	NA[e]	0	NA[e]
	Total	**13 (0.008)**	**16 (0.01)**	**None**
Public – MEI Dose (rem and LCF risk)	PDP	(g)	(g)	NA
	NPMP	(c)	(c)	None[d]
	Dilution	NA[e]	0	NA[e]
	C&P	NA[e]	0	NA[e]
	Total	**(g)**	**(g)**	**None[d]**
Public – Population Dose (person-rem and number of LCFs)	PDP	(g)	(g)	NA
	NPMP	(c)	(c)	None[d]
	Dilution	NA[e]	0	NA[e]
	C&P	NA[e]	0	NA[e]
	Total	**(g)**	**(g)**	**None[d]**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NNSA = National Nuclear Security Administration; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The construction/modification impacts associated with the Base Approach and the SRS NPMP Sub-Alternatives would be the same.

(c) Construction/modification activities for NPMP at LANL are not distinct from PDP construction/modification activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.

(d) No construction/modification activities and no potential dose/impact.

(e) Not applicable because dilution and C&P would not occur at LANL except under the All LANL Sub-Alternative. No potential dose/impact from activities at LANL.

(f) Totals are not listed, because different individuals would work on different capabilities or work during different years.

(g) LCFs to the public and the MEI from construction activities for the sub-alternatives 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.

Notes: Numbers are rounded to one or two significant digits. Columns may not sum to totals due to rounding. LCFs calculated using a conversion of 0.0006 LCFs per rem or person-rem (DOE 2003). NNSA considers LCFs <0.5 to be 0 for the Workforce – Project Collective Dose and Public – Population Dose.

Source: LANL 2022.

Table C-6. Radiation Dose and Impacts at LANL by Capability During Operations for the Preferred and No Action Alternatives

Receptor (Units)	Capability	Preferred Alternative[a] Base Approach and SRS NPMP Sub-Alternatives[b]	Preferred Alternative[a] All LANL Sub-Alternative	No Action Alternative
Worker – Dose Rate (rem/yr)	PDP	0.45	0.45	NA
	NPMP	(c)	(c)	0.45
	Dilution	NA[d]	0.66	NA[d]
	C&P	NA[d]	0.28	NA[d]
	Total	**(e)**	**(e)**	**(e)**
Worker – Project Dose (rem and LCF risk)	PDP	7.7 (0.005)	7.7 (0.005)	NA
	NPMP	(c)	(c)	8.1 (0.005)
	Dilution	NA[d]	11 (0.007)	NA[d]
	C&P	NA[d]	4.8 (0.003)	NA[d]
	Total	**(e)**	**(e)**	**(e)**
Workforce – Project Collective Dose (person-rem and number of LCFs)	PDP	2,000 (1.2)	2,000 (1.2)	NA
	NPMP	(c)	(c)	780 (0.5)
	Dilution	NA[d]	970 (0.6)	NA[d]
	C&P	NA[d]	150 (0.09)	NA[d]
	Total	**2,000 (1.2)**	**3,100 (1.8)**	**780 (0.46)**
Public – MEI Dose Rate (rem/yr)	PDP	2.9×10^{-6}	2.9×10^{-6}	NA
	NPMP	(c)	(c)	7.1×10^{-7}
	Dilution	NA[d]	3.5×10^{-6}	NA[d]
	C&P	NA[d]	0	NA[d]
	Total	**2.9×10^{-6}**	**6.4×10^{-6}**	**7.1×10^{-7}**
Public – MEI Dose (rem and LCF risk)	PDP	0.000047 (3×10^{-8})	0.000047 (3×10^{-8})	NA
	NPMP	(c)	(c)	0.000013 (8×10^{-9})
	Dilution	NA[d]	0.000060 (4×10^{-8})	NA[d]
	C&P	NA[d]	0	NA[d]
	Total	**0.000047 (3×10^{-8})**	**0.00011 (6×10^{-8})**	**0.000013 (8×10^{-9})**

Receptor (Units)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
Public – Population Dose (person-rem and number of LCF)	PDP	0.16 (0.0001)	0.16 (0.0001)	NA
	NPMP	(c)	(c)	0.044 (0.00003)
	Dilution	NA[(d)]	0.21 (0.0001)	NA[(d)]
	C&P	NA[(d)]	0 (0)	NA[(d)]
	Total	**0.16 (0.0001)**	**0.37 (0.0002)**	**0.044 (0.00003)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NNSA = National Nuclear Security Administration; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The operation impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.

(c) Operations activities for NPMP at LANL are not distinct from PDP operations activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.

(d) Not applicable because dilution and C&P would not occur at LANL except under the All LANL Sub-Alternative. No potential dose/impact from activities at LANL.

(e) Totals are not listed, because different individuals would work on different capabilities.

Notes: Numbers are rounded to one or two significant digits. Columns may not sum to totals due to rounding. LCFs calculated using a conversion of 0.0006 LCFs per rem or person-rem (DOE 2003). NNSA considers LCFs <0.5 to be 0 for the Workforce – Project Collective Dose and Public – Population Dose.

Source: LANL 2022.

Table C-7. Peak-Year Economic Impacts at LANL by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
Direct Employment (FTE in peak year)	PDP	116	116	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	23	NA
	C&P	NA	(e)	NA
	Total	**116**	**139**	**(d)**
Total ROI Employment (Jobs in peak year)	PDP	221	221	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	42	NA
	C&P	NA	(e)	NA
	Total	**221**	**263**	**(d)**

Impact Indicator (Units)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
Direct Earnings ($Million in peak year)	PDP	19.4	19.4	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	3.8	NA
	C&P	NA	(e)	NA
	Total	**19.4**	**23.2**	**(d)**
Total ROI Earnings ($Million in peak year)	PDP	23.6	23.6	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	4.6	NA
	C&P	NA	(e)	NA
	Total	**23.6**	**28.2**	**(d)**
Direct Output ($Million in peak year)	PDP	20.3	20.3	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	3.9	NA
	C&P	NA	(e)	NA
	Total	**20.3**	**24.2**	**(d)**
Total ROI Output ($Million in peak year)	PDP	36.3	36.3	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	7.0	NA
	C&P	NA	(e)	NA
	Total	**36.3**	**43.3**	**(d)**

C&P = characterization and packaging; FTE = full-time equivalent (employee); LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; ROI = region of influence; SRS = Savannah River Site.

(a) A column for All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The construction/modification impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.

(c) Construction/modification activities for NPMP at LANL are not distinct from PDP construction/modification activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.

(d) No construction/modification activities are anticipated.

(e) C&P impacts are included in totals for PDP and dilution – staff are shared between activities.

Source: Calculated from LANL 2022|derived from Section 2.14|.

Table C-8. Peak-Year Economic Impacts at LANL by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach and SRS NPMP Sub-Alternatives[b]	Preferred Alternative[a] All LANL Sub-Alternative	No Action Alternative
Direct Employment (FTE in peak year)[c]	PDP	395	395	NA
	NPMP	(d)	(d)	147
	Dilution	NA	114	NA
	C&P	NA	40	NA
	Total	**395**	**549**	**147**
Total ROI Employment (Jobs in peak year)	PDP	1,301	1,301	(e)
	NPMP	(d)	(d)	376
	Dilution	NA	365	NA
	C&P	NA	128	NA
	Total	**1,301**	**1,794**	**376**
Direct Earnings ($Million in peak year)	PDP	458.1	458.1	(e)
	NPMP	(d)	(d)	83.6
	Dilution	NA	41.2	NA
	C&P	NA	14.4	NA
	Total	**458.1**	**513.7**	**83.6**
Total ROI Earnings ($Million in peak year)	PDP	627.3	627.3	(e)
	NPMP	(d)	(d)	114.2
	Dilution	NA	56.1	NA
	C&P	NA	19.7	NA
	Total	**627.3**	**703.1**	**114.2**
Direct Output ($Million in peak year)	PDP	1,276.5	1,276.5	(e)
	NPMP	(d)	(d)	228.9
	Dilution	NA	112.7	NA
	C&P	NA	39.6	NA
	Total	**1,276.5**	**1,428.8**	**228.9**
Total ROI Output ($Million in peak year)	PDP	1,851.3	1,851.3	(e)
	NPMP	(d)	(d)	332.9
	Dilution	NA	163.9	NA
	C&P	NA	57.5	NA
	Total	**1,851.3**	**2,072.7**	**332.9**

C&P = characterization and packaging; FTE = full-time equivalent (employee); LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; ROI = region of influence; SRS = Savannah River Site.

(a) A column for All SRS Sub-Alternative is not included because no capabilities would occur at LANL.
(b) The operation impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.
(c) The differences in staffing numbers between LANL and SRS relates to the amount of equipment that is used at each of the sites for processing activities.

(d) Operations activities for NPMP at LANL are not distinct from PDP operations activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.
(e) Similar activities are currently ongoing, thus no new impacts.
Source: Calculated from LANL 2022|derived from Sections 1.4.1, 1.4.2|.

Table C-9. Infrastructure Impacts at LANL by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach and SRS NPMP Sub-Alternatives[b]	Preferred Alternative[a] All LANL Sub-Alternative	No Action Alternative
Electricity Use (MWh/yr)	PDP	160	160	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	(c)	NA
	C&P	NA	0	NA
	Total	**160**	**160**	**(d)**
Electricity Peak Load (MW)	PDP	0.02	0.02	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	(c)	NA
	C&P	NA	0	NA
	Total	**0.02**	**0.02**	**(d)**
Fuel Use (gal/yr)	PDP	55,000	55,000	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	(c)	NA
	C&P	NA	15,000	NA
	Total	**55,000**	**70,000**	**(d)**
Water Use (millions of gal/yr)	PDP	2.6[e]	2.6[e]	NA
	NPMP	(f)	(f)	(d)
	Dilution	NA	(f)	NA
	C&P	NA	(f)	NA
	Total	**2.6**	**2.6**	**(d)**
Sewage Generation (millions of gal/yr)	PDP	0.055	0.055	NA
	NPMP	(g)	(g)	(d)
	Dilution	NA	(g)	NA
	C&P	NA	(g)	NA
	Total	**0.055**	**0.055**	**(d)**

C&P = characterization and packaging; DHF = Drum Handling Facility; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PF-4 = Plutonium Facility-4; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) A column for the All SRS Sub-Alternative is not included because no capabilities would occur at LANL.
(b) The impacts associated with the Base Approach and SRS NPMP Sub-Alternative would be the same.
(c) Construction/modification activities are not distinct from PDP construction/modification activities and are included in PDP impacts.
(d) No construction/modification activities are anticipated.

(e) The maximum water requirements for the Preferred Alternative is during construction activities in Year 5, which is 2.6 million gallons (LANL 2022|Section 2.16.1.1|). Construction of DHF starts in Year 6, which is not a peak year, water requirements would be included in PDP activities.
(f) Water requirements for staff performing construction/modifications activities for NPMP, dilution, and C&P capability are included in PDP activities.
(g) Sewage generation for workers performing construction/modification activities inside PF-4 are included in requirements for PDP activities. Construction workers outside PF-4 would use portable toilets. (LANL 2022|Section 2.16.1.1|)
Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.
Source: LANL 2022.

Table C-10. Infrastructure Impacts at LANL by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative(a) Base Approach and SRS NPMP Sub-Alternatives(b)	Preferred Alternative(a) All LANL Sub-Alternative	No Action Alternative(c)
Electricity Use (MWh/yr)	PDP	7,200	7,200	NA
	NPMP	(d)	(d)	2,700
	Dilution	NA	500	NA
	C&P	NA	1,700	NA
	Total	**7,200**	**9,400**	**2,700**
Electricity Peak Load (MW)	PDP	0.82	0.82	NA
	NPMP	(d)	(d)	0.31
	Dilution	NA	0.06	NA
	C&P	NA	0.19	NA
	Total	**0.82**	**1.1**	**0.31**
Fuel Use (gal/yr)	PDP	0	0	NA
	NPMP	0	0	0
	Dilution	NA	0	NA
	C&P	NA	0	NA
	Total	**0**	**0**	**0**
Water Use (millions of gal/yr)	PDP	1.7	1.7	NA
	NPMP	(e)	(e)	0.6
	Dilution	NA	0.85	NA
	C&P	NA	(f)	NA
	Total	**1.7**	**2.5**	**0.6**
Sewage Generation (millions of gal/yr)	PDP	1.7	1.7	NA
	NPMP	(e)	(e)	0.6
	Dilution	NA	0.85	NA
	C&P	NA	(f)	NA
	Total	**1.7**	**2.5**	**0.6**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) A column for All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The operation impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.
(c) For the No Action Alternative, operations to process 7.1 MT of non-pit would be within the scope of current and ongoing operations at LANL. The 7.1 MT of non-pit surplus plutonium oxidized at LANL is part of the 34 MT considered in the Base Approach Sub-Alternative and as a result, infrastructure impacts would be a fraction (approximately 37 percent) of that used for the Base Approach Sub-Alternative, based on number of workers. The Base Approach Sub-Alternative assumes 395 workers, whereas the No Action Alternative assumes 147 workers (see Table 4-8) (LANL 2022|Sections 2.7.1.2, 2.7.2|).
(d) Operations activities for NPMP at LANL are not distinct from PDP operations activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL (LANL 2022|Sections 2.7.1.2, 2.7.2|).
(e) Water and sewage requirements for operations of NPMP (staff and process equipment) are included in the PDP activities (LANL 2022|Section 2.16.1.2|).
(f) Water and sewage requirements for performing C&P activities are included in the dilution activities (LANL 2022|Section 2.16.2.2|).
Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.
Sources: LANL 2022; LANL 2013.

Table C-11. Total Waste Generation at LANL by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Unit)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
CH-TRU Waste (job control waste) (m^3)	PDP	69	69	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	38	NA
	C&P	NA	(e)	NA
	Total	**69**	**110**	**(d)**
LLW (m^3)	PDP	360	360	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	200	NA
	C&P	NA	(e)	NA
	Total	**360**	**560**	**(d)**
MLLW (m^3)	PDP	4.8	4.8	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	2.6	NA
	C&P	NA	(e)	NA
	Total	**4.8**	**7.4**	**(d)**
Liquid LLW (L)	PDP	0	0	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	0	NA
	C&P	NA	(e)	NA
	Total	**0**	**0**	**(d)**

Impact Indicator (Unit)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
Solid Hazardous Waste (m^3)	PDP	2.4	2.4	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	0.68	NA
	C&P	NA	(e)	NA
	Total	**2.4**	**3.1**	**(d)**
Solid Non-hazardous waste (m^3)	PDP	210	210	NA
	NPMP	(c)	(c)	(d)
	Dilution	NA	61	NA
	C&P	NA	(e)	NA
	Total	**210**	**280**	**(d)**

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) A column for All SRS Sub-Alternative is not included because no capabilities would occur at LANL.
(b) The construction/modification impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.
(c) Construction/modification activities for NPMP at LANL are not distinct from PDP construction/modification activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.
(d) No construction/modification activities are anticipated for the No Action Alternative.
(e) C&P waste generation is included in the dilution estimate.
Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.
Source: Calculated from LANL 2022.

Table C-12. Total Waste Generation at LANL by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
CH-TRU Waste (diluted plutonium oxide) (m^3 and CCOs)	**Total**	0	1,500 m^3 113,400 CCOs	0
CH-TRU Waste (job control waste) (m^3)	PDP	670	670	NA
	NPMP	(c)	(c)	59
	Dilution	NA	970	NA
	C&P	NA	0	NA
	Total	**670**	**1,600**	**59**

Impact Indicator (Units)	Capability	Preferred Alternative[(a)] Base Approach and SRS NPMP Sub-Alternatives[(b)]	Preferred Alternative[(a)] All LANL Sub-Alternative	No Action Alternative
LLW (m^3)	PDP	3,200	3,200	NA
	NPMP	(c)	(c)	280
	Dilution	NA	14,000	NA
	C&P	NA	0	NA
	Total	**3,200**	**17,000**	**280**
MLLW (m^3)	PDP	42	42	NA
	NPMP	(c)	(c)	3.7
	Dilution	NA	47	NA
	C&P	NA	0	NA
	Total	**42**	**89**	**3.7**
Liquid LLW (L)	PDP	65,000	65,000	NA
	NPMP	(c)	(c)	0
	Dilution	NA	0	NA
	C&P	NA	0	NA
	Total	**65,000**	**65,000**	**0**
Solid Hazardous Waste (m^3)	PDP	6.6	6.6	NA
	NPMP	(c)	(c)	0.7
	Dilution	NA	0.17	NA
	C&P	NA	0	NA
	Total	**6.6**	**6.8**	**0.7**
Solid Non-hazardous waste (m^3)	PDP	1,500	1,500	NA
	NPMP	(c)	(c)	150
	Dilution	NA	18	NA
	C&P	NA	0	NA
	Total	**1,500**	**1,500**	**150**

C&P = characterization and packaging; CCO = criticality control overpack; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for All SRS Sub-Alternative is not included because no capabilities would occur at LANL.

(b) The operation impacts associated with the Base Approach and SRS NPMP Sub-Alternatives would be the same.

(c) Operations activities for NPMP at LANL are not distinct from PDP operations activities and are included in PDP impacts. For the SRS NPMP Sub-Alternative, operations for NPMP would occur at SRS rather than LANL.

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.

Source: Calculated from LANL 2022|Sections 2.12.1.2, 17|.

C.2 Savannah River Site

Table C-13. Roadmap for Alternative/Sub-Alternatives Activities Conducted at SRS

Capability	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP Sub-Alternative	Preferred Alternative All SRS Sub-Alternative	No Action Alternative
PDP	*(LANL)*	*(LANL)*	SRS	*(No PDP)*
NPMP	*(LANL)*	SRS	SRS	SRS
Dilution	SRS	SRS	SRS	SRS
C&P	SRS	SRS	SRS	SRS

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

Table C-14. Land Disturbance at SRS by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Land Disturbance (ac)	PDP	NA	NA	NA	20	20	NA
	NPMP	NA	0	0.3	(b)	(b)	0
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**0**	**0.3**	**20**	**20**	**0**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.
(b) Construction/modification activities for NPMP are included in PDP construction/modification activities.
(c) No construction/modification activities are anticipated.
Source: SRNS 2022a.

Table C-15. Geologic Materials Used at SRS by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[(a)] Base Approach Sub-Alternative	Preferred Alternative[(a)] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[(a)] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[(a)] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[(a)] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Geologic Materials Used (sand, gravel, crushed stone) (yd^3)	PDP	NA	NA	NA	260,000	260,000	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**0**	**0**	**260,000**	**260,000**	**0**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.
(b) Construction/modification activities for NPMP are included in PDP construction/modification activities.
(c) No construction/modification activities are anticipated.
Note: Values rounded to two significant digits.
Source: SRNS 2022a.

Table C-16. Estimated Criteria Air Pollutant Emissions at SRS During Construction/Modification and Operations for the Preferred and No Action Alternatives (T/yr)

		PM_{10}	$PM_{2.5}$	SO_x	NO_x	CO	VOCs
Preferred Alternative[a]	**Construction**	(b)	(b)	(b)	(b)	(b)	(b)
Base Approach Sub-Alternative	Operations – Dilution	0.031	0.031	<0.001	0.061	0.54	0.23
	Operations – C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total Operations	0.031	0.031	<0.001	0.061	0.54	0.23
Preferred Alternative[a]	**Construction[d]**	<0.001	<0.001	(c)	(c)	<0.001	0.94
SRS NPMP Sub-Alternative	Operations – NPMP	0.033	0.033	<0.001	0.061	0.54	0.23
	Operations – Dilution	0.031	0.031	<0.001	0.061	0.54	0.23
(105-K and Modular NPMP Options)	Operations – C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total Operations[e]	0.063	0.063	0.002	0.12	1.1	0.47
Preferred Alternative[a]	**Construction**	5.5	5.0	0.049	23	29	4.7
All SRS Sub-Alternative	Operations – PDP and NPMP in F-Area	0.99	0.66	0.018	39	10	0.99
	Operations – Dilution	0.031	0.031	<0.001	0.061	0.54	0.23
(F-Area PDP Option)	Operations – C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Operations – Annual On-Site Transportation	<0.001	<0.001	<0.001	0.002	<0.001	<0.001
	Total Operations	1.0	0.69	0.019	39	11	1.2
Preferred Alternative[a]	**Construction**	5.9	5.4	0.085	26	30	4.8
All SRS Sub-Alternative	Operations – PDP and NPMP in K-Area	0.99	0.66	0.018	39	10	0.99
	Operations – Dilution	0.031	0.031	<0.001	0.061	0.54	0.23
(K-Area PDP Option)	Operations – C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total Operations	1.0	0.69	0.019	39	11	1.2

		PM_{10}	$PM_{2.5}$	SO_x	NO_x	CO	VOCs
No Action Alternative	**Construction**	<0.001	<0.001	(c)	(c)	<0.001	0.94
	Operations - NPMP	0.033	0.033	<0.001	0.061	0.54	0.23
	Operations - Dilution	0.031	0.031	<0.001	0.061	0.54	0.23
	Operations - C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total Operations	0.063	0.063	0.002	0.12	1.1	0.47

C&P = characterization and packaging; CO = carbon monoxide; LANL = Los Alamos National Laboratory; NO_x = nitrogen oxide; NPMP = non-pit metal processing; PDP = pit disassembly and processing; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxide; SRS = Savannah River Site; VOC = volatile organic compound.

(a) A row for the All LANL Sub-Alternative is not included because no activities would occur at SRS.

(b) No construction/modification activities are anticipated.

(c) Emissions not expected.

(d) Emissions from construction of modular system would be higher that these values but lower than those for construction of the F-Area PDP Option.

(e) Emissions from modular system are equal to emissions from Building 105-K.

Note: Values rounded to two significant digits.

Sources: Emissions under the Base Approach and SRS NPMP Sub-Alternatives are based on SRS 2022b, scaled for 2.5 MT/yr throughput. SO_x values were adjusted for ultra-low sulfur diesel emission factors. Emissions under the All SRS F-Area and K-Area PDP Option Sub-Alternatives include emissions from the Base Approach Sub-Alternative and values from DOE 2012|Table 2.2-7|. SRS 2020 Emissions are from SRNS 2021a|Page 1/95|.

1 **Table C-17. Radiation Dose and Impacts at SRS by Capability During Construction/Modification for the Preferred and No Action Alternatives**

Receptor (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Worker –Dose Rate (rem/yr)	PDP	NA[b]	NA[b]	NA[b]	0	0.13	NA
	NPMP	NA[b]	0.03	0	(c)	(c)	0.03
	Dilution	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	Total	**(e)**	**(e)**	**(e)**	**(e)**	**(e)**	**(e)**
Worker –Project Dose (rem and LCF risk)	PDP	NA[b]	NA[b]	NA[b]	0	0.19 (0.0001)	NA
	NPMP	NA[b]	0.075 (0.00005)	0	(c)	(c)	0.075 (0.00005)
	Dilution	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	Total	**None[d]**	**0.075 (0.00005)**	**0**	**0**	**0.19 (0.0001)**	**0.075 (0.00005)**
Workforce – Project Collective Dose (person-rem and number of LCFs)	PDP	NA[b]	NA[b]	NA[b]	0	5.3 (0.003)	NA
	NPMP	NA[b]	1.1 (0.0007)	0	(c)	(c)	1.1 (0.0007)
	Dilution	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	Total	**None[d]**	**1.1 (0.0007)**	**0**	**0**	**5.3 (0.003)**	**1.1 (0.0007)**
Public – MEI Dose (rem and LCF risk)	PDP	NA[b]	NA[b]	NA[b]	0	0.000054 (3×10^{-8})	NA
	NPMP	NA[b]	(f)	0	(c)	(c)	(f)
	Dilution	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	Total	**None[d]**	**(f)**	**0**	**0**	**0.000054 (3×10^{-8})**	**(f)**

Receptor (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Public – Population Dose (person-rem and number of LCFs)	PDP	NA[b]	NA[b]	NA[b]	0	2.7 (0.002)	NA
	NPMP	NA[b]	(f)	0	(c)	(c)	(f)
	Dilution	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	None[d]	None[d]	None[d]
	Total	**None[d]**	**(f)**	**0**	**0**	**2.7 (0.002)**	**(f)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.

(b) Not applicable because PDP would not occur at SRS except under the All SRS Sub-Alternative and NPMP would not occur at SRS under the Base Approach Sub-Alternative. No potential dose/impact at SRS.

(c) Construction of the PDP and NPMP capabilities occur together for the All SRS Sub-Alternative.

(d) No construction/modification activities are anticipated. No potential dose/impact from activities at SRS.

(e) Totals are not listed, because different individuals would work on different capabilities or work during different years.

(f) LCFs to the public and the MEI from construction activities for the 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.

Notes: Numbers are rounded to one or two significant digits. Columns may not sum to totals due to rounding. LCFs calculated using a conversion of 0.0006 LCFs per rem or person-rem (DOE 2003). NNSA considers LCFs <0.5 to be 0 for the Workforce – Project Collective Dose and Public – Population Dose.

Source: SRNS 2022a.

Table C-18. Radiation Dose and Impacts at SRS by Capability During Operations for the Preferred and No Action Alternatives

Receptor (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Worker – Dose Rate (rem/yr)	PDP	NA[b]	NA[b]	NA[b]	0.45	0.45	NA
	NPMP	NA[b]	0.63	0.63	(c)	(c)	0.63
	Dilution	0.63	0.63	0.63	0.63	0.63	0.63
	C&P	0.27	0.27	0.27	0.27	0.27	0.27
	Total	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**
Worker – Project Dose (rem and LCF risk)	PDP	NA[b]	NA[b]	NA[b]	6.1 (0.004)	6.1 (0.004)	NA
	NPMP	NA[b]	11 (0.007)	7.5 (0.004)	(c)	(c)	11 (0.007)
	Dilution	8.6 (0.005)	8.6 (0.005)	8.6 (0.005)	8.6 (0.005)	8.6 (0.005)	11 (0.007)
	C&P	3.7 (0.002)	3.7 (0.002)	3.7 (0.002)	3.7 (0.002)	3.7 (0.002)	4.8 (0.003)
	Total	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**
Workforce – Project Collective Dose (person-rem/yr and LCF)	PDP	NA[b]	NA[b]	NA[b]	2,000 (1.2)	2,000 (1.2)	NA
	NPMP	NA[b]	805 (0.5)	181 (0.1)	(c)	(c)	800 (0.5)
	Dilution	2,000 (1.1)	2,000 (1.1)	2,000 (1.1)	2,000 (1.1)	2,000 (1.1)	510 (0.3)
	C&P	190 (0.1)	190 (0.1)	190 (0.1)	190 (0.1)	190 (0.1)	50 (0.030)
	Total	**2,000 (1.2)**	**2,800 (1.7)**	**2,200 (1.3)**	**4,000 (2.4)**	**4,000 (2.4)**	**1,400 (0.8)**
Public – MEI Dose Rate (rem/yr)	PDP	NA[b]	NA[b]	NA[b]	1.1×10^{-7}	8.8×10^{-8}	NA
	NPMP	NA[b]	1.8×10^{-8}	2.7×10^{-8}	(c)	(c)	1.8×10^{-8}
	Dilution	1.1×10^{-7}	1.1×10^{-7}	1.1×10^{-7}	1.4×10^{-7}	1.1×10^{-7}	1.8×10^{-8}
	C&P	0	0	0	0	0	0
	Total	**1.1×10^{-7}**	**1.3×10^{-7}**	**1.4×10^{-7}**	**2.4×10^{-7}**	**2.0×10^{-7}**	**3.6×10^{-8}**

Receptor (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Public –MEI Dose (rem and LCF risk)	PDP	NA[b]	NA[b]	NA[b]	1.5×10^{-6} (9×10^{-10})	1.2×10^{-6} (7×10^{-10})	NA
	NPMP	NA[b]	3.2×10^{-7} (2×10^{-10})	3.2×10^{-7} (2×10^{-10})	(c)	(c)	3.2×10^{-7} (2×10^{-10})
	Dilution	1.5×10^{-6} (9×10^{-10})	1.5×10^{-6} (9×10^{-10})	1.5×10^{-6} (9×10^{-10})	1.5×10^{-6} (9×10^{-10})	1.5×10^{-6} (9×10^{-10})	3.2×10^{-7} (2×10^{-10})
	C&P	0	0	0	0	0	0
	Total	**1.5×10^{-6} (9×10^{-10})**	**1.8×10^{-6} (1×10^{-9})**	**1.8×10^{-6} (1×10^{-9})**	**3.0×10^{-6} (2×10^{-9})**	**2.7×10^{-6} (2×10^{-9})**	**6.3×10^{-7} (4×10^{-10})**
Public – Population Dose (person-rem) (LCF)	PDP	NA[b]	NA[b]	NA[b]	0.060 (0.00004)	0.060 (0.00004)	NA
	NPMP	NA[b]	0.016 (0.00001)	0.016 (0.00001)	(c)	(c)	0.016 (0.00001)
	Dilution	0.076 (0.00005)	0.076 (0.00005)	0.076 (0.00005)	0.076 (0.00005)	0.076 (0.00005)	0.016 (0.00001)
	C&P	0	0	0	0	0	0
	Total	**0.076 (0.00005)**	**0.092 (0.00006)**	**0.092 (0.00006)**	**0.14 (0.00008)**	**0.14 (0.00008)**	**0.032 (0.00002)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.

(b) Not applicable because PDP would not occur at SRS except under the All SRS Sub-Alternative and NPMP would not occur at SRS under the Base Approach Sub-Alternative. No potential dose/impact from activities at SRS.

(c) NPMP is included in PDP activities.

(d) Totals are not listed, because different individuals would work on different capabilities.

Notes: Numbers are rounded to one or two significant digits. Columns may not sum to totals due to rounding. LCFs calculated using a conversion of 0.0006 LCFs per rem or person-rem (DOE 2003). NNSA considers LCFs <0.5 to be 0 for the Workforce – Project Collective Dose and Public – Population Dose.

Source: SRNS 2022a.

Table C-19. Peak-Year Economic Impacts at SRS by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Direct Employment (FTE in peak year)	PDP	NA	NA	NA	525	525	NA
	NPMP	NA	70	30	(b)	(b)	70
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**70**	**30**	**525**	**525**	**70**
Total ROI Employment (Jobs in peak year)	PDP	NA	NA	NA	1,092	1,092	NA
	NPMP	NA	140	89	(b)	(b)	140
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**140**	**89**	**1,092**	**1,092**	**140**
Direct Earnings ($Million in peak year)	PDP	NA	NA	NA	145.9	145.9	NA
	NPMP	NA	19.5	7.5	(b)	(b)	19.5
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**19.5**	**7.5**	**145.9**	**145.9**	**19.5**
Total ROI Earnings ($Million in peak year)	PDP	NA	NA	NA	200.5	200.5	NA
	NPMP	NA	26.7	10.1	(b)	(b)	26.7
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**26.7**	**10.1**	**200.5**	**200.5**	**26.7**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Direct Output ($Million in peak year)	PDP	NA	NA	NA	307.9	307.9	NA
	NPMP	NA	41.1	9.5	(b)	(b)	41.1
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**41.1**	**9.5**	**307.9**	**307.9**	**41.1**
Total ROI Output ($Million in peak year)	PDP	NA	NA	NA	490.4	490.4	NA
	NPMP	NA	65.4	17.7	(b)	(b)	65.4
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**65.4**	**17.7**	**490.4**	**490.4**	**65.4**

C&P = characterization and packaging; FTE = full-time equivalent (employee); LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; ROI = region of influence; SRS = Savannah River Site.

(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.

(b) Construction/modification activities for NPMP are included in PDP construction/modification activities.

(c) No construction/modification activities are anticipated.

Sources: Calculated from data in SRNS 2022a; DOE 2012|Table 2.4-2|; DOE 2015|Table F-8|.

Table C-20. Peak-Year Economic Impacts at SRS by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Direct Employment (FTE in peak year)[b]	PDP	NA	NA	NA	494	494	NA
	NPMP	NA	98	33	(c)	(c)	98
	Dilution	295	295	295	295	295	62
	C&P	55	55	55	55	55	11
	Total	**350**	**448**	**383**	**844**	**844**	**171**
Total ROI Employment (Jobs in peak year)	PDP	NA	NA	NA	2,624	2,624	NA
	NPMP	NA	153	54	(c)	(c)	191
	Dilution	867	867	867	867	867	121
	C&P	164	164	164	164	164	22
	Total	**1,031**	**1,184**	**1,085**	**3,655**	**3,655**	**334**
Direct Earnings ($Million in peak year)	PDP	NA	NA	NA	573.0	573.0	NA
	NPMP	NA	10.7	3.6	(c)	(c)	8.8
	Dilution	118.2	118.2	118.2	118.2	118.2	21.1
	C&P	40.6	40.6	40.6	40.6	40.6	5.2
	Total	**158.8**	**169.5**	**162.4**	**731.8**	**731.8**	**35.1**
Total ROI Earnings ($Million in peak year)	PDP	NA	NA	NA	874	874	NA
	NPMP	NA	16.4	5.5	(c)	(c)	30.7
	Dilution	204.6	204.6	204.6	204.6	204.6	19.4
	C&P	38.2	38.2	38.2	38.2	38.2	3.4
	Total	**242.8**	**259.2**	**248.3**	**1,116.8**	**1,116.8**	**53.5**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Direct Output ($Million in peak year)	PDP	NA	NA	NA	1,579.5	1,579.5	NA
	NPMP	NA	29.6	9.9	(c)	(c)	55.4
	Dilution	373.1	373.1	373.1	373.1	373.1	35.1
	C&P	69.6	69.6	69.6	69.6	69.6	6.2
	Total	**442.7**	**472.3**	**452.6**	**2,022.2**	**2,022.2**	**96.7**
Total ROI Output ($Million in peak year)	PDP	NA	NA	NA	2,493.7	2,493.7	NA
	NPMP	NA	46.8	15.6	(c)	(c)	87.5
	Dilution	588.2	588.2	588.2	588.2	588.2	55.4
	C&P	109.7	109.7	109.7	109.7	109.7	9.8
	Total	**697.9**	**744.7**	**713.5**	**3,191.6**	**3,191.6**	**152.7**

C&P = characterization and packaging; FTE = full-time equivalent (employee); LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; ROI = region of influence; SRS = Savannah River Site.
(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at LANL.
(b) The differences in staffing numbers between LANL and SRS relates to the amount of equipment that is used at each of the sites for processing activities.
(c) NPMP is included in PDP activities.
Sources: Calculated from data in SRNS 2022a; DOE 2012; SRNS 2021b; DOE 2015; LANL 2022.

1 **Table C-21. Infrastructure Impacts at SRS by Capability During Construction/Modification for the Preferred and No Action Alternatives**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Electricity Use (MWh/yr)	PDP	NA	NA	NA	16,000	16,000	NA
	NPMP	NA	minimal	minimal	(b)	(b)	minimal
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**minimal**	**minimal**	**16,000**	**16,000**	**minimal**
Electricity Peak Load (MW)	PDP	NA	NA	NA	1.8	1.8	NA
	NPMP	NA	minimal	minimal	(b)	(b)	minimal
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**minimal**	**minimal**	**1.8**	**1.8**	**minimal**
Fuel Use (gal/yr)[d]	PDP	NA	NA	NA	300,000	540,000	NA
	NPMP	NA	4,000	750	(b)	(b)	4,000
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**4,000**	**750**	**300,000**	**540,000**	**4,000**
Water Use (millions of gal/yr)	PDP	NA	NA	NA	1.1	2	NA
	NPMP	NA	1	0.5	(b)	(b)	1
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**1**	**0.5**	**1.1**	**2**	**1**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Sewage Generation (millions of gal/yr)	PDP	NA	NA	NA	1.1	1.1	NA
	NPMP	NA	1	0.5	(b)	(b)	1
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**1**	**0.5**	**1.1**	**1.1**	**1**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.
(b) Infrastructure resource for construction of NPMP capability is included in the PDP activities.
(c) No construction/modification activities are anticipated.
(d) Fuel is diesel and gasoline combined for construction of non-pit processing capability in Building 105-K.
Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.
Sources: SRNS 2022a; DOE 2015|Table F-26|; SRNS 2010; ACI 2013.

Table C-22. Infrastructure Impacts at SRS by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative[b] (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Electricity Use (MWh/yr)	PDP	NA	NA	NA	41,000	41,000	NA
	NPMP	NA	1,700	2,300	(b)	(b)	1,700
	Dilution	9,000	9,000	9,000	9,000	9,000	1,900[e]
	C&P	2,900	2,900	2,900	2,900	2,900	600[e]
	Total	**12,000**	**14,000**	**14,000**	**53,000**	**53,000**	**4,200**
Electricity Peak Load (MW)	PDP	NA	NA	NA	1.9	1.9	NA
	NPMP	NA	0.19	0.26	(b)	(b)	0.19
	Dilution	1.3	1.3	1.3	1.3	1.3	0.27[e]
	C&P	0.41	0.41	0.41	0.41	0.41	0.09[e]
	Total	**1.7**	**1.9**	**2.0**	**3.6**	**3.6**	**0.55**
Fuel Use (gal/yr)[c]	PDP	NA	NA	NA	170,000	170,000	NA
	NPMP	NA	7,200	7,200	(b)	(b)	0
	Dilution	7,200	7,200	7,200	7,200	7,200	1,500[e]
	C&P[d]	0	0	0	0	0	0
	Total	**7,200**	**14,000**	**14,000**	**180,000**	**180,000**	**1,500**
Water Use (millions of gal/yr)	PDP	NA	NA	NA	5	5	NA
	NPMP	NA	1	1	(b)	(b)	1
	Dilution	3	3	3	3	3	0.6[e]
	C&P	0.6	0.6	0.6	0.6	0.6	0.1[e]
	Total	**3.6**	**4.6**	**4.6**	**8.6**	**8.6**	**1.8**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative[b] (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Sewage Generation (millions of gal/yr)	PDP	NA	NA	NA	5	5	NA
	NPMP	NA	1	1	(b)	(b)	1
	Dilution	3	3	3	3	3	0.6[e]
	C&P	0.6	0.6	0.6	0.6	0.6	0.1[e]
	Total	**3.6**	**4.6**	**4.6**	**8.6**	**8.6**	**1.8**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.
(b) Infrastructure resources for operations of NPMP are included in PDP activities.
(c) Diesel fuel is used for operations and maintenance of a diesel generator.
(d) Propane would be needed for C&P operations (1,600 lbs/yr) and is not reflected in the table. For the No Action Alternative, a fraction (7.1/34 or 21%) of the propane use would be required (334 lbs/yr).
(e) For the No Action Alternative, operation of dilution and C&P activities would result in a fraction (7.1/34 or 21%) of the resources impacted in the Base Approach Sub-Alternative.

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.
Sources: SRNS 2022a; DOE 2012|Section 2.2.3, Table 2.2-7|; DOE 2015|Table F-27|.

Table C-23. Total Waste Generation at SRS by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
CH-TRU Waste (job control waste) (m^3)	PDP	NA	NA	NA	0	0	NA
	NPMP	NA	110	0	(b)	(b)	110
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**110**	**0**	**0**	**0**	**110**
LLW (m^3)	PDP	NA	NA	NA	0	12,000	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**0**	**0**	**0**	**12,000**	**0**
MLLW (m^3)	PDP	NA	NA	NA	0	210	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**0**	**0**	**0**	**210**	**0**
Liquid LLW (L)	PDP	NA	NA	NA	0	0	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**0**	**0**	**0**	**0**	**0**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Solid Hazardous Waste (m^3)	PDP	NA	NA	NA	45	6,600	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**0**	**0**	**45**	**6,600**	**0**
Solid Non-hazardous waste (m^3)	PDP	NA	NA	NA	1,000	6,900	NA
	NPMP	NA	66	66	(b)	(b)	66
	Dilution	(c)	(c)	(c)	(c)	(c)	(c)
	C&P	(c)	(c)	(c)	(c)	(c)	(c)
	Total	**(c)**	**66**	**66**	**1,000**	**6,900**	**66**

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NPMP = not-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.

(b) Construction/modification activities for NPMP are included in PDP construction/modification activities.

(c) No construction/modification activities are anticipated.

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.

Source: Calculated from SRNS 2022a.

Table C-24. Total Waste Generation at SRS by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative[b] (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative[b] (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
CH-TRU Waste (diluted plutonium oxide) (m^3 and CCOs)	**Total**	1,500 m^3 113,400 CCOs	1,500 m^3 113,400 CCOs	1,500 m^3 113,400 CCOs	1,500 m^3 113,400 CCOs	1,500 m^3 113,400 CCOs	310 m^3 24,000 CCOs
CH-TRU Waste (job control waste) (m^3)	PDP	NA	NA	NA	670	670	NA
	NPMP	NA	170	220	(b)	(b)	35
	Dilution	1,400	1,400	1,400	1,400	1,400	140
	C&P	0	0	0	0	0	0
	Total	**1,400**	**1,500**	**1,600**	**2,000**	**2,000**	**170**
LLW (m^3)	PDP	NA	NA	NA	3,200	3,200	NA
	NPMP	NA	2,300	3,100	(b)	(b)	490
	Dilution	19,000	19,000	19,000	19,000	19,000	2,000
	C&P	0	0	0	0	0	0
	Total	**19,000**	**22,000**	**23,000**	**23,000**	**23,000**	**2,400**
MLLW (m^3)	PDP	NA	NA	NA	42	42	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	0	0	0	0	0	0
	C&P	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**42**	**42**	**0**
Liquid LLW (L)	PDP	NA	NA	NA	65,000	65,000	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	0	0	0	0	0	0
	C&P	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**65,000**	**65,000**	**0**

Impact Indicator (Units)	Capability	Preferred Alternative[a] Base Approach Sub-Alternative	Preferred Alternative[a] SRS NPMP Sub-Alternative[b] (105-K NPMP Option)	Preferred Alternative[a] SRS NPMP Sub-Alternative[b] (Modular NPMP Option)	Preferred Alternative[a] All SRS Sub-Alternative (F-Area PDP Option)	Preferred Alternative[a] All SRS Sub-Alternative (K-Area PDP Option)	No Action Alternative
Solid Hazardous Waste (m^3)	PDP	NA	NA	NA	6.6	6.6	NA
	NPMP	NA	0	0	(b)	(b)	0
	Dilution	0	0	0	0	0	0
	C&P	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**6.6**	**6.6**	**0**
Solid Non-hazardous waste (m^3)	PDP	NA	NA	NA	1,500	1,500	NA
	NPMP	NA	1,700	1,700	(b)	(b)	360
	Dilution	11,000	11,000	11,000	11,000	11,000	1,100
	C&P	2,000	2,000	2,000	2,000	2,000	200
	Total	**13,000**	**14,000**	**14,000**	**14,000**	**14,000**	**1,600**

C&P = characterization and packaging; CCOs = criticality control overpacks; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NPMP = not-pit metal processing PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) A column for the All LANL Sub-Alternative is not included because no activities would occur at SRS.

(b) NPMP activities are included in PDP activities.

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.

Sources: Calculated from LANL 2022; SRNS 2022a.

C.3 Cross-Site Tables

Table C-25. Land Disturbance by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capa-bility	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)	PDP	5.6	5.6	5.6	5.6	20	20	NA	NA
	NPMP	(c)	0	0.3	(c)	(c)	(c)	0	(d)
	Dilution	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	0.6[f]	(d)	(d)	(d)	(d)
	Total	**5.6**	**5.6**	**5.9**	**5.6[f]**	**20**	**20**	**0**	**(d)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site; TA-55 = Technical Area 55.

(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) Construction/modification activities for NPMP are not distinct from PDP construction/modification activities and are included in PDP impacts.
(d) No construction/modification activities are anticipated.
(e) Dilution activities occur within PDP facilities and would have no additional impacts from associated building modifications.
(f) The Drum Handling Facility for C&P in the All LANL Sub-Alternative replaces one of the TA-55 laydown areas in the Base Approach Sub-Alternative after it is first used as a laydown area in the All LANL Sub-Alternative, so the total area used at LANL for the Base Approach and the All LANL Sub-Alternatives are the same.

Sources: LANL 2022; SRNS 2022a.

Table C-26. Geologic Materials Used by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	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)
Geologic Materials Used (sand, gravel, crushed stone) (yd^3)	PDP	30,000	30,000	30,000	30,000	260,000	260,000	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	(d)
	Dilution	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	11,000	(d)	(d)	(d)	(d)
	Total	**30,000**	**30,000**	**30,000**	**41,000**	**260,000**	**260,000**	**0**	**(d)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(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) Construction/modification activities for NPMP are not distinct from PDP construction/modification activities and are included in PDP impacts.

(d) No construction/modification activities are anticipated.

(e) Dilution activities occur within PDP facilities and would have no additional impacts from associated building modifications.

Note: Values rounded to two significant digits.

Sources: LANL 2022|Section 2.13|; SRNS 2022a.

1 **Table C-27. LCF Impacts by Capability During Construction/Modification for the Preferred and No Action Alternatives**

Receptor (Units)	Capability	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)
Worker – total risk of LCF	PDP	0.001	0.001	0.001	0.001	0	0.0001	NA	NA
	NPMP	(c)	0.00005	0	(c)	(c)	(c)	0.00005	None[d]
	Dilution	None[d]	None[d]	None[d]	0.0005	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	0	None[d]	None[d]	None[d]	None[d]
	Total[e]	**0.001**	**0.001**	**0.001**	**0.002**	**0**	**0.0001**	**0.00005**	**None[d]**
Workforce – number of LCFs	PDP	0 (0.008)	0 (0.008)	0 (0.008)	0 (0.008)	0 (0)	0 (0.003)	NA	NA
	NPMP	(c)	0 (0.0007)	0 (0)	(c)	(c)	(c)	0 (0.0007)	None[d]
	Dilution	None[d]	None[d]	None[d]	0.002	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	0	None[d]	None[d]	None[d]	None[d]
	Total	**0 (0.008)**	**0 (0.009)**	**0 (0.008)**	**0 (0.01)**	**0 (0)**	**0 (0.003)**	**0 (0.0007)**	**None[d]**
Public – MEI total risk of LCF	PDP	(f)	(f)	(f)	(f)	0	3×10^{-8}	NA	NA
	NPMP	(c)	(f)	0	(c)	(c)	(c)	(f)	None[d]
	Dilution	None[d]	None[d]	None[d]	(f)	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	(f)	None[d]	None[d]	None[d]	None[d]
	Total	**(f)**	**(f)**	**(f)**	**(f)**	**0**	**3×10^{-8}**	**(f)**	**None[d]**
Public – population number of LCFs	PDP	(f)	(f)	(f)	(f)	0 (0)	0 (0.002)	NA	NA
	NPMP	(c)	(f)	0 (0)	(c)	(c)	(c)	(f)	None[d]
	Dilution	None[d]	None[d]	None[d]	(f)	None[d]	None[d]	None[d]	None[d]
	C&P	None[d]	None[d]	None[d]	(f)	None[d]	None[d]	None[d]	None[d]
	Total	**(f)**	**(f)**	**(f)**	**(f)**	**0 (0)**	**0 (0.002)**	**(f)**	**None[d]**

C&P = characterization and packaging; 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); MEI = maximally exposed individual; NA = not applicable; NNSA = National Nuclear Security Administration; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(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 construction would occur in F-Area and K-Area, respectively, in the F-Area PDP Option and K-Area PDP Option.
(c) Construction/modification activities for NPMP are not distinct from PDP construction/modification activities and are included in PDP impacts.
(d) No construction/modification activities are anticipated.
(e) Totals are for a “maximum” worker who works on all construction activities.
(f) LCFs to the public and the MEI from construction activities for the 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.

Notes: Numbers are rounded to one or two significant digits. Columns may not sum to totals due to rounding. NNSA considers LCFs <0.5 to be 0 for the Workforce – Project Collective Dose and Public – Population Dose.

Sources: LANL 2022; SRNS 2022a.

Table C-28 LCF Impacts by Capability During Operations for the Preferred and No Action Alternatives

Receptor (Units)	Capability	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)
Worker – total risk of LCF	PDP	0.005	0.005	0.005	0.005	0.004	0.004	NA	NA
	NPMP	(c)	0.007	0.004	(c)	(c)	(c)	0.007	0.005
	Dilution	0.005	0.005	0.005	0.007	0.005	0.005	0.007	0.007
	C&P	0.002	0.002	0.002	0.003	0.002	0.002	0.003	0.003
	Total	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**	**(d)**
Workforce – total number of LCFs	PDP	1 (1.2)	1 (1.2)	1 (1.2)	1 (1.2)	1 (1.2)	1 (1.2)	NA	NA
	NPMP	(c)	1 (0.5)	0 (0.1)	(c)	(c)	(c)	0 (0.5)	0 (0.5)
	Dilution	1 (1.1)	1 (1.1)	1 (1.1)	1 (0.6)	1 (1.1)	1 (1.1)	0 (0.3)	0 (0.3)
	C&P	0 (0.1)	0 (0.1)	0 (0.1)	0 (0.09)	0 (0.1)	0 (0.1)	0 (0.03)	0 (0.03)
	Total	**2 (2.4)**	**3 (2.9)**	**3 (2.5)**	**2 (1.8)**	**2 (2.4)**	**2 (2.4)**	**1 (0.8)**	**1 (0.8)**
Public – MEI risk of LCF	PDP	3×10^{-8}	3×10^{-8}	3×10^{-8}	3×10^{-8}	9×10^{-10}	7×10^{-10}	NA	NA
	NPMP	(c)	2×10^{-10}	2×10^{-10}	(c)	(c)	(c)	2×10^{-10}	8×10^{-9}
	Dilution	9×10^{-10}	9×10^{-10}	9×10^{-10}	4×10^{-8}	9×10^{-10}	9×10^{-10}	2×10^{-10}	2×10^{-10}
	C&P	0	0	0	0	0	0	0	0
	Total[e]	**3×10^{-8}**	**3×10^{-8}**	**3×10^{-8}**	**6×10^{-8}**	**2×10^{-9}**	**2×10^{-9}**	**4×10^{-10}**	**8×10^{-9}**
Public – Population number of LCFs	PDP	0 (0.0001)	0 (0.0001)	0 (0.0001)	0 (0.0001)	0 (0.00004)	0 (0.00004)	NA	NA
	NPMP	(c)	0 (0.00001)	0 (0.00001)	(c)	(c)	(c)	0 (0.00001)	0 (0.00003)
	Dilution	0 (0.00005)	0 (0.00005)	0 (0.00005)	0 (0.0001)	0 (0.00005)	0 (0.00005)	0 (0.00001)	0 (0.00001)
	C&P	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Total	**0 (0.0001)[f]**	**0 (0.0002)[f]**	**0 (0.0002)[f]**	**0 (0.0002)**	**0 (0.00008)**	**0 (0.00008)**	**0 (0.00002)**	**0 (0.00004)[f]**

C&P = characterization and packaging; 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); MEI = maximally exposed individual; NA = not applicable; NNSA = National Nuclear Security Administration; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(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) Operations activities for NPMP are not distinct from PDP activities and are included in PDP impacts.

(d) Totals are not listed, because different individuals would work on different capabilities.

(e) Total for the site with the highest risk of LCF. The total does not sum across LANL and SRS.

(f) 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.

Notes: Numbers are rounded to one or two significant digits. Columns may not sum to totals due to rounding. NNSA considers LCFs <0.5 to be 0 for the Workforce – Project Collective Dose and Public – Population Dose.

Sources: LANL 2022; SRNS 2022a.

Table C-29. Bounding Accident- LCF by Site During Operations for the Preferred and No Action Alternatives

Receptor (Units)	Location of Accident	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP Sub-Alternative (105-K NPMP Option)	Preferred Alternative SRS NPMP Sub-Alternative (Modular NPMP Option)	Preferred Alternative All LANL Sub-Alternative	Preferred Alternative All SRS Sub-Alternative (F-Area PDP[a] Option)	Preferred Alternative All SRS Sub-Alternative (K-Area PDP[a] Option)	No Action Alternative (SRS NPMP Option)	No Action Alternative (LANL NPMP Option)
Noninvolved worker – maximum LCFs	LANL	0.036	0.036	0.036	0.036	NA	NA	NA	0.00072
	SRS K-Area	0.0018	0.0033	0.052	NA	0.0018	0.0033	0.0033	0.001
	SRS F-Area	NA	NA	NA	NA	0.0039	NA	NA	NA
Public – MEI maximum LCFs	LANL	0.0015	0.0015	0.0015	0.0015	NA	NA	NA	0.000062
	SRS K-Area	0.000064	0.00012	0.00072	NA	0.000064	0.00012	0.00012	0.000028
	SRS F-Area	NA	NA	NA	NA	0.00016	NA	NA	NA
Public – Population maximum LCFs	LANL	0 (0.086)	0 (0.086)	0 (0.086)	0 (0.086)	NA	NA	NA	0 (0.028)
	SRS K-Area	0 (0.056)	0 (0.1)	1 (0.62)	NA	0 (0.056)	0 (0.1)	0 (0.1)	0 (0.024)
	SRS F-Area	NA	NA	NA	NA	0 (0.14)	NA	NA	NA

C&P = characterization and packaging; 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); MEI = maximally exposed individual; MEI = maximally exposed individual; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(a) Both PDP and NPMP could occur in F-Area and K-Area, respectively, in the F-Area PDP Option and K-Area PDP Option. Dilution and C&P would only occur in K-Area.

Note: Beyond Extremely Unlikely accidents are not included in this table. See Appendix D for more detail.

Source: See tables, calculations, and references in Appendix D.

Table C-30. Peak-Year Economic Impacts by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	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)
Direct Employment (FTE in Peak Year)	PDP	116	116	116	116	525	525	NA	NA
	NPMP	(c)	70	30	(c)	(c)	(c)	70	(d)
	Dilution	(d)	(d)	(d)	23	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**116**	**186**	**146**	**139**	**525**	**525**	**70**	**(d)**
Total ROI Employment (FTE in Peak Year)	PDP	221	221	221	221	1,092	1,092	NA	NA
	NPMP	(c)	140	89	(c)	(c)	(c)	140	(d)
	Dilution	(d)	(d)	(d)	42	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**221**	**361**	**310**	**263**	**1,092**	**1,092**	**140**	**(d)**
Direct Earnings ($Million in peak year)	PDP	19.4	19.4	19.4	19.4	145.9	145.9	NA	NA
	NPMP	(c)	19.5	7.5	(c)	(c)	(c)	19.5	(d)
	Dilution	(d)	(d)	(d)	3.8	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**19.4**	**38.9**	**26.9**	**23.2**	**145.9**	**145.9**	**19.5**	**(d)**
Total ROI Earnings ($Million in peak year)	PDP	23.6	23.6	23.6	23.6	200.5	200.5	NA	NA
	NPMP	(c)	26.7	10.1	(c)	(c)	(c)	26.7	(d)
	Dilution	(d)	(d)	(d)	4.6	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**23.6**	**50.3**	**33.7**	**28.2**	**200.5**	**200.5**	**26.7**	**(d)**

Impact Indicator (Units)	Capability	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)
Direct Output ($Million in peak year)	PDP	20.3	20.3	20.3	20.3	307.9	307.9	NA	NA
	NPMP	(c)	41.1	9.5	(c)	(c)	(c)	41.1	(d)
	Dilution	(d)	(d)	(d)	3.9	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**20.3**	**61.4**	**29.8**	**24.2**	**307.9**	**307.9**	**41.1**	**(d)**
Total ROI Output ($Million in peak year)	PDP	36.3	36.3	36.3	36.3	490.4	490.4	NA	NA
	NPMP	(c)	65.4	17.7	(c)	(c)	(c)	65.4	(d)
	Dilution	(d)	(d)	(d)	7.0	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**36.3**	**101.7**	**54.0**	**43.3**	**490.4**	**490.4**	**65.4**	**(d)**

C&P = characterization and packaging; FTE = full-time equivalent (employee); LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; ROI = region of influence; SRS = Savannah River Site.

(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) Construction/modification activities for NPMP are not distinct from PDP construction/modification activities and are included in PDP impacts.

(d) No construction/modification activities are anticipated.

(e) C&P are included in the totals for PDP and dilution – staff are shared between activities.

Sources: Calculated from data in LANL 2022|derived from Section 2.14|; SRNS 2022a, DOE 2012|Table 2.4-2|; DOE 2015|Table F-8|.

Table C-31. Peak-Year Economic Impacts by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	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)
Direct Employment (FTE in Peak Year)[(d)]	PDP	395	395	395	395	494	494	NA	NA
	NPMP	(c)	98	33	(c)	(c)	(c)	98	147
	Dilution	295	295	295	114	295	295	62	62
	C&P	55	55	55	40	55	55	11	11
	Total	**745**	**843**	**778**	**549**	**844**	**844**	**171**	**220**
Total ROI Employment (FTE in Peak Year)	PDP	1,301	1,301	1,301	1,301	2,624	2,624	NA	NA
	NPMP	(c)	153	54	(c)	(c)	(c)	191	376
	Dilution	867	867	867	365	867	867	121	121
	C&P	164	164	164	128	164	164	22	22
	Total	**2,332**	**2,485**	**2,386**	**1,794**	**3,655**	**3,655**	**334**	**519**
Direct Earnings ($Million in peak year)	PDP	458.1	458.1	458.1	458.1	573.0	573.0	NA	NA
	NPMP	(c)	10.7	3.6	(c)	(c)	(c)	8.8	83.6
	Dilution	118.2	118.2	118.2	41.2	118.2	118.2	21.1	21.1
	C&P	40.6	40.6	40.6	14.4	40.6	40.6	5.2	5.2
	Total	**616.9**	**627.6**	**620.5**	**513.7**	**731.8**	**731.8**	**35.1**	**109.9**
Total ROI Earnings ($Million in peak year)	PDP	627.3	627.3	627.3	627.3	874.0	874.0	NA	NA
	NPMP	(c)	16.4	5.5	(c)	(c)	(c)	30.7	114.2
	Dilution	204.6	204.6	204.6	56.1	204.6	204.6	19.4	19.4
	C&P	38.2	38.2	38.2	19.7	38.2	38.2	3.4	3.4
	Total	**870.1**	**886.5**	**875.6**	**703.1**	**1,116.8**	**1,116.8**	**53.5**	**137.0**

Impact Indicator (Units)	Capability	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)
Direct Output ($Million in peak year)	PDP	1,276.5	1,276.5	1,276.5	1,276.5	1,579.5	1,579.5	NA	NA
	NPMP	(c)	29.6	9.9	(c)	(c)	(c)	55.4	228.9
	Dilution	373.1	373.1	373.1	112.7	373.1	373.1	35.1	35.1
	C&P	69.6	69.6	69.6	39.6	69.6	69.6	6.2	6.2
	Total	**1,719.2**	**1,748.8**	**1,729.1**	**1,428.8**	**2,022.2**	**2,022.2**	**96.7**	**270.2**
Total ROI Output ($Million in peak year)	PDP	1,851.3	1,851.3	1,851.3	1,851.3	2,493.7	2,493.7	NA	NA
	NPMP	(c)	46.8	15.6	(c)	(c)	(c)	87.5	332.9
	Dilution	588.2	588.2	588.2	163.9	588.2	588.2	55.4	55.4
	C&P	109.7	109.7	109.7	57.5	109.7	109.7	9.8	9.8
	Total	**2,549.2**	**2,596.0**	**2,564.8**	**2,027.7**	**3,191.6**	**3,191.6**	**152.7**	**398.1**

C&P = characterization and packaging; FTE = full-time equivalent (employee); LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; ROI = region of influence; SRS = Savannah River Site.

(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) Operations activities for NPMP are not distinct from PDP activities and are included in PDP impacts.

(d) The number of staff anticipated at each site (LANL or SRS) for equivalent processing activities varies based on the equipment that would be used at each site for processing activities.

Sources: Calculated from data in LANL 2022|Sections 1.4.1, 1.4.2|; SRNS 2022a; DOE 2012; SRNS 2021b; DOE 2015.

Table C-32. Infrastructure by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	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)
Electricity Use (MWh/yr)	PDP	160	160	160	160	16,000	16,000	NA	NA
	NPMP	(c)	minimal	minimal	(c)	(c)	(c)	minimal	(d)
	Dilution	(d)	(d)	(d)	(c)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	0	(d)	(d)	(d)	(d)
	Total	**160**	**160**	**160**	**160**	**16,000**	**16,000**	**minimal**	**(d)**
Electricity Peak Load (MW)	PDP	0.02	0.02	0.02	0.02	1.8	1.8	NA	NA
	NPMP	(c)	minimal	minimal	(c)	(c)	(c)	minimal	(d)
	Dilution	(d)	(d)	(d)	(c)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	0	(d)	(d)	(d)	(d)
	Total	**0.02**	**0.02**	**0.02**	**0.02**	**1.8**	**1.8**	**minimal**	**(d)**
Fuel Use (gal/yr)	PDP	55,000	55,000	55,000	55,000	300,000	540,000	NA	NA
	NPMP	(c)	4,000	750	(c)	(c)	(c)	4,000	(d)
	Dilution	(d)	(d)	(d)	(c)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	15,000	(d)	(d)	(d)	(d)
	Total	**55,000**	**59,000**	**56,000**	**70,000**	**300,000**	**540,000**	**4,000**	**(d)**
Water Use (millions of gal/yr)	PDP	2.6	2.6	2.6	2.6	1.1	2	NA	NA
	NPMP	(c)	1	0.5	(c)	(c)	(c)	1	(d)
	Dilution	(d)	(d)	(d)	(c)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(c)	(d)	(d)	(d)	(d)
	Total	**2.6**	**3.6**	**3.1**	**2.6**	**1.1**	**2**	**1**	**(d)**

Impact Indicator (Units)	Capability	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)
Sewage Generation (millions of gal/yr)	PDP	0.055	0.055	0.055	0.055	1.1	1.1	NA	NA
	NPMP	(c)	1	0.5	(c)	(c)	(c)	1	(d)
	Dilution	(d)	(d)	(d)	(c)	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**0.055**	**1.1**	**0.56**	**0.055**	**1.1**	**1.1**	**1**	**(d)**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; PF-4 = Plutonium Facility-4; SRS = Savannah River Site.

(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) Construction/modification activities are not distinct from PDP construction/modification activities and are included in PDP impacts.

(d) No construction/modification activities are anticipated.

(e) Sewage generation for workers performing construction/modification activities inside PF-4 are included in the requirements for PDP activities. Construction workers outside PF-4 would use portable toilets (LANL 2022|Section 2.16.1.1|).

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.

Sources: LANL 2022; SRNS 2022a; DOE 2015|Table F-26|; SRNS 2010; ACI 2013.

1 **Table C-33. Infrastructure by Capability During Operations for the Preferred and No Action Alternatives**

Impact Indicator (Units)	Capability	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)
Electricity Use (MWh/yr)	PDP	7,200	7,200	7,200	7,200	41,000	41,000	NA	NA
	NPMP	(c)	1,700	2,300	(c)	(c)	(c)	1,700	2,700
	Dilution	9,000	9,000	9,000	500	9,000	9,000	1,900	1,900
	C&P	2,900	2,900	2,900	1,700	2,900	2,900	600	600
	Total	**19,000**	**21,000**	**21,000**	**9,400**	**53,000**	**53,000**	**4,200**	**5,200**
Electricity Peak Load (MW)	PDP	0.82	0.82	0.82	0.82	1.9	1.9	NA	NA
	NPMP	(c)	0.19	0.26	(c)	(c)	(c)	0.19	0.31
	Dilution	1.3	1.3	1.3	0.06	1.3	1.3	0.27	0.27
	C&P	0.41	0.41	0.41	0.19	0.41	0.41	0.09	0.09
	Total	**2.5**	**2.7**	**2.8**	**1.1**	**3.6**	**3.6**	**0.55**	**0.67**
Fuel Use (gal/yr)	PDP	0	0	0	0	170,000	170,000	NA	NA
	NPMP	(c)	7,200	7,200	(c)	(c)	(c)	0	0
	Dilution	7,200	7,200	7,200	0	7,200	7,200	1,500	1,500
	C&P	0[(d)]	0[(d)]	0[(d)]	0	0[(d)]	0[(d)]	0[(d)]	0[(d)]
	Total	**7,200**	**14,000**	**14,000**	**0**	**180,000**	**180,000**	**1,500**	**1,500**
Water Use (millions of gal/yr)	PDP	1.7	1.7	1.7	1.7	5	5	NA	NA
	NPMP	(c)	1	1	(c)	(c)	(c)	1	0.6
	Dilution	3	3	3	0.85	3	3	0.6	0.6
	C&P	0.6	0.6	0.6	(e)	0.6	0.6	0.1	0.1
	Total	**5.3**	**6.3**	**6.3**	**2.5**	**8.6**	**8.6**	**1.8**	**1.4**

Impact Indicator (Units)	Capability	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)
Sewage Generation (millions of gal/yr)	PDP	1.7	1.7	1.7	1.7	5	5	NA	NA
	NPMP	(c)	1	1	(c)	(c)	(c)	1	0.6
	Dilution	3	3	3	0.85	3	3	0.6	0.6
	C&P	0.6	0.6	0.6	(e)	0.6	0.6	0.1	0.1
	Total	**5.3**	**6.3**	**6.3**	**2.5**	**8.6**	**8.6**	**1.8**	**1.4**

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(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) Operations activities are not distinct from PDP activities and are included in PDP impacts.

(d) Propane would be needed for C&P operations (1,600 lb/yr) and is not reflected in the table. For the No Action Alternative, a fraction (7.1/34 or 21%) of the propane use would be required (334 lb/yr).

(e) Operation activities are not distinct and are included in dilution impacts.

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.

Sources: LANL 2022; SRNS 2022a; DOE 2015|Table F-27|; DOE 2012|Section 2.2.3, Table 2.2-7|.

Table C-34. Total Waste Generation by Capability During Construction/Modification for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	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)
CH-TRU Waste (job control waste) (m^3)	PDP	69	69	69	69	0	0	NA	NA
	NPMP	(c)	110	0	(c)	(c)	(c)	110	(d)
	Dilution	(d)	(d)	(d)	38	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**69**	**170**	**69**	**110**	**0**	**0**	**110**	**(d)**
LLW (m^3)	PDP	360	360	360	360	0	12,000	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	(d)
	Dilution	(d)	(d)	(d)	200	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**360**	**360**	**360**	**560**	**0**	**12,000**	**0**	**(d)**
MLLW (m^3)	PDP	4.8	4.8	4.8	4.8	0	210	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	(d)
	Dilution	(d)	(d)	(d)	2.6	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**4.8**	**4.8**	**4.8**	**7.4**	**0**	**210**	**0**	**(d)**
Liquid LLW (m^3)	PDP	0	0	0	0	0	0	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	(d)
	Dilution	(d)	(d)	(d)	0	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**(d)**

Impact Indicator (Units)	Capability	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)
Solid Hazardous Waste (m^3)	PDP	2.4	2.4	2.4	2.4	45	6,600	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	(d)
	Dilution	(d)	(d)	(d)	0.68	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**2.4**	**2.4**	**2.4**	**3.1**	**45**	**6,600**	**0**	**(d)**
Solid Non-Hazardous Waste (m^3)	PDP	210	210	210	210	1,000	6,900	NA	NA
	NPMP	(c)	66	66	(c)	(c)	(c)	66	(d)
	Dilution	(d)	(d)	(d)	61	(d)	(d)	(d)	(d)
	C&P	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)
	Total	**210**	**280**	**280**	**280**	**1,000**	**6,900**	**66**	**(d)**

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(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) Construction/modification activities for NPMP are not distinct from PDP construction/modification activities and are included in PDP impacts.

(d) No construction/modification activities are anticipated.

(e) C&P waste generation is included in the dilution estimate at LANL.

Notes: Numbers are rounded to two significant digits. Columns may not sum to totals due to rounding.

Sources: Calculated from LANL 2022; SRNS 2022a.

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Table C-35. Total Waste Generation by Capability During Operations for the Preferred and No Action Alternatives

Impact Indicator (Units)	Capability	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)
CH-TRU Waste (job control waste) (m^3)	PDP	670	670	670	670	670	670	NA	NA
	NPMP	(c)	170	220	(c)	(c)	(c)	35	59
	Dilution	1,400	1,400	1,400	970	1,400	1,400	140	140
	C&P	0	0	0	0	0	0	0	0
	Total	**2,000**	**2,200**	**2,300**	**1,600**	**2,000**	**2,000**	**170**	**200**
LLW (m^3)	PDP	3,200	3,200	3,200	3,200	3,200	3,200	NA	NA
	NPMP	(c)	2,300	3,100	(c)	(c)	(c)	490	280
	Dilution	19,000	19,000	19,000	14,000	19,000	19,000	2,000	2,000
	C&P	0	0	0	0	0	0	0	0
	Total	**23,000**	**25,000**	**26,000**	**17,000**	**23,000**	**23,000**	**2,400**	**2,200**
MLLW (m^3)	PDP	42	42	42	42	42	42	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	3.7
	Dilution	0	0	0	47	0	0	0	0
	C&P	0	0	0	0	0	0	0	0
	Total	**42**	**42**	**42**	**89**	**42**	**42**	**0**	**3.7**
Liquid LLW (m^3)	PDP	65,000	65,000	65,000	65,000	65,000	65,000	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	0
	Dilution	0	0	0	0	0	0	0	0
	C&P	0	0	0	0	0	0	0	0
	Total	**65,000**	**65,000**	**65,000**	**65,000**	**65,000**	**65,000**	**0**	**0**

Impact Indicator (Units)	Capability	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)
Solid Hazardous Waste (m^3)	PDP	6.6	6.6	6.6	6.6	6.6	6.6	NA	NA
	NPMP	(c)	0	0	(c)	(c)	(c)	0	0.7
	Dilution	0	0	0	0.17	0	0	0	0
	C&P	0	0	0	0	0	0	0	0
	Total	**6.6**	**6.6**	**6.6**	**6.8**	**6.6**	**6.6**	**0.0**	**0.7**
Solid Non-Hazardous Waste (m^3)	PDP	1,500	1,500	1,500	1,500	1,500	1,500	NA	NA
	NPMP	(c)	1,700	1,700	(c)	(c)	(c)	360	150
	Dilution	11,000	11,000	11,000	18	11,000	11,000	1,100	1,100
	C&P	2,000	2,000	2,000	0	2,000	2,000	200	200
	Total	**14,000**	**16,000**	**16,000**	**1,500**	**14,000**	**14,000**	**1,600**	**1,400**

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.

(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) Operations activities for NPMP are not distinct from PDP activities and are included in PDP impacts.

Sources: Calculated from LANL 2022; SRNS 2022a.

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APPENDIX D

EVALUATION OF HUMAN HEALTH EFFECTS FROM FACILITY ACCIDENTS

Following the basic approaches used in the *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (SPD Supplemental EIS; DOE 2015), this appendix details the human health effects on noninvolved workers, maximally exposed individual (MEI) offsite, and the general population associated with postulated accidents that result in radiological releases. As discussed in Chapter 2.0, anticipated activities at Pantex Plant, the Y-12 National Security Complex, and the Waste Isolation Pilot Plant are a continuation of ongoing activities that were previously evaluated. Therefore, this evaluation focuses on the activities occurring at Los Alamos National Laboratory (LANL) and the Savannah River Site (SRS) that are associated with the alternatives in this *Surplus Plutonium Disposition Program Environmental Impact Statement* (SPDP EIS).

The operational accidents selected and the material at risk (MAR) are consistent with those analyzed in the 2015 *Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (SPD SEIS) (DOE 2015) because these accidents were deemed to remain representative of the proposed plutonium disposition activities under the Preferred and No Action Alternatives. Facility-wide events (e.g., seismic, external impacts) are analyzed based on using the entire facility limits for the MAR, as for each of the sub-alternatives the actions will be carried out in a portion of the identified facilities with other activities also occurring. However, the accident consequences have been revised based on updated population data, updated meteorological data, and use of more recent dose conversion factors (i.e., those based on a supplement to Federal Guidance Report [FGR] 13 instead of FGR 11) (EPA 2002 and EPA 1988). In addition, National Nuclear Security Administration assumed the most conservative of the pit (weapons-grade) and non-pit (K-Area bounding isotopic [KBI]) isotopic mix in the consequence analyses. The detailed discussion from the 2015 SPD SEIS is not reiterated in this appendix; instead, the reader is referred to the original analysis (DOE 2015).

Surplus plutonium disposition activities do not require the use or storage of large amounts of hazardous chemicals; therefore, the impacts from postulated chemical releases are limited to the immediate accident vicinity and present negligible risks to the noninvolved worker, MEI, and the population. The occupational risks associated with postulated chemical releases are managed under the required industrial hygiene program. Because no substantial hazardous chemical releases are expected, chemical releases are not analyzed in this SPDP EIS.

Section D.1 summarizes and presents the differences between the consequence analysis methodologies used in this SPDP EIS and those used in the 2015 SPD SEIS (DOE 2015). Section D.2 provides the potential radiological impacts of postulated accidents associated with alternatives in this SPDP EIS. Section D.3 provides a list of references.

D.1 Consequence Analysis Methodology

As discussed in the 2015 SPD SEIS (DOE 2015), consequences are presented in terms of estimated dose and the potential resultant latent cancer fatalities (LCFs). For individuals (i.e., noninvolved worker and MEI) or population groups, estimates of potential LCFs are made using a factor of 0.0006 LCF per rem or person-rem (or 600 LCF per 1 million rem or person-rem) (DOE 2003). For cases where the individual (MEI or noninvolved worker) dose would be equal to or greater than 20 rem, the LCF risk was doubled

(NCRP 1993). If the dose to an individual exceeds 400 rem, it was assumed to result in a fatality, with the LCF = 1.

Accident frequencies are grouped into the bins of "anticipated," "unlikely," "extremely unlikely," and "beyond extremely unlikely," with estimated annual frequencies of greater than or equal to 1 in 100 ($\geq 1\times10^{-2}$), 1 in 100 to 1 in 10,000 (1×10^{-2} to 1×10^{-4}), 1 in 10,000 to 1 in 1 million (1×10^{-4} to 1×10^{-6}), and less than 1 in 1 million (1×10^{-6}), respectively (DOE 2014).

Accident Frequencies

Frequency Bin	Estimated Probability Per Year
Anticipated	Is greater than 1×10^{-2}
Unlikely	Is between 1×10^{-2} and 1×10^{-4}
Extremely Unlikely	Is between 1×10^{-4} and 1×10^{-6}
Beyond Extremely Unlikely	Is less than or equal to 1×10^{-6}

Consequences from accidental releases are estimated for the following three receptors:

- noninvolved worker
- MEI
- the projected 2040 population within a radius of 50 mi from the release point.

Individual and population doses were computed for unit releases from each of the LANL and SRS locations:

- LANL Technical Area 55,
- SRS F-Area, and
- SRS K-Area.

Section D.2 summarizes the consequences and provides both the estimated doses and the projected number of LCFs resulting from the doses received.

The accidents selected for this SPDP EIS, the analysis assumptions, and the resultant source terms are consistent with those presented in the 2015 SPD SEIS (DOE 2015) augmented to reflect new systems or facilities as appropriate (e.g., characterization and packaging facilities). Because of the preliminary state of the design, representative accidents from the 2015 SPD SEIS (DOE 2015) were included at each location even if not previously identified (e.g., a DMO steam explosion has been analyzed for all locations). Appendix D of the 2015 SPD SEIS includes discussion of the consequence analysis methodology, dispersion modeling assumptions, receptor locations, accident scenario selection, and development of the source terms (considering the MAR, damage ratios, airborne release fractions, respirable fractions, and building leak path factors). Therefore, this section is limited to a discussion of changes in the methodology described in the 2015 SPD SEIS (DOE 2015).

NNSA has prepared Documented Safety Analyses (DSAs) for the facilities evaluated in this SPDP EIS; NNSA is updating some of them. The central focus of the DSA process is to demonstrate that sufficient safety controls have been or will be put in place. The purpose is not to quantify risks during facility operations. In general, the purpose of the DSA process is not to establish best estimates of the probabilities or consequences of potential accidents. Consistent with their purpose, source terms and other assumptions used for DSA frequency and consequence estimates are conservative. NNSA expects that the actual risk of the facility operations would be much lower than portrayed in DSAs. For this SPDP EIS the DSAs are the basis for the doses presented. However, NNSA uses more realistic assumptions, such as the application of controls, to estimate doses. Therefore, the doses presented in this SPDP EIS may not match those presented in the DSAs. NNSA has reviewed the doses presented in this SPDP EIS against the DSAs and determined that they are more realistic, while still conservative, estimates of doses that could result under accident conditions.

In this SPDP EIS, DOE updated the consequences for the accidents selected in the 2015 SPD SEIS (DOE 2015), while generally assuming the same amount of material is at risk for release during the accidents. The analysis of consequences for these accidents and source terms was revised by using the following:

- MELCOR Accident Consequence Code System (MACCS) (WinMACCS, Version 3.11.2),
- 50 mi population distributions projected to the year 2040,
- updated meteorological data,
- updated inhalation dose coefficients from FGR 13 instead of those from FGR 11, and
- updated isotopic information for pit and/or non-pit material.

D.1.1 MACCS

The MACCS computer code version 3.11.2 was used to compute unit doses (for Pu-239 and fission products released during a criticality event) (Chanin and Young 1998; Jow et al. 1990). This software version was used because subsequent releases were not available for Project Quality Assurance verification prior to initiating the accident consequence evaluation. No significant modeling impacts would be expected if the evaluations were based on the latest released version. Unit doses (1 gram of Pu-239) were used to estimate the doses to the noninvolved worker, MEI, and the projected 2040 population within a 50 mi radius. Three requisite input files, which separately provide population distributions, meteorological data, and dose coefficients, were also updated as described in Sections D.1.2, D.1.3, and D.1.4.

Chapter 2.0 describes the surplus plutonium disposition activities that would occur in each of these locations for each of the alternatives.

D.1.2 Population Distribution

For each of the surplus plutonium disposition locations, the population distribution was derived using the same base census data as those used in the 2015 SPD SEIS (DOE 2015), but projecting to the year 2040, which was selected as a representative year for full-scale operations (USCB 2018). The 2040 projections were based on the 2000 and 2010 Census data, in addition to the annual estimates for 2010 to 2017 (USCB 2021). The distributions consisted of the 2040 projected populations as a function of compass sectors and distance grids up to 50 mi for each of the locations described in Section D.1. These updated population distributions were used to compute the population doses presented in this SPDP EIS.

D.1.3 Meteorological Data

At least 5 years of meteorological data for both LANL and SRS were evaluated to determine which meteorological data set provided the largest doses (LANL 2022; SRNL 2021). Doses presented in this SPDP EIS were calculated using the annual meteorological data that generated the greatest doses. This meteorological data is bound by the data in the 2015 SPD SEIS (DOE 2015).

D.1.4 Dose Coefficients

Source terms are presented in Pu-239 equivalent grams applicable to the isotopic mix and are identified based on the most conservative of the KBI and weapons-grade (WG) isotopic mixes that could be present for analyzing the potential consequences from activities. The 2015 SPD SEIS contains a general discussion of plutonium equivalency (PuE) (DOE 2015). For activities only involving pit disassembly and processing, the WG isotopic mixture is used. Table D-1 provides the updated isotopic distributions and FGR 13 PuE values for bounding isotopic mixes:

- KBI (non-pit) mix
- WG mix.

Consequences analyzed in this SPDP EIS were updated using the most recent dose coefficients provided in the supplement to FGR 13 (EPA 2002) rather than the FGR 11 dose coefficients, which had been used for the 2015 SPD SEIS (DOE 2015). The unit doses and the FGR 13 PuE values were based on an absorption class of moderate (M) for all the plutonium and americium isotopes in the given mix based on recommendations in International Commission on Radiological Protection Report 71 (ICRP 1995). For the same MAR this resulted in a reduction of the dose.

Table D-1. Isotopic Mixes and PuE Factors

Isotope	KBI (Non-Pit) Plutonium Mix[(a)] Weight Fraction	Weapons-Grade (Pit) Plutonium[(b)] Weight Fraction
Pu-238	4.00×10^{-4}	1.00×10^{-4}
Pu-239	8.78×10^{-1}	9.45×10^{-1}
Pu-240	1.15×10^{-1}	6.00×10^{-2}
Pu-241	3.70×10^{-3}	8.2×10^{-4}
Pu-242	2.60×10^{-3}	3.1×10^{-4}
Am-241	6.25×10^{-2}	5.64×10^{-3}
Total:	1.06	1.01
FGR 13 PuE factor[(c)]	**4.37**	**1.47**

Am = americium; FGR = Federal Guidance Report; KBI = K-Area bounding isotopic; Pu = plutonium; PuE = plutonium-239 equivalency.
(a) Source: SRNS 2019.
(b) Source: LANL 2022|Section 2.15.1.2.4|.
(c) FGR 13 PuE factors were developed using the dose coefficients from EPA 2002. For FGR 13 PuE, an absorption class of “M” was assumed for plutonium and Am-241 isotopes. PuE conversion factors were determined using methodology from Wen 2011.

D.2 Radiological Impacts of Facility Accidents

Table D-2 provides a crosswalk of tables in this section to the comparable tables in the 2015 SPD SEIS (DOE 2015).

Table D-2. Crosswalk of Accident Impact Tables to the 2015 SPD SEIS

SPDP EIS Accident Impacts Table No.	SPDP EIS Table Title	2015 SPD SEIS Accident Basis Tables
Table D-3	LANL Accident Impacts for the Preferred Alternative: Base Approach Sub-Alternative	Table D-9
Table D-4	SRS Accident Impacts for the Preferred Alternative: Base Approach Sub-Alternative	Tables D-1 & D-10
Table D-5	LANL Accident Impacts for the Preferred Alternative: SRS NPMP Sub-Alternative	Table D-9
Table D-6	SRS Accident Impacts for the Preferred Alternative: SRS NPMP Sub-Alternative	Tables D-1, D-3, & D-10
Table D-7	LANL Accident Impacts for the Preferred Alternative: All LANL Sub-Alternative	Table D-9
Table D-8	SRS Accident Impacts for the Preferred Alternative: All SRS Sub-Alternative	Tables D-1, D-2, D-6, D-10, & D-15
Table D-9	LANL Accident Impacts for No Action Alternative	Table D-9
Table D-10	SRS Accident Impacts for No Action Alternative	Tables D-1, D-3, & D-10

EIS = environmental impact statement; LANL = Los Alamos National Laboratory; NPMP = non-pit metal processing; SEIS = supplemental environmental impact statement; SPD = surplus plutonium disposition; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site.
Source: DOE 2015.

Table D-3 through Table D-10 provide the potential impacts of the accidents and associated source terms. These tables update the consequence analysis results based on changes in methodology described in Section D.1. A description of the accidents identified in these tables and the source term development is found in Appendix D of the 2015 SPD SEIS (DOE 2015).

Table D-3. LANL Accident Impacts for the Preferred Alternative: Base Approach Sub-Alternative

Accident	Source Term (PuE g)[(a)]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[(c)(d)(e)(f)]	Impacts on an MEI at the Site Boundary[(b)] Dose (rem)	Impacts on an MEI at the Site Boundary[(b)] LCF[(c)(d)(f)]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[(c)(d)]
Criticality	NA[(g)]	Extremely Unlikely	6.9×10^{-1}	4.1×10^{-4}	9.4×10^{-2}	5.6×10^{-5}	$4.3\times10^{+0}$	0 (2.6×10^{-3})
Oxide spill in ARIES (or oxidation)	1.9×10^{-1}	Extremely Unlikely	1.1×10^{-1}	6.6×10^{-5}	9.5×10^{-3}	5.7×10^{-6}	5.3×10^{-1}	0 (3.2×10^{-4})
Glovebox fire in the pyrochemical metal preparation	5.0×10^{-2}	Extremely Unlikely	3.1×10^{-2}	1.9×10^{-5}	2.7×10^{-3}	1.6×10^{-6}	1.5×10^{-1}	0 (9.0×10^{-5})
Fire in TA-55 vault	$2.57\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	1.8×10^{-1}	1.1×10^{-4}	9.5×10^{-2}	5.7×10^{-5}	$4.7\times10^{+1}$	0 (2.8×10^{-2})
Steam explosion in the DMO furnace	$4.98\times10^{+1}$	Extremely Unlikely	$3.0\times10^{+1}$	3.6×10^{-2}	$2.6\times10^{+0}$	1.5×10^{-3}	$1.4\times10^{+2}$	0 (8.6×10^{-2})
Design-basis earthquake (SPDP inventory)	$2.36\times10^{+0}$	Extremely Unlikely	$1.4\times10^{+0}$	8.4×10^{-4}	1.2×10^{-1}	7.3×10^{-5}	$6.8\times10^{+0}$	0 (4.1×10^{-3})
Design-basis earthquake with fire (SPDP inventory)	$4.72\times10^{+0}$	Extremely Unlikely	$2.8\times10^{+0}$	1.7×10^{-3}	2.4×10^{-1}	1.5×10^{-4}	$1.4\times10^{+1}$	0 (8.2×10^{-3})
Beyond-design-basis earthquake-induced collapse with fire (SPDP inventory)	$6.17\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	$3.7\times10^{+1}$	4.4×10^{-2}	$3.2\times10^{+0}$	1.9×10^{-3}	$1.8\times10^{+2}$	0 (1.1×10^{-1})
Beyond-design-basis earthquake-induced collapse with fire (facility inventory)	$2.37\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$1.4\times10^{+3}$	$1.7\times10^{+0}$	$1.22\times10^{+2}$	1.5×10^{-1}	$6.8\times10^{+3}$	4 ($4.1\times10^{+0}$)

ARIES = Advanced Recovery and Integrated Extraction System; DMO = Direct Metal Oxidation; FGR = Federal Guidance Report; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; TA-55 = Technical Area 55.

(a) Except for criticality, source terms are PuE grams normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.
(b) The distance to the nearest site boundary was assumed to be 0.68 mi.
(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.
(d) The rounded LCF value is provided, followed by the calculated value in parentheses.
(e) If the dose is >400 rem it is assumed to result in a fatality (LCF = 1), otherwise it is the estimate of an LCF.
(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.
(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1\times10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-4. SRS Accident Impacts for the Preferred Alternative: Base Approach Sub-Alternative

Accident	Source Term (PuE g)[(a)]	Frequency (per year)	Impacts on Noninvolved Worker Dose (rem)	Impacts on Noninvolved Worker LCF[(c)(d)(e)]	Impacts on an MEI at the Site Boundary[(b)] Dose (rem)	Impacts on an MEI at the Site Boundary[(b)] LCF[(c)(d)(e)]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[(c)(d)]
Criticality	NA[(f)]	Extremely unlikely	6.2×10^{-2}	3.7×10^{-5}	2.2×10^{-3}	1.3×10^{-6}	7.2×10^{-1}	0 (4.3×10^{-4})
Fire in KIS vault with 3013 can rupture at 1,000 psig	$1.20\times10^{+1}$	Extremely unlikely to beyond extremely unlikely	4.5×10^{-1}	2.7×10^{-4}	1.6×10^{-2}	9.7×10^{-6}	$1.4\times10^{+1}$	0 (8.4×10^{-3})
Explosion (deflagration of 3013 can during puncturing)	$6.79\times10^{+0}$	Extremely unlikely to beyond extremely unlikely	2.5×10^{-1}	1.5×10^{-4}	9.1×10^{-3}	5.5×10^{-6}	$7.9\times10^{+0}$	0 (4.8×10^{-3})
Design-basis earthquake	$2.52\times10^{+1}$	Unlikely	9.4×10^{-1}	5.6×10^{-4}	3.4×10^{-2}	2.0×10^{-5}	$3.0\times10^{+1}$	0 (1.8×10^{-2})
Design-basis earthquake with fire	$8.0\times10^{+1}$	Extremely unlikely	$3.0\times10^{+0}$	1.8×10^{-3}	1.1×10^{-1}	6.4×10^{-5}	$9.4\times10^{+1}$	0 (5.6×10^{-2})
Beyond-design-basis earthquake - induced collapse with fire (SPDP material only)	$1.59\times10^{+3}$	Extremely unlikely to beyond extremely unlikely	$7.8\times10^{+1}$	9.4×10^{-2}	$2.2\times10^{+0}$	1.3×10^{-3}	$1.9\times10^{+3}$	1 ($1.1\times10^{+0}$)
Beyond-design-basis earthquake-induced collapse with fire (total building inventory)	$5.86\times10^{+3}$	Extremely unlikely to beyond extremely unlikely	$2.9\times10^{+2}$	3.5×10^{-1}	$8.0\times10^{+0}$	4.8×10^{-3}	$6.9\times10^{+3}$	4 ($4.1\times10^{+0}$)
Seismic with subsequent Fire on the KAC CCO Pad (SPDP material only)	$6.06\times10^{+0}$	Unlikely	3×10^{-1}	1.8×10^{-4}	8.2×10^{-3}	4.9×10^{-6}	$7.1\times10^{+0}$	0 (4.3×10^{-3})
Seismic with subsequent Fire on the KAC CCO Pad (total inventory)	$3.48\times10^{+1}$	Unlikely	$1.7\times10^{+0}$	1.0×10^{-3}	4.7×10^{-2}	2.8×10^{-5}	$4.1\times10^{+1}$	0 (2.4×10^{-2})

CCO= Criticality Controlled Overpack; FGR = Federal Guidance Report; KAC= K-Area Complex; KIS = K-Area Interim Surveillance; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site.

(a) Except for criticality, source terms are PuE grams normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.

(b) The distance to the nearest site boundary from KAC was assumed to be 5.5 mi.

(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.

(d) The rounded LCF value is provided, followed by the calculated value in parentheses.

(e) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.

(f) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1\times10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-5. LANL Accident Impacts for the Preferred Alternative: SRS NPMP Sub-Alternative

Accident	Source Term (PuE g)[a]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[c](d)(e)(f)	Impacts on an MEI at the Site Boundary[b] Dose (rem)	Impacts on an MEI at the Site Boundary[b] LCF[c](d)(f)	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[c](d)
Criticality	NA[g]	Extremely Unlikely	6.9×10^{-1}	4.1×10^{-4}	9.4×10^{-2}	5.6×10^{-5}	$4.3\times10^{+0}$	0 (2.6×10^{-3})
Oxide spill in ARIES (or oxidation)	6.23×10^{-2}	Extremely Unlikely	3.7×10^{-2}	2.2×10^{-5}	3.2×10^{-3}	1.9×10^{-6}	1.8×10^{-1}	0 (1.1×10^{-4})
Glovebox fire in the pyrochemical metal preparation	5.19×10^{-2}	Extremely Unlikely	3.1×10^{-2}	1.9×10^{-5}	2.6×10^{-3}	1.6×10^{-6}	1.5×10^{-1}	0 (9.0×10^{-5})
Fire in TA-55 vault	$8.65\times10^{+0}$	Extremely Unlikely to Beyond Extremely Unlikely	6.2×10^{-2}	3.7×10^{-5}	3.2×10^{-2}	1.9×10^{-5}	$1.6\times10^{+1}$	0 (9.5×10^{-3})
Steam explosion in the DMO furnace	$4.98\times10^{+1}$	Extremely Unlikely	$3.0\times10^{+1}$	3.6×10^{-2}	$2.6\times10^{+0}$	1.5×10^{-3}	$1.4\times10^{+2}$	0 (8.6×10^{-2})
Design-basis earthquake	$1.7\times10^{+0}$	Extremely Unlikely	$1.0\times10^{+0}$	6.0×10^{-4}	8.7×10^{-2}	5.2×10^{-5}	$4.9\times10^{+0}$	0 (2.9×10^{-3})
Design-basis earthquake with fire	$3.4\times10^{+0}$	Extremely Unlikely	$2.0\times10^{+0}$	1.2×10^{-3}	1.7×10^{-1}	1.0×10^{-4}	$9.8\times10^{+0}$	0 (5.9×10^{-3})
Beyond-design-basis earthquake-induced collapse with fire (SPDP inventory)	$4.4\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	$2.6\times10^{+1}$	3.2×10^{-2}	$2.3\times10^{+0}$	1.4×10^{-3}	$1.3\times10^{+2}$	0 (7.6×10^{-2})
Beyond-design-basis earthquake-induced collapse with fire (facility inventory)	$8.0\times10^{+2}$	Beyond Extremely Unlikely	$4.7\times10^{+2}$	5.7×10^{-1}	$4.1\times10^{+1}$	4.9×10^{-2}	$2.3\times10^{+3}$	1 ($1.4\times10^{+0}$)

ARIES = Advanced Recovery and Integrated Extraction System; DMO = direct metal oxidation; FGR = Federal Guidance Report; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NPMP = non-pit metal processing; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site; TA-55 = Technical Area 55.

(a) Except for criticality, source terms are PuE grams from Appendix D of DOE 2015. Plutonium releases have been normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.

(b) The distance to the nearest site boundary was assumed to be 0.68 mi.

(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.

(d) The rounded LCF value is provided, followed by the calculated value in parentheses.

(e) If the dose is >400 rem, it is assumed to result in a fatality, otherwise it is an LCF.

(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.

(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1\times10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-6. SRS Accident Impacts for the Preferred Alternative: SRS NPMP Sub-Alternative

Accident	Source Term (PuE g)[a]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[c][d][e][f]	Impacts on an MEI at the Site Boundary[b] Dose (rem)	Impacts on an MEI at the Site Boundary[b] LCF[c][d][f]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[c][d]
Criticality	NA[g]	Extremely unlikely	6.2×10^{-2}	3.7×10^{-5}	2.2×10^{-3}	1.3×10^{-6}	7.2×10^{-1}	0 (4.3×10^{-4})
Fire in KIS Vault with 3013 rupture at 1,000 psig	$1.20\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	4.5×10^{-1}	2.7×10^{-4}	1.6×10^{-2}	9.7×10^{-6}	$1.4\times10^{+1}$	0 (8.4×10^{-3})
Explosion (deflagration of 3013 during puncturing)	$6.79\times10^{+0}$	Extremely Unlikely to Beyond Extremely Unlikely	2.5×10^{-1}	1.5×10^{-4}	9.1×10^{-3}	5.5×10^{-6}	$7.9\times10^{+0}$	0 (4.8×10^{-3})
Product NDA room fire	$4.47\times10^{+0}$	Extremely Unlikely	1.7×10^{-1}	1.0×10^{-4}	6.0×10^{-3}	3.6×10^{-6}	$5.2\times10^{+0}$	0 (3.1×10^{-3})
Multi-room fire	$1.12\times10^{+1}$	Extremely Unlikely	4.2×10^{-1}	2.5×10^{-4}	1.5×10^{-2}	9.0×10^{-6}	$1.3\times10^{+1}$	0 (7.9×10^{-3})
Fire in the DMO glovebox	$4.23\times10^{+0}$	Extremely Unlikely	1.6×10^{-1}	9.5×10^{-5}	5.7×10^{-3}	3.4×10^{-6}	$4.9\times10^{+0}$	0 (3.0×10^{-3})
Over pressurization of oxide storage cans	$2.64\times10^{+1}$	Extremely Unlikely	9.9×10^{-1}	5.9×10^{-4}	3.5×10^{-2}	2.1×10^{-5}	$3.1\times10^{+1}$	0 (1.9×10^{-2})
Steam explosion in the DMO furnace	$1.48\times10^{+2}$	Extremely Unlikely	$5.5\times10^{+0}$	3.3×10^{-3}	2.0×10^{-1}	1.2×10^{-4}	$1.7\times10^{+2}$	0 (1.0×10^{-1})
Design-basis earthquake	$4.17\times10^{+0}$	Unlikely	$1.1\times10^{+0}$	6.4×10^{-4}	3.2×10^{-2}	2.3×10^{-5}	$3.3\times10^{+1}$	0 (2.0×10^{-2})
Design-basis earthquake with fire (SPDP inventory)	$8.99\times10^{+1}$	Extremely Unlikely	$3.4\times10^{+0}$	2.0×10^{-3}	1.2×10^{-1}	7.2×10^{-5}	$1.1\times10^{+2}$	0 (6.3×10^{-2})
Beyond-design-basis earthquake-induced collapse with fire (SPDP inventory)	$1.78\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$8.8\times10^{+1}$	1.1×10^{-1}	$2.4\times10^{+0}$	1.5×10^{-3}	$2.1\times10^{+3}$	1 ($1.3\times10^{+0}$)
Beyond-design-basis earthquake-induced collapse with fire (facility inventory)	$5.86\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$2.9\times10^{+2}$	3.5×10^{-1}	$8.0\times10^{+0}$	4.8×10^{-3}	$6.9\times10^{+3}$	4 ($4.1\times10^{+0}$)
Seismic with subsequent fire on the KAC CCO Pad (SPDP inventory)	$6.82\times10^{+0}$	Unlikely	3.4×10^{-1}	2.0×10^{-4}	9.3×10^{-3}	5.6×10^{-6}	$8.0\times10^{+0}$	0 (4.8×10^{-3})
Seismic with subsequent fire on the KAC CCO Pad (total inventory)	$3.48\times10^{+1}$	Unlikely	$1.7\times10^{+0}$	1.0×10^{-3}	4.7×10^{-2}	2.8×10^{-5}	$4.1\times10^{+1}$	0 (2.4×10^{-2})
Modular - fire in the DMO glovebox	$1.36\times10^{+2}$	Extremely Unlikely	$6.7\times10^{+0}$	4.0×10^{-3}	1.8×10^{-1}	1.1×10^{-4}	$1.6\times10^{+2}$	0 (9.5×10^{-2})
Modular - multi-module fire	$3.75\times10^{+2}$	Extremely Unlikely	$1.9\times10^{+1}$	1.1×10^{-2}	5.1×10^{-1}	3.1×10^{-4}	$4.4\times10^{+2}$	0 (2.6×10^{-1})
Modular - over pressurization of oxide storage cans	$8.81\times10^{+2}$	Extremely Unlikely	$4.4\times10^{+1}$	5.2×10^{-2}	$1.2\times10^{+0}$	7.2×10^{-4}	$1.0\times10^{+3}$	1 (6.2×10^{-1})

CCO= Criticality Controlled Overpack; DMO = direct metal oxidation; FGR = Federal Guidance Report; KAC = K-Area Complex; KIS = K-Area Interim Surveillance; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NDA = nondestructive assay; NPMP = non-pit metal processing; PuE = plutonium-239 dose equivalent; SPDP= Surplus Plutonium Disposition Program; SRS = Savannah River Site.

(a) Except for criticality, source terms are PuE grams normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.

(b) The distance to the nearest site boundary from KAC was assumed to be 5.5 mi.

(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.

(d) The rounded LCF value is provided, followed by the calculated value in parentheses.

(e) If the dose is >400 rem, it is assumed to result in a fatality, otherwise it is an LCF.

(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.

(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1\times10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-7. LANL Accident Impacts for the Preferred Alternative: All LANL Sub-Alternative

Accident	Source Term (PuE g)[(a)]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[(c)(d)(e)(f)]	Impacts on an MEI at the Site Boundary[(b)] Dose (rem)	Impacts on an MEI at the Site Boundary[(b)] LCF[(c)(d)(f)]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[(c)(d)]
Criticality	NA[(g)]	Extremely Unlikely	6.9×10^{-1}	4.1×10^{-4}	9.4×10^{-2}	5.6×10^{-5}	$4.3\times10^{+0}$	0 (2.6×10^{-3})
Oxide spill in ARIES (or oxidation)	1.85×10^{-1}	Extremely Unlikely	1.1×10^{-1}	6.6×10^{-5}	9.5×10^{-3}	5.7×10^{-6}	5.3×10^{-1}	0 (3.2×10^{-4})
Glovebox fire in the pyrochemical metal preparation	5.19×10^{-2}	Extremely Unlikely	3.1×10^{-2}	1.9×10^{-5}	2.7×10^{-3}	1.6×10^{-6}	1.5×10^{-1}	0 (9.0×10^{-5})
Fire in TA-55 vault	$2.57\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	1.8×10^{-1}	1.1×10^{-4}	9.5×10^{-2}	5.7×10^{-5}	$4.7\times10^{+1}$	0 (2.8×10^{-2})
Steam explosion in the DMO furnace	$4.98\times10^{+1}$	Extremely Unlikely	$3.0\times10^{+1}$	3.6×10^{-2}	$2.6\times10^{+0}$	1.5×10^{-3}	$1.4\times10^{+2}$	0 (8.6×10^{-2})
Design-basis earthquake	$2.36\times10^{+0}$	Extremely Unlikely	$1.4\times10^{+0}$	8.4×10^{-4}	1.2×10^{-1}	7.3×10^{-5}	$6.8\times10^{+0}$	0 (4.1×10^{-3})
Design-basis earthquake with fire	$4.72\times10^{+0}$	Extremely Unlikely	$2.8\times10^{+0}$	1.7×10^{-3}	2.4×10^{-1}	1.5×10^{-4}	$1.4\times10^{+1}$	0 (8.2×10^{-3})
Beyond-design-basis earthquake-induced collapse with fire (SPDP inventory)	$6.17\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	$3.7\times10^{+1}$	4.4×10^{-2}	$3.2\times10^{+0}$	1.9×10^{-3}	$1.8\times10^{+2}$	0 (1.1×10^{-1})
Beyond-design-basis earthquake-induced collapse with fire (facility inventory)	$2.37\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$1.4\times10^{+3}$	$1.7\times10^{+0}$	$1.22\times10^{+2}$	1.5×10^{-1}	$6.8\times10^{+3}$	4 ($4.1\times10^{+0}$)
Design-basis earthquake with fire DHF (fire contribution) at 4 MT	$5.15\times10^{+0}$	Extremely Unlikely to Beyond Extremely Unlikely	$3.1\times10^{+0}$	1.8×10^{-3}	2.6×10^{-1}	1.6×10^{-4}	$1.5\times10^{+1}$	0 (8.9×10^{-3})

ARIES = Advanced Recovery and Integrated Extraction System; DHF = Drum Handling Facility; DMO = direct metal oxidation; FGR = Federal Guidance Report; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; TA-55 = Technical Area 55.

(a) Except for criticality, source terms are PuE grams from Appendix D of DOE 2015. Plutonium releases have been normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.
(b) The distance to the nearest site boundary was assumed to be 0.68 mi.
(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.
(d) The rounded LCF value is provided, followed by the calculated value in parentheses.
(e) If the dose is >400 rem, it is assumed to result in a fatality, otherwise it is an LCF.
(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.
(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1\times10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-8. SRS Accident Impacts for the Preferred Alternative: All SRS Sub-Alternative

Accident	Source Term (PuE g)[a]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[c][d][e][f]	Impacts on an MEI at the Site Boundary[b] Dose (rem)	Impacts on an MEI at the Site Boundary[b] LCF[c][d][f]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[c][d]
Criticality K-Area	NA[g]	Extremely Unlikely	6.2×10^{-2}	3.7×10^{-5}	2.2×10^{-3}	1.3×10^{-6}	7.2×10^{-1}	0 (4.3×10^{-4})
Criticality F-Area	NA[g]	Extremely Unlikely	7.3×10^{-2}	4.4×10^{-5}	3.1×10^{-3}	1.9×10^{-6}	$1.1\times10^{+0}$	0 (6.8×10^{-4})
K-Area - Fire in KIS Vault with 3013 rupture at 1,000 psig	$1.20\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	4.5×10^{-1}	2.7×10^{-4}	1.6×10^{-2}	9.7×10^{-6}	$1.4\times10^{+1}$	0 (8.4×10^{-3})
K-Area - Explosion (deflagration of 3013 during puncturing)	$6.79\times10^{+0}$	Extremely Unlikely to Beyond Extremely Unlikely	2.5×10^{-1}	1.5×10^{-4}	9.1×10^{-3}	5.5×10^{-6}	$7.9\times10^{+0}$	0 (4.8×10^{-3})
K-Area - Design-basis earthquake	$4.17\times10^{+0}$	Unlikely	9.4×10^{-1}	5.6×10^{-4}	3.4×10^{-2}	2.0×10^{-5}	$3.0\times10^{+1}$	0 (1.8×10^{-2})
K-Area - Design-basis earthquake with fire	$8.0\times10^{+1}$	Extremely Unlikely	$3.0\times10^{+0}$	1.8×10^{-3}	1.1×10^{-1}	6.4×10^{-5}	$9.4\times10^{+1}$	0 (5.6×10^{-2})
K-Area - Beyond-design-basis earthquake-induced collapse with fire (SPDP inventory)	$1.59\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$7.8\times10^{+1}$	9.4×10^{-2}	$2.2\times10^{+0}$	1.3×10^{-3}	$1.9\times10^{+3}$	1 ($1.1\times10^{+0}$)
K-Area - Beyond-design-basis earthquake-induced collapse with fire (total inventory)	$5.86\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$2.9\times10^{+2}$	3.5×10^{-1}	$8.0\times10^{+0}$	4.8×10^{-3}	$6.9\times10^{+3}$	4 ($4.1\times10^{+0}$)
K-Area - Seismic with subsequent fire on the KAC CCO Pad (SPDP inventory)	$6.06\times10^{+0}$	Unlikely	$3\ \times10^{-1}$	1.8×10^{-4}	8.2×10^{-3}	4.9×10^{-6}	$7.1\times10^{+0}$	0 (4.3×10^{-3})

Accident	Source Term (PuE g)(a)	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF(c)(d)(e)(f)	Impacts on an MEI at the Site Boundary(b) Dose (rem)	Impacts on an MEI at the Site Boundary(b) LCF(c)(d)(f)	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF(c)(d)
K-Area - Seismic with subsequent fire on the KAC CCO Pad (total inventory)	$3.48\times10^{+1}$	Unlikely	$1.7\times10^{+0}$	1.0×10^{-3}	4.7×10^{-2}	2.8×10^{-5}	$4.1\times10^{+1}$	0 (2.4×10^{-2})
K-Area Product NDA room fire	$4.65\times10^{+0}$	Extremely Unlikely	1.7×10^{-1}	1.0×10^{-4}	6.2×10^{-3}	3.7×10^{-6}	$5.4\times10^{+0}$	0 (3.3×10^{-3})
K-Area multi-room fire	$1.17\times10^{+1}$	Extremely Unlikely	4.4×10^{-1}	2.6×10^{-4}	1.6×10^{-2}	9.4×10^{-6}	$1.4\times10^{+1}$	0 (8.2×10^{-3})
K-Area Fire in the DMO glovebox	$4.43\times10^{+0}$	Extremely Unlikely	1.7×10^{-1}	9.9×10^{-5}	5.9×10^{-3}	3.6×10^{-6}	$5.2\times10^{+0}$	0 (3.1×10^{-3})
K-Area steam explosion in the DMO furnace	$4.98\times10^{+1}$	Extremely Unlikely	$5.2\times10^{+0}$	3.3×10^{-3}	2.0×10^{-1}	1.2×10^{-4}	$1.7\times10^{+2}$	0 (1.0×10^{-1})
K-Area over pressurization of oxide storage cans	$2.76\times10^{+1}$	Extremely Unlikely	$1.0\times10^{+0}$	6.2×10^{-4}	3.7×10^{-2}	2.2×10^{-5}	$3.2\times10^{+1}$	0 (1.9×10^{-2})
F-Area Product NDA room fire	9.09×10^{-1}	Extremely Unlikely	4.0×10^{-2}	2.4×10^{-5}	1.6×10^{-3}	9.8×10^{-7}	$1.5\times10^{+0}$	0 (8.9×10^{-4})
F-Area multi-room fire	$7.12\times10^{+0}$	Extremely Unlikely	3.1×10^{-1}	1.9×10^{-4}	1.3×10^{-2}	7.7×10^{-6}	$1.2\times10^{+1}$	0 (7.0×10^{-3})
F-Area fire in the DMO glovebox	$2.59\times10^{+1}$	Extremely Unlikely	$1.1\times10+^{0}$	6.8×10^{-4}	4.6×10^{-2}	2.8×10^{-5}	$4.2\times10^{+1}$	0 (2.5×10^{-2})
F-Area steam explosion in the DMO furnace	$1.48\times10^{+2}$	Extremely Unlikely	$6.4\times10^{+0}$	3.9×10^{-3}	2.6×10^{-1}	1.6×10^{-4}	$2.4\times10^{+2}$	0 (1.4×10^{-1})
F-Area; Design-basis earthquake with fire	$1.39\times10^{+2}$	Extremely Unlikely	$6.0\times10^{+0}$	3.6×10^{-3}	2.5×10^{-1}	1.5×10^{-4}	$2.3\times10^{+2}$	0 (1.4×10^{-1})
F-Area Beyond-design-basis earthquake-induced collapse with subsequent fire (SPDP inventory)	$1.27\times10^{+3}$	Extremely Unlikely	$634\times10^{+1}$	7.5×10^{-2}	$2.3\times10^{+0}$	4.3×10^{-3}	$2.1\times10^{+3}$	1 ($1.3\times10^{+0}$)
F-Area Beyond-design-basis earthquake-induced collapse with subsequent fire (total inventory)	$4.65\times10^{+3}$	Extremely Unlikely	$2.3\times10^{+2}$	2.8×10^{-1}	$8.4\times10^{+0}$	5.0×10^{-3}	$7.6\times10^{+3}$	5 ($4.6\times10^{+0}$)

CCO= Criticality Controlled Overpack; DMO = direct metal oxidation; FGR = Federal Guidance Report; KAC= K-Area Complex; KIS = K-Area Interim Surveillance; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NDA = nondestructive assay; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site.

(a) Except for criticality, source terms are PuE grams normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.

(b) The distance to the nearest site boundary was assumed to be 5.5 mi for KAC and 5.8 mi for F-Area.
(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.
(d) The rounded LCF value is provided, followed by the calculated value in parentheses.
(e) If the dose is >400 rem, it is assumed to result in a fatality, otherwise it is an LCF.
(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.
(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1 \times 10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-9. LANL Accident Impacts for the No Action Alternative

Accident	Source Term (PuE g)[a]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[c][d][e][f]	Impacts on an MEI at the Site Boundary[b] Dose (rem)	Impacts on an MEI at the Site Boundary[b] LCF[c][d][f]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[c][d]
Criticality	NA[g]	Extremely Unlikely	6.9×10^{-1}	4.1×10^{-4}	9.4×10^{-2}	5.6×10^{-5}	$4.3\times10^{+0}$	0 (2.6×10^{-3})
Oxide spill in ARIES (or processing or dilution)	1.85×10^{-1}	Extremely Unlikely	1.1×10^{-1}	6.6×10^{-5}	9.5×10^{-3}	5.7×10^{-6}	5.3×10^{-1}	0 (3.2×10^{-4})
Glovebox fire in the pyrochemical metal preparation	5.19×10^{-2}	Extremely Unlikely	3.1×10^{-2}	1.9×10^{-5}	2.7×10^{-3}	1.6×10^{-6}	1.5×10^{-1}	0 (9.0×10^{-5})
Fire in TA-55 vault	$2.57\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	1.8×10^{-1}	1.1×10^{-4}	9.5×10^{-2}	5.7×10^{-5}	$4.7\times10^{+1}$	0 (2.8×10^{-2})
Design-basis earthquake	$1.0\times10^{+0}$	Extremely Unlikely	6.0×10^{-1}	3.6×10^{-4}	5.2×10^{-12}	3.1×10^{-5}	$2.9\times10^{+0}$	0 (1.7×10^{-3})
Design-basis earthquake with fire	$2.01\times10^{+0}$	Extremely Unlikely	$1.2\times10^{+0}$	7.2×10^{-4}	1.0×10^{-1}	6.2×10^{-5}	$5.8\times10^{+0}$	0 (3.5×10^{-3})
Beyond-design-basis earthquake induced collapse with fire (SPDP inventory)	$2.62\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	$1.6\times10^{+1}$	9.4×10^{-3}	$1.4\times10^{+0}$	8.1×10^{-4}	$7.6\times10^{+1}$	0 (4.5×10^{-2})
Beyond-design-basis earthquake-induced collapse with fire (facility inventory)	$2.37\times10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$1.4\times10^{+3}$	1	$1.2\times10^{+2}$	1.5×10^{-1}	$6.8\times10^{+3}$	4 ($4.1\times10^{+0}$)

ARIES = Advanced Recovery and Integrated Extraction System; FGR = Federal Guidance Report; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; TA-55 = Technical Area 55.

(a) Except for criticality, source terms are PuE grams normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.

(b) The distance to the nearest site boundary was assumed to be 0.68 mi.

(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.

(d) The rounded LCF value is provided, followed by the calculated value in parentheses.

(e) If the dose is >400 rem, it is assumed to result in a fatality, otherwise it is an LCF.
(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario’s dose would be per person and the fatalities would be multiplied by the number of persons exposed.
(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1\times10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

Table D-10. SRS Accident Impacts for the No Action Alternative

Accident	Source Term (PuE g)[a]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[c][d][e][f]	Impacts on an MEI at the Site Boundary[b] Dose (rem)	Impacts on an MEI at the Site Boundary[b] LCF[c][d][f]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[c][d]
Criticality	NA[g]	Extremely Unlikely	3.7×10^{-2}	2.2×10^{-5}	1.3×10^{-3}	8.0×10^{-7}	$1.2\times10^{+0}$	0 (7.0×10^{-4})
Explosion (deflagration of 3013 during puncturing)	$6.79\times10^{+0}$	Extremely Unlikely to Beyond Extremely Unlikely	2.5×10^{-1}	1.5×10^{-4}	9.1×10^{-3}	5.5×10^{-6}	$7.9\times10^{+0}$	0 (4.8×10^{-3})
Over pressurization of oxide storage cans	$2.64\times10^{+1}$	Extremely Unlikely	9.9×10^{-1}	5.9×10^{-4}	3.5×10^{-2}	2.1×10^{-5}	$3.1\times10^{+1}$	0 (1.9×10^{-2})
Fire in KIS Vault with 3013 rupture at 1,000 psig	$1.20\times10^{+1}$	Extremely Unlikely to Beyond Extremely Unlikely	4.5×10^{-1}	2.7×10^{-4}	1.6×10^{-2}	9.7×10^{-6}	$1.4\times10^{+1}$	0 (8.4×10^{-3})
Product NDA room fire	$4.47\times10^{+0}$	Extremely Unlikely	1.7×10^{-1}	1.0×10^{-4}	6.0×10^{-3}	3.6×10^{-6}	$5.2\times10^{+0}$	0 (3.1×10^{-3})
Multi-room fire	$1.12\times10^{+1}$	Extremely Unlikely	4.2×10^{-1}	2.5×10^{-4}	1.5×10^{-2}	9.0×10^{-6}	$1.3\times10^{+1}$	0 (7.9×10^{-3})
Fire in the DMO glovebox	$4.23\times10^{+0}$	Extremely Unlikely	1.6×10^{-1}	9.5×10^{-5}	5.7×10^{-3}	3.4×10^{-6}	$4.9\times10^{+0}$	0 (3.0×10^{-3})
Steam explosion in the DMO furnace	$1.48\times10^{+2}$	Extremely Unlikely	$5.5\times10^{+0}$	3.3×10^{-3}	2.0×10^{-1}	1.2×10^{-4}	$1.7\times10^{+2}$	0 (1.0×10^{-1})
Seismic with subsequent fire on the KAC CCO Pad (SPDP inventory)	$2.2\times10^{+0}$	Unlikely	1.1×10^{-1}	6.5×10^{-5}	3.0×10^{-3}	1.8×10^{-6}	$2.6\times10^{+0}$	0 (1.5×10^{-3})
Seismic with subsequent fire on the KAC CCO Pad (total inventory)	$3.48\times10^{+1}$	Unlikely	$1.7\times10^{+0}$	1.0×10^{-3}	4.7×10^{-2}	2.8×10^{-5}	$4.1\times10^{+1}$	0 (2.4×10^{-2})
Design-basis earthquake	$9.12\times10^{+0}$	Unlikely	3.4×10^{-1}	2.0×10^{-4}	1.2×10^{-2}	7.3×10^{-6}	$1.1\times10^{+1}$	0 (6.4×10^{-3})
Design-basis earthquake with fire	$2.89\times10^{+1}$	Extremely unlikely	$1.1\times10^{+0}$	6.5×10^{-4}	3.9×10^{-2}	2.3×10^{-5}	$3.4\times10^{+1}$	0 (2.0×10^{-2})

Accident	Source Term (PuE g)[a]	Frequency (per year)	Impacts on a Noninvolved Worker Dose (rem)	Impacts on a Noninvolved Worker LCF[c][d][e][f]	Impacts on an MEI at the Site Boundary[b] Dose (rem)	Impacts on an MEI at the Site Boundary[b] LCF[c][d][f]	Impacts on Population within 50 Miles Dose (person-rem)	Impacts on Population within 50 Miles LCF[c][d]
Beyond-design-basis earthquake-induced collapse with fire (SPDP inventory)	$5.73 \times 10^{+2}$	Extremely Unlikely to Beyond Extremely Unlikely	$2.8 \times 10^{+1}$	3.4×10^{-2}	7.8×10^{-1}	4.7×10^{-4}	$6.7 \times 10^{+2}$	0 (4.0×10^{-1})
Beyond-design-basis earthquake-induced collapse with fire (total inventory)	$5.86 \times 10^{+3}$	Extremely Unlikely to Beyond Extremely Unlikely	$2.9 \times 10^{+2}$	3.5×10^{-1}	$8.0 \times 10^{+0}$	4.8×10^{-3}	$6.9 \times 10^{+3}$	4 ($4.1 \times 10^{+0}$)

CCO= Criticality Controlled Overpack; DMO = direct metal oxidation; FGR = Federal Guidance Report; KAC= K-Area Complex; KIS = K-Area Interim Surveillance; LCF = latent cancer fatality; MEI = maximally exposed individual; NA = not applicable; NDA = nondestructive assay; PuE = plutonium-239 dose equivalent; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site.

(a) Except for criticality, source terms are PuE grams normalized to FGR 13 PuE values assuming the most conservative isotopic mix given in Table D-1.

(b) The distance to the nearest site boundary from KAC was assumed to be 5.5 mi.

(c) The LCF is calculated by using a risk estimator of 0.0006 fatal cancers per rem or person-rem. For estimated individual doses equal to or greater than 20 rem, the risk estimated was doubled.

(d) The rounded LCF value is provided, followed by the calculated value in parentheses.

(e) If the dose is >400 rem, it is assumed to result in a fatality, otherwise it is an LCF.

(f) The MEI and the noninvolved worker scenarios each assume that one person was exposed. If more than one person was exposed in either of these scenarios, then that scenario's dose would be per person and the fatalities would be multiplied by the number of persons exposed.

(g) The source term consists of the iodine and noble gas radioisotopes generated by a criticality excursion involving $1 \times 10^{+19}$ fissions from Table 6-9 of DOE 1994/2013.

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APPENDIX E

EVALUATION OF HUMAN HEALTH EFFECTS FROM TRANSPORTATION

Transportation involves a risk to transportation crew members and members of the public, resulting directly from transportation-related accidents, regardless of the cargo. In addition, the transport of certain materials, such as hazardous or radioactive waste, can pose further risk due to the nature of the material itself. This appendix details the human health risks associated with the transportation of radioactive materials and wastes, as well as nonradioactive hazardous waste, on public highways for the alternatives in this *Surplus Plutonium Disposition Program Environmental Impact Statement* (SPDP EIS).

E.1 Scope of Assessment

The scope of the transportation human health risk assessment includes incident-free and accident impacts, and radiological and nonradiological impacts. Section E.2 of the *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (2015 SPD SEIS; DOE 2015) provides more details about the scope of the assessment, including transportation-related activities, radiological impacts, nonradiological impacts, transportation modes, and receptors. Note that the impacts of increased transportation levels on local traffic flow or infrastructure are addressed in Chapter 4.0, Sections 4.1.2.9.3 and 4.1.3.9.3 of this SPDP EIS for Los Alamos National Laboratory (LANL) and Savannah River Site (SRS), respectively.

E.2 Packaging and Transportation Regulations

The U.S. Department of Transportation (DOT) and the U.S. Nuclear Regulatory Commission have primary responsibility for developing and implementing Federal Regulations that govern radioactive materials transportation. In addition, the U.S. Department of Energy (DOE) works with the DOT and U.S. Nuclear Regulatory Commission in developing requirements and standards for radioactive materials transportation. DOE, including its National Nuclear Security Administration, has broad authority under the Atomic Energy Act of 1954, as amended (42 U.S.C. § 2011 et seq.), to regulate all aspects of activities involving radioactive materials that are undertaken by DOE or on its behalf, including the transportation of radioactive materials.

Section E.3 in the 2015 SPD SEIS (DOE 2015) contains more information about packaging and transportation regulations.

E.3 Emergency Response

The U.S. Department of Homeland Security is responsible for establishing policies for, and coordinating, civil emergency management, planning, and interaction with Federal Executive agencies that have emergency response functions in the event of a transportation incident. If a transportation incident involving nuclear material occurs, guidelines for response actions are outlined in the *National Response Framework* (DHS 2019).

Section E.4 in the 2015 SPD SEIS (DOE 2015) contains more information about emergency response.

E.4 Methodology

The transportation risk assessment is based on the alternatives described in Chapter 2 of this SPDP EIS. Figure E-1 depicts the transportation risk assessment methodology (DOE 2015|Figure E-1|). After the alternatives were identified and the requirements of the shipping campaign were understood, data were collected about material characteristics, transportation routes, and accident parameters.

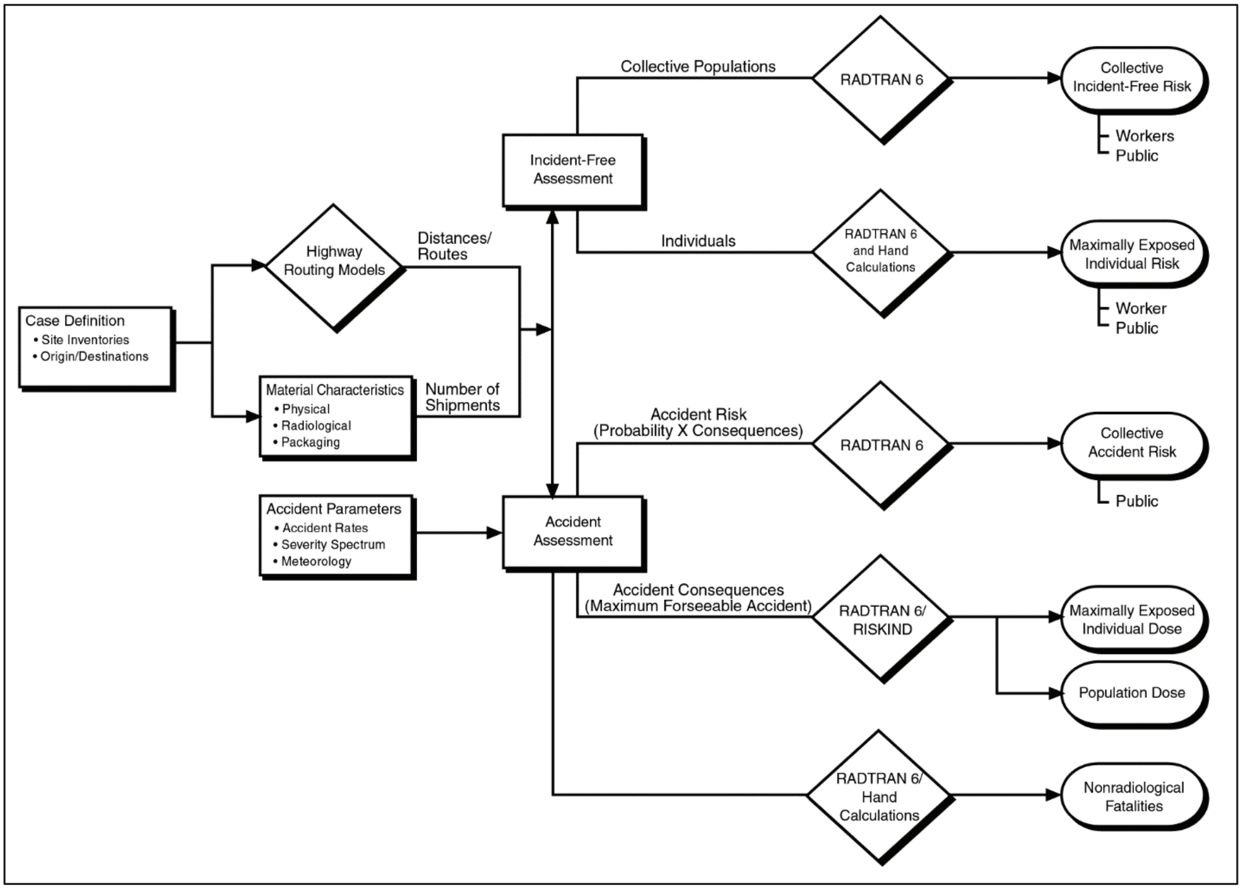

Figure E-1. Transportation Risk Assessment Methodology

Transportation impacts calculated for this SPDP EIS are presented in two parts: impacts from incident-free or routine transportation and impacts from transportation accidents. Impacts of transportation accidents are further divided into nonradiological and radiological impacts. Nonradiological impacts could result from transportation accidents and are quantified in terms of traffic fatalities. Radiological impacts of incident-free transportation include impacts on members of the public and crew from radiation emanating from materials (plutonium, uranium, or radioactive wastes) in the shipment. Radiological impacts from accident conditions consider all foreseeable scenarios that could damage transportation packages, including releases of radioactive materials to the environment.

The impact of transportation accidents is expressed in terms of probabilistic risk, which is the probability of an accident multiplied by the consequences of that accident and summed over a range of accidents. Hypothetical transportation accident conditions ranging from low-speed “fender-bender” collisions to high-speed collisions with or without fires were analyzed.

Transportation impacts were estimated using the Web Transportation Routing Analysis Geographic Information System (WebTRAGIS) computer program (Peterson 2018), the Radioactive Material Transportation Risk Assessment 6.02 computer code (Weiner et al. 2013, Weiner et al. 2014), and the Risks and Consequences of Radioactive Material Transport computer code (Yuan et al. 1995). Section E.5 in the 2015 SPD SEIS (DOE 2015) contains more information about the methodology used to estimate transportation impacts.

E.4.1 Transportation Routes

To assess incident-free and transportation accident impacts, route characteristics were determined for the following offsite shipments that would occur as part of routine operations:

- pits and associated materials shipped from the Pantex Plant (Pantex) in Texas to LANL in New Mexico or to SRS in South Carolina
- highly enriched uranium oxide shipped from LANL or SRS to the Y-12 National Security Complex in Tennessee
- byproduct material from SRS to LANL
- plutonium oxide and non-pit surplus plutonium shipped from LANL to SRS, or from SRS to LANL
- contact-handled transuranic (CH-TRU) waste shipped from SRS and LANL to the Waste Isolation Pilot Plant (WIPP) facility in New Mexico
- low-level and mixed low-level radioactive waste (LLW and MLLW) shipped from LANL to offsite Federal or commercial disposal facilities; for purposes of analysis in this SPDP EIS the offsite facility was assumed to be the Nevada National Security Site near Las Vegas, Nevada because it is located the furthest from the LANL site
- adulterant from a commercial vendor assumed to be located 3,000 mi (4,800 km) from either LANL or SRS
- construction materials shipped to SRS or LANL
- hazardous waste shipped from SRS and LANL to an offsite treatment, storage, and disposal facility (nonradiological impacts only).

These routes and material types represent the majority of shipments that would be transported under the Preferred and No Action Alternatives. As discussed in Section 1.1 of this SPDP EIS, transport of material to consolidated storage at Pantex or SRS was previously evaluated.[1]

For offsite transport, highway routes were determined using the routing computer program WebTRAGIS (Peterson 2018). The features in WebTRAGIS allow users to determine routes for shipment of radioactive materials that conform to DOT regulations as specified in Title 49 of the *Code of Federal Regulations* Part 397 (49 CFR Part 397). The population densities along each route were derived from 2010 Census Bureau data (Peterson 2018). Changes in State-level U.S. Census Bureau data between 2010 (USCB 2018) and 2000 Census Bureau data were used to project population densities out to 2040. Over this time period, the overall U.S. population was projected to increase by a factor of 1.30. Projected population changes for individual States ranged from 0.985 (i.e., the population was projected to decrease) to 2.32.

[1] The impacts of transporting and consolidating the storage of surplus non-pit plutonium were evaluated in the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (DOE 1996).

E.4.1.1 Offsite Route Characteristics

Important route characteristics for this analysis include the total shipment distance and population distribution along the route. The specific route selected determines both the total potentially exposed population and the expected frequency of transportation-related accidents. Route characteristics analyzed in this SPDP EIS are summarized in Table E-1. Rural, suburban, and urban areas are characterized according to the following breakdown (Peterson 2018):

- Rural population densities range from 0 to 54 persons/km^2.
- Suburban population densities range from 55 to 1,284 persons/km^2.
- Urban population densities include all population densities greater than 1,284 persons/km^2.

Table E-1. Route Characteristics for Routes Analyzed in this SPDP EIS

Origin	Destination	Nominal Distance (km)	Distance Traveled in Zones (km)			Population Density in Zone[a] (number/km^2)			Number of Affected Persons[b]
			Rural	Suburban	Urban	Rural	Suburban	Urban	
Pantex, TX	LANL	573	493	71	9	25	347	2,867	101,987
Pantex, TX	SRS	2,074	1,479	573	22	19	542	2,209	618,962
LANL	Y-12	2,319	1,797	480	41	22	475	2,409	586,846
SRS	Y-12	569	321	229	19	34	430	2,223	243,320
SRS/LANL[c]	LANL/SRS[c]	2,722	1,980	652	90	22	574	2,689	1,056,121
SRS	WIPP facility	2,332	1,583	720	29	22	500	2,347	742,118
LANL	WIPP facility	586	525	61	0	21	311	0	47,803
SRS[d]	NNSS	3,890	3,015	760	115	17	588	2,714	1,294,041
LANL	NNSS	1,398	1,205	170	23	12	518	2,676	264,392

EIS = environmental impact statement; LANL = Los Alamos National Laboratory; NNSS = Nevada National Security Site; Pantex = Pantex Plant; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site; TX = Texas; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

(a) Population densities have been projected to 2040 using State-level data from the 2010 Census (USCB 2018) and assuming State population growth rates from 2000 to 2010 continue to 2040.

(b) For offsite shipments, the estimated number of persons residing within 800 m along the transportation route; projected to 2040.

(c) Shipments of non-pit or pit plutonium would be made from SRS to LANL and from LANL to SRS, depending on the sub-alternative under the alternatives.

(d) This information is provided for completeness; no low-level radioactive wastes would be transported to NNSS from SRS.

Note: Values are rounded to the nearest kilometer.

The affected population for route characterization and incident-free dose calculation includes all persons living within 800 m of each side of the transportation route.

Analyzed truck routes for offsite shipments of radioactive waste and materials to and from SRS are shown in Figure E-2; analyzed truck routes to and from LANL are shown in Figure E-3.

Figure E-2. Analyzed National and Regional Truck Routes from SRS

Figure E-3. Analyzed National and Regional Truck Routes from LANL

E.4.2 Radioactive Material and Waste Shipments

Transportation of all material and waste types is assumed to occur in certified packaging on exclusive-use vehicles. Use of legal-weight heavy combination trucks is assumed for highway transportation. Type A packages are transported on common flatbed or covered trailers; Type B packages are generally shipped on trailers specifically designed for the packaging being used (see Section E.3.1 of the 2015 SPD SEIS [DOE 2015]). For transportation by truck, the maximum payload weight is considered to be about 22,000 kg, based on the Federal gross vehicle weight limit of 36,288 kg (23 CFR 658.17).

The various wastes that would be transported under the alternatives in this SPDP EIS include LLW and MLLW waste, CH-TRU waste[1] (including CH-TRU job control waste and diluted plutonium oxide CH-TRU waste), demolition and construction debris, and hazardous waste. Table E-2 lists the types of containers assumed for the analysis along with their volumes and the number of containers in a shipment. A shipment is defined as the amount of waste transported on a single truck.

In general, the number of shipping containers per shipment was estimated on the basis of the dimensions and weight of the shipping containers; the Transport Index,[2] which is the dose rate at 1 m from the container; and the transport vehicle dimensions and weight limits. The various materials and wastes were assumed to be transported on standard truck semi-trailers in a single stack.

Special nuclear material would be transported using an appropriate Office of Secure Transportation (OST) transporter, and would include plutonium pits, plutonium oxides and metal, and highly enriched uranium. The number of shipments associated with the transport of pits, plutonium oxide, and highly enriched uranium were determined using up-to-date information about the types of transport packages to be used and the forecasted generation rates. These materials would be transported in Type B packages. While it is assumed that a specific Type B package would be used for each type of nuclear material being transported for purposes of analysis, more than one particular package design could be used. Use of different Type B packages that are applicable to a particular cargo would not significantly change the impacts presented in this analysis because the designs and shipping configurations of the Type B packages are similar.

Table E-2. Material or Waste Type and Associated Container Characteristics[a]

Material or Waste Type	Container	Container Volume (m^3)[b]	Container Mass (kg)[c]	Shipment Description
Mixed low-level radioactive waste or low-level radioactive waste	208 L drum (Type A Package)	0.2	399	80 per truck
Low-level radioactive waste	B-25 box (Type A Package)	2.55	4,536	5 per truck

[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.

[2] The Transport Index is a dimensionless number (rounded up to the next tenth) placed on the label of a package to designate the degree of control to be exercised by the carrier. Its value is equivalent to the maximum radiation level in millirem per hour at 1 m from the package (10 CFR 71.4; 49 CFR 173.403).

Material or Waste Type	Container	Container Volume (m^3)[b]	Container Mass (kg)[c]	Shipment Description
CH-TRU waste (job control from operation and maintenance)	208 L drum	0.2	142[d]	14 per TRUPACT-II (Type B package) 3 TRUPACT-II per truck
CH-TRU waste (job control in pipe overpack)	Pipe overpack container[e]	0.2	142[d]	14 per TRUPACT-II (Type B package) 3 TRUPACT-II per truck
Special nuclear material	Type B package	0.13 — 0.30	183 — 318	1 to 30 per OST transporter
CH-TRU waste (diluted plutonium oxide)	Criticality control container[f]	0.2	142[d]	14 per TRUPACT-II (Type B package) 3 TRUPACT-II per truck
Construction/demolition debris	Roll-on/roll-off	15.30	NA	1 per truck
Hazardous waste	208 L drum	0.2	399	40 per truck

CH-TRU = contact-handled transuranic; NA = not applicable; OST = Office of Secure Transportation; TRUPACT-II = Transuranic Package Transporter Model-II.

(a) Containers and transport packages identified in this table were used to determine the transportation impacts for purposes of analysis. Specific Type B packages, while not identified in this table, were assumed for specific material or waste types to conduct the analysis. Other containers and transportation packages may be used in addition to, or in lieu of, those shown.

(b) Container exterior volume. To convert from cubic meters to cubic feet, multiply by 35.315.

(c) Filled container maximum mass. Container mass includes the mass of the container shell, its internal packaging, and the materials within the container. To convert from kilograms to pounds, multiply by 2.2046.

(d) For the 14 drums per TRUPACT-II and three TRUPACT-IIs per shipment, the average weight of the drum is limited to 142 kg.

(e) Pipe overpack containers containing CH-TRU job control waste would be packaged in 208 L drums.

(f) Diluted plutonium oxide CH-TRU waste would be packaged in the criticality control containers, which would be the same size as a 208 L drum.

Sources: DOE 2015; LANL 2022; SRNS 2022.

For radioactive waste to be transported to a radioactive waste disposal site, it was assumed that the wastes would meet the disposal facility's waste acceptance criteria. For purposes of analysis, it was assumed that the LLW generated at SRS would be disposed onsite at SRS. In addition, it was assumed that all LLW and MLLW generated at LANL would be transported to Nevada National Security Site.

CH-TRU waste would be transported to the WIPP facility for disposal. CH-TRU waste would consist of job control waste resulting from processing activities and diluted plutonium oxide CH-TRU waste under the No Action Alternative and the Preferred Alternative. The CH-TRU job control waste would be packaged in drums or in pipe overpack containers as appropriate. The diluted plutonium oxide CH-TRU waste would be packaged in criticality control overpacks at a higher concentration. These shipments would consist of 42 containers per shipment.

E.4.3 Radionuclide Inventories

Radionuclide inventories are used to determine the accident risks associated with a release of the radioactive or contaminated cargo. Table E-3 provides the container radionuclide inventory concentration assumed for LLW and MLLW. It is assumed that these two waste types would have the same radionuclide composition, and that the MLLW would have a hazardous component. The list of radionuclides in these tables is limited to those that would be expected from disassembly and conversion operations. The composition of the waste is the average curie concentration per radioisotope as measured in the year 2010 and received at E-Area at SRS. This composition is assumed to be representative of the LLW and MLLW streams generated by surplus plutonium disposition activities.

Table E-3. Low-Level and Mixed Low-Level Radioactive Waste Radionuclide Concentrations[(a)]

Nuclide	Curies per Cubic Meter
Americium-241	0.000050
Plutonium-238	0.00038
Plutonium-239	0.00011
Plutonium-240	0.000049
Plutonium-241	0.00048
Technetium-99	0.0000052

SRS = Savannah River Site.

(a) These are the primary radionuclides expected in offsite shipments of low-level and mixed low-level radioactive waste. The concentrations are representative of what historically has been generated at SRS.

Source: DOE 2015|Table E-3|.

For transport of pits from Pantex to LANL, plutonium oxide from LANL to SRS (or from SRS to LANL), and highly enriched uranium oxide from LANL or SRS to Y-12 National Security Complex, it was assumed that the contents of one Type B package would be released in the event of an accident (DOE 2015).

Under the No Action Alternative and the Preferred Alternative (for which plutonium would be disassembled, oxidized, diluted, and repackaged and sent to the WIPP facility for disposal), it was assumed there would be 150 g of pit plutonium per pipe overpack container and 300 g of diluted surplus pit or non-pit plutonium oxide per criticality control overpacks (SRNS 2022; LANL 2022). A shipment would consist of three Transuranic Package Transporter Model-II packages, each containing 14 containers.

For CH-TRU job control waste generated from processing surplus pit plutonium, it was assumed there would be 20 g of plutonium per drum. For CH-TRU waste generated from processing non-pit surplus plutonium, it was assumed there would be 10 g of plutonium per drum[1] (DOE 2015). A shipment of CH-TRU waste for either of these two cases would consist of three Transuranic Package Transporter Model-II packages, each containing 14 containers (DOE 2015).

E.5 Incident-free Transportation Risks

During the transportation of radioactive materials, incident-free radiological impacts may occur for workers and members of the public. Section E.6 in the 2015 SPD SEIS (DOE 2015) contains more information about incident-free transportation risks.

[1] The plutonium contaminations per drum assignments for the CH-TRU job control waste generated from the processing of surplus pit and non-pit plutonium are based on the potential decay heat limit as determined in the 2012 NEPA source document (DOE 2012), which is driven by the isotopic mix in surplus pit and non-pit plutonium.

E.6 Transportation Accident Risks

During the transportation of radioactive materials, transportation accidents may also occur, resulting in radiological and nonradiological impacts. Section A.3 in the 2015 SPD SEIS (DOE 2015) contains more information about transportation accident risks. Section A.3 also discusses acts of sabotage and terrorism.

E.7 Risk Analysis Results

The activities at LANL and SRS analyzed in this SPDP EIS occur within four sub-alternatives of the Preferred Alternative and the No Action Alternative, as indicated in Table E-4. For example, under the Base Approach Sub-Alternative of the Preferred Alternative, the pit disassembly and processing (PDP) and the non-pit metal processing would occur at LANL, and dilution and disposition would occur at SRS. Under the All LANL Sub-Alternative, all pit and non-pit processing, dilution, and disposition activities would occur at LANL. Under the All SRS Sub-Alternative, all activities would occur at SRS.

Table E-4. Roadmap for Interpreting Transportation Impact Tables Displaying Alternative/Sub-Alternative Capabilities Conducted at LANL and at SRS

Capability	Preferred Alternative Base Approach Sub-Alternative	Preferred Alternative SRS NPMP Sub-Alternative	Preferred Alternative All SRS Sub-Alternative	Preferred Alternative All LANL Sub-Alternative	No Action Alternative
PDP	LANL	LANL	SRS	LANL	No PDP
NPMP	LANL	SRS	SRS	LANL	LANL/SRS[a]
Dilution	SRS	SRS	SRS	LANL	SRS
C&P	SRS	SRS	SRS	LANL	SRS

C&P = characterization and packaging; LANL = Los Alamos National Laboratory; NPMP = non-pit metal processing; PDP = pit disassembly and processing; SRS = Savannah River Site.
(a) Under the No Action Alternative, NPMP could occur at either LANL or SRS.

Per-shipment risk factors have been calculated for the collective populations of exposed persons and for the crew for all anticipated routes and shipment configurations. Radiological risks are presented in doses per shipment for each unique route, material, and container combination. Radiological risk factors per shipment for incident-free transportation and accident conditions are presented in Table E-5 (DOE 2002). These factors have been adjusted to reflect the projected population in 2040. For incident-free transportation, both dose and latent cancer fatality (LCF) risk factors are provided for the crew and exposed population, including the off-link public (people living along the route), on-link public (pedestrian and car occupants along the route), and public at rest and fuel stops.

For transportation accidents, the risk factors are given for both radiological impacts, in terms of the potential LCFs in the exposed population, and nonradiological impacts, in terms of the number of traffic fatalities. Under accident conditions, the population would be exposed to radiation from released radioactivity if the package were damaged and would receive a direct dose if the package were unbreached. For accidents that involve no release, the analysis conservatively assumed that it would take about 12 hours to remove the package and/or commercial vehicle from the accident area (DOE 2002); 6 hours was assumed for OST transporter shipments. The nonradiological risk factors are nonoccupational traffic fatalities resulting from transportation accidents.

Table E-6 and Table E-7 show the risks of transporting radioactive materials and wastes under the No Action Alternative and the Preferred Alternative, respectively. Under the No Action Alternative, the indicated risks are for processing 7.1 metric ton (MT) of non-pit surplus plutonium. Under the Preferred Alternative, the indicated risks for each sub-alternative are for processing 34 MT of surplus pit plutonium and 7.1 MT of non-pit surplus plutonium. The risks are calculated by multiplying the previously given per-shipment factors by the number of shipments over the duration of the program and, for radiological doses, by the health risk conversion factors. The risks are for the entire period under each alternative and include both construction and operations. The number of shipments for the different waste types was estimated using the data in SPDP data call responses from Savanah River Nuclear Solutions and LANL (SRNS 2022, LANL 2022), the 2015 SPD SEIS (DOE 2015), and the waste container and shipment characteristics provided in Section E.4.2 and Table E-2.

Comparison of Table E-6 and Table E-7 indicates that the No Action Alternative would have the lowest overall transportation risks, with no expected fatalities. The Preferred Alternative would also lead to no expected fatalities from transporting radioactive material and waste.

Nonradiological accident risks (the potential for fatalities as a direct result of traffic accidents) present the greatest risks, with an estimate of up to one fatality (0.6) for the Preferred Alternative. Considering that the transportation activities analyzed in this SPDP EIS would occur over about 30 years and that the average number of traffic fatalities in the United States is about 34,860 per year for the 10-year period 2010 through 2019 (DOT 2021), the traffic fatality risk under both alternatives would be very small.

Table E-5. Risk Factors per Shipment of Radioactive Material and Waste

Material or Waste Type	Shipments Between		Incident-Free Crew Dose (person-rem)	Incident-Free Crew Risk (LCF)	Incident-Free Population Dose (person-rem)	Incident-Free Population Risk (LCF)	Accident Rad. Risk (LCF)	Accident Nonrad. Risk (traffic fatalities)
Pits[(a)(b)]	Pantex	LANL	0.013	0 (7.9×10^{-6})	0.026	0 (1.6×10^{-5})	0 (2.9×10^{-10})	0 (0.000017)
Pits[(a)(b)]	Pantex	SRS	0.049	0 (2.9×10^{-5})	0.10	0 (6.0×10^{-5})	0 (1.4×10^{-9})	0 (0.000055)
HEU[(a)(b)]	LANL	Y-12	0.013	0 (7.9×10^{-6})	0.039	0 (2.3×10^{-5})	0 (1.6×10^{-10})	0 (0.000081)
HEU[(a)(b)]	SRS	Y-12	0.0033	0 (2.0×10^{-6})	0.010	0 (6.2×10^{-6})	0 (6.3×10^{-11})	0 (0.000016)
Byproduct material	SRS	LANL	0.014	0 (8.1×10^{-6})	0.049	0 (2.9×10^{-5})	0 (1.2×10^{-9})	0 (0.000075)
Undiluted plutonium oxide[(a)(b)(c)]	LANL	SRS	0.034	0 (2.0×10^{-5})	0.12	0 (7.3×10^{-5})	0 (9.2×10^{-8} [pit]) 0 (2.3×10^{-7} [non-pit])	0 (0.000075)
Diluted plutonium oxide CH-TRU waste in CCOs[(d)]	SRS	WIPP facility	0.090	0 (5.4×10^{-5})	0.075	0 (4.5×10^{-5})	0 (2.1×10^{-8} [pit]) 0 (5.0×10^{-8} [non-pit])	0 (0.00014)
CH-TRU waste in POCs[(d)]	SRS	WIPP facility	0.090	0 (5.4×10^{-5})	0.075	0 (4.5×10^{-5})	0 (1.1×10^{-8} [pit]) 0 (2.6×10^{-8} [non-pit])	0 (0.00014)
CH-TRU waste with 10 g non-pit surplus plutonium per drum[(d)]	SRS	WIPP facility	0.090	0 (5.4×10^{-5})	0.075	0 (4.5×10^{-5})	0 (2.7×10^{-9})	0 (0.00014)
CH-TRU waste with 20 g pit plutonium per drum[(d)]	SRS	WIPP facility	0.090	0 (5.4×10^{-5})	0.075	0 (4.5×10^{-5})	0 (2.4×10^{-9})	0 (0.00014)
Diluted plutonium oxide CH-TRU waste in CCOs[(d)]	LANL	WIPP facility	0.022	0 (1.3×10^{-5})	0.017	0 (1.0×10^{-5})	0 (2.4×10^{-10} [pit]) 0 (5.8×10^{-10} [non-pit])	0 (0.000020)

Material or Waste Type	Shipments Between		Incident-Free Crew Dose (person-rem)	Incident-Free Crew Risk (LCF)	Incident-Free Population Dose (person-rem)	Incident-Free Population Risk (LCF)	Accident Rad. Risk (LCF)	Accident Nonrad. Risk (traffic fatalities)
CH-TRU waste in POCs[(d)]	LANL	WIPP facility	0.022	0 (1.3×10^{-5})	0.017	0 (1.0×10^{-5})	0 (1.3×10^{-10} [pit]) 0 (3.0×10^{-10} [non-pit])	0 (0.000020)
CH-TRU waste with 10 g non-pit surplus plutonium per drum[(d)]	LANL	WIPP facility	0.022	0 (1.3×10^{-5})	0.017	0 (1.0×10^{-5})	0 (3.9×10^{-11})	0 (0.000020)
CH-TRU waste with 20 g pit plutonium per drum[(d)]	LANL	WIPP facility	0.022	0 (1.3×10^{-5})	0.017	0 (1.0×10^{-5})	0 (3.5×10^{-11})	0 (0.000020)
LLW[(e)]	LANL	NNSS	0.028	0 (1.7×10^{-5})	0.018	0 (1.1×10^{-5})	0 (3.8×10^{-11})	0 (0.000041)
LLW and MLLW[(f)]	LANL	NNSS	0.033	0 (2.0×10^{-5})	0.035	0 (2.1×10^{-5})	0 (7.3×10^{-11})	0 (0.000041)

CCO = criticality control overpack; CH-TRU = contact-handled transuranic; HEU = highly enriched uranium; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NNSS = Nevada National Security Site; nonrad. = nonradiological; OST = Office of Secure Transportation; Pantex = Pantex Plant; POC = pipe overpack container; rad. = radiological; SRS = Savannah River Site; TRUPACT-II = Transuranic Package Transporter Model-II; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

(a) Transported in Type B packages.
(b) Transported by OST transporters.
(c) The radiological risks associated with shipments of powder bound the radiological risks associated with shipments of metal.
(d) Transported in 208 L (55 gal) drums in 3 TRUPACT-IIs per shipment. CCOs are the same size as a 208-L (55 gal) drum.
(e) Transported in Type A B-25 boxes.
(f) Transported in Type A 208 L (55 gal) drums.

Table E-6. Risks of Transporting Radioactive Material and Waste – No Action Alternative

No Action Alternative	Route (Material or Waste Type)	Transport Mode	Number of Shipments	One-Way Kilometers Traveled (million)	Incident-Free Crew Dose (person-rem)	Incident-Free Crew LCFs[a]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCFs[a]	Accident Radiological LCFs[a]	Accident Non-radiological Risk[a]
NPMP at LANL and Dilution at SRS	All OST Transporter Routes (undiluted Pu and PuO_2)[b][c]	OST Transporter	89 – 178	0.24 – 0.48	3.0 – 6.0	0 (0.002) – 0 (0.004)	0.002 – 0.004	0 (0.006) – 0 (0.01)	0 (2×10^{-5}) – 0 (4×10^{-5})	0 (0.007 – 0.01)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	303	0.42	11	0 (0.007)	11	0 (0.007)	0 (1×10^{-7})	0 (0.01)
	All Diluted PuO_2 CH-TRU Waste[e] Shipments to the WIPP Facility	Truck	663	1.8	51	0 (0.03)	42	0 (0.03)	0 (3×10^{-5})	0 (0.1)
	Total[c]		1,055 – 1,144	2.5 – 2.7	65 – 68	0 (0.04)	64 – 75	0 (0.04) – 0 (0.05)	0 (5×10^{-5}) – 0 (7×10^{-5})	0 (0.1)
NPMP and Dilution at SRS	All OST Transporter Routes (undiluted Pu and PuO_2)[b][c]	OST Transporter	0 – 89	0 – 0.24	0 – 3.0	0 – 0 (0.002)	0 – 11	0 – 0 (0.006)	0 – 0 (2×10^{-5})	0 (0 – 0.007)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	78	0.18	7.0	0 (0.004)	5.9	0 (0.004)	0 (2×10^{-7})	0 (0.01)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	663	1.8	51	0 (0.03)	42	0 (0.03)	0 (3×10^{-5})	0 (0.1)
	Total[c]		741 – 830	2 – 2.2	58 – 61	0 (0.03) – 0 (0.04)	48 – 59	0 (0.03) – 0 (0.04)	0 (3×10^{-5}) – 0 (5×10^{-5})	0 (0.1)

CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; LLW = low-level radioactive waste; NNSS = Nevada National Security Site; NPMP = non-pit metal processing; OST = Office of Secure Transportation; Pu = plutonium; PuO_2 = plutonium oxide; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

(a) Risk is expressed in terms of latent cancer fatalities, except for the nonradiological risk, where it refers to the number of traffic accident fatalities. Both are the expected fatalities based on the statistical data (e.g., LCFs per unit dose absorbed, and the traffic fatalities per 100 million kilometers traveled). Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values are rounded to one non-zero digit.

(b) OST transporter routes include routes from LANL to SRS and SRS to LANL. Shipments on these routes would be made in OST transporters.

(c) Range in the number of shipments, one-way kilometers traveled, and incident-free and accident impacts is due to the assumed origin of the non-pit surplus plutonium.
(d) Job Control Waste routes include routes from LANL and SRS to the WIPP facility and LANL to NNSS.
(e) Includes impacts from adulterant shipments from an assumed distance of 4,800 km to SRS or LANL.

Notes:

- A roadmap is provided in Table E-4 to orient readers to the activities that would occur at LANL or SRS for the No Action Alternative. Under the No Action Alternative, NPMP could occur at either LANL or at SRS. The analysis also considers the non-pit surplus plutonium origin could be either SRS or LANL (see footnote c).
- The cited total values may differ from the sum of the individual values because of rounding.
- Crew doses are for truck drivers, assuming to be two drivers per transport.

Table E-7. Risks of Transporting Radioactive Material and Waste – Preferred Alternative

Preferred Alternative	Route (Material or Waste Type)	Transport Mode	Number of Shipments	One-Way Kilometers Traveled (million)	Incident-Free Crew Dose (person-rem)[a]	Incident-Free Crew LCFs[b]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCFs[b]	Accident Radio-logical LCFs[b]	Accident Non-radio-logical Risk[b]
Base Approach Sub-Alternative: *PDP at LANL and Dilution at SRS*	All OST Transporter Routes (pits, HEU, undiluted PuO_2)[c]	OST Transporter	1,800	2.2	33	0 (0.02)	89	0 (0.05)	0 (4×10^{-5})	0 (0.06)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	591	0.81	26	0 (0.02)	23	0 (0.01)	0 (4×10^{-7})	0 (0.03)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	3,172	8.6	240	0 (0.1)	200	0 (0.1)	0 (6×10^{-5})	1 (0.5)
	Total		**5,563**	**12**	**300**	**0 (0.2)**	**320**	**0 (0.2)**	**0 (0.0001)**	**1 (0.6)**

Preferred Alternative	Route (Material or Waste Type)	Transport Mode	Number of Shipments	One-Way Kilometers Traveled (million)	Incident-Free Crew Dose (person-rem)[a]	Incident-Free Crew LCFs[b]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCFs[b]	Accident Radio-logical LCFs[b]	Accident Non-radio-logical Risk[b]
NPMP at LANL and Dilution at SRS	All OST Transporter Routes (undiluted Pu and PuO_2)[c]	OST Transporter	178	0.48	6.0	0 (0.004)	22	0 (0.01)	0 (4×10^{-5})	0 (0.01)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	303	0.42	11	0 (0.007)	11	0 (0.007)	0 (1×10^{-7})	0 (0.01)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	663	1.8	51	0 (0.03)	42	0 (0.03)	0 (3×10^{-5})	0 (0.1)
	Total		**1,144**	**2.7**	**68**	**0 (0.04)**	**75**	**0 (0.05)**	**0 (7×10^{-5})**	**0 (0.1)**
All LANL Sub-Alternative: *PDP and Dilution at LANL*	All OST Transporter Routes (pits and HEU)[c]	OST Transporter	1,375	1.0	18	0 (0.01)	38	0 (0.02)	0 (4×10^{-7})	0 (0.03)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	1,636	2.0	51	0 (0.03)	52	0 (0.03)	0 (1×10^{-7})	0 (0.06)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	3,172	3.9	60	0 (0.04)	46	0 (0.03)	0 (7×10^{-7})	0 (0.2)
	Total		**6,183**	**6.9**	**130**	**0 (0.08)**	**140**	**0 (0.08)**	**0 (1×10^{-6})**	**0 (0.3)**

Preferred Alternative	Route (Material or Waste Type)	Transport Mode	Number of Shipments	One-Way Kilometers Traveled (million)	Incident-Free Crew Dose (person-rem)[a]	Incident-Free Crew LCFs[b]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCFs[b]	Accident Radio-logical LCFs[b]	Accident Non-radio-logical Risk[b]
NPMP and Dilution at LANL	All OST Transporter Routes (undiluted Pu)[c]	OST Transporter	89	0.24	3.0	0 (0.002)	11	0 (0.006)	0 (2×10^{-5})	0 (0.007)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	517	0.67	17	0 (0.01)	17	0 (0.01)	0 (4×10^{-8})	0 (0.02)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	663	0.81	13	0 (0.008)	9.7	0 (0.006)	0 (3×10^{-7})	0 (0.03)
	Total		**1,269**	**1.7**	**32**	**0 (0.02)**	**38**	**0 (0.02)**	**0 (2×10^{-5})**	**0 (0.06)**
SRS NPMP Sub-Alternative: *PDP at LANL and Dilution at SRS*	All OST Transporter Routes (pits, HEU, undiluted PuO_2)[c]	OST Transporter	1,800	2.2	33	0 (0.02)	89	0 (0.05)	0 (4×10^{-5})	0 (0.06)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	591	0.81	26	0 (0.02)	23	0 (0.01)	0 (4×10^{-7})	0 (0.03)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	3,172	8.6	240	0 (0.1)	200	0 (0.1)	0 (6×10^{-5})	1 (0.5)
	Total	**Truck**	**5,563**	**12**	**300**	**0 (0.2)**	**320**	**0 (0.2)**	**0 (0.0001)**	**1 (0.6)**

Preferred Alternative	Route (Material or Waste Type)	Transport Mode	Number of Shipments	One-Way Kilometers Traveled (million)	Incident-Free Crew Dose (person-rem)[a]	Incident-Free Crew LCFs[b]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCFs[b]	Accident Radio-logical LCFs[b]	Accident Non-radio-logical Risk[b]
NPMP at SRS and Dilution at SRS	All OST Transporter Routes (undiluted Pu and PuO_2)[c]	OST Transporter	89	0.24	3.0	0 (0.002)	11	0 (0.006)	0 (2×10^{-5})	0 (0.007)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	62	0.14	5.6	0 (0.003)	4.7	0 (0.003)	0 (2×10^{-7})	0 (0.009)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	663	1.8	51	0 (0.03)	42	0 (0.03)	0 (3×10^{-5})	0 (0.1)
	Total		**814**	**2.2**	**59**	**0 (0.04)**	**58**	**0 (0.03)**	**0 (5×10^{-5})**	**0 (0.1)**
All SRS Sub-Alternative: *PDP and Dilution at SRS*	All OST Transporter Routes (pits, HEU, and byproduct material)[c]	OST Transporter	1,415	2.8	62	0 (0.04)	130	0 (0.08)	0 (2×10^{-6})	0 (0.07)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	309	0.72	28	0 (0.02)	23	0 (0.01)	0 (2×10^{-6})	0 (0.04)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	3,172	8.6	240	0 (0.1)	200	0 (0.1)	0 (6×10^{-5})	1 (0.5)
	Total		**4,896**	**12**	**330**	**0 (0.2)**	**350**	**0 (0.2)**	**0 (6×10^{-5})**	**1 (0.6)**

Preferred Alternative	Route (Material or Waste Type)	Transport Mode	Number of Shipments	One-Way Kilometers Traveled (million)	Incident-Free Crew Dose (person-rem)[a]	Incident-Free Crew LCFs[b]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCFs[b]	Accident Radio-logical LCFs[b]	Accident Non-radio-logical Risk[b]
NPMP and Dilution at SRS	All OST Transporter Routes[c]	OST Transporter	89	0.24	3.0	0 (0.002)	11	0 (0.006)	0 (2×10^{-5})	0 (0.007)
	All Job Control Waste Routes (CH-TRU and LLW)[d]	Truck	62	0.14	5.6	0 (0.003)	4.7	0 (0.003)	0 (2×10^{-7})	0 (0.009)
	All Diluted PuO_2 CH-TRU Waste Shipments[e] to the WIPP Facility	Truck	663	1.8	51	0 (0.03)	42	0 (0.03)	0 (3×10^{-5})	0 (0.1)
	Total		**814**	**2.2**	**59**	**0 (0.04)**	**58**	**0 (0.03)**	**0 (5×10^{-5})**	**0 (0.1)**

C&P = characterization and packaging; CH-TRU = contact-handled transuranic; HEU = highly enriched uranium; LANL = Los Alamos National Laboratory; LCF = latent cancer fatality; LLW = low-level radioactive waste; NNSS = Nevada National Security Site; NPMP = non-pit metal processing; OST = Office of Secure Transportation; Pantex = Pantex Plant; PDP = pit disassembly and processing; Pu = plutonium; PuO_2 = plutonium oxide; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

(a) Crew doses are for the truck drivers, assumed to be two drivers per transport.

(b) Risk is expressed in terms of latent cancer fatalities, except for the nonradiological risk, where it refers to the number of traffic accident fatalities. Both are the expected fatalities based on the statistical data (e.g., LCFs per unit dose absorbed, and the traffic fatalities per 100 million kilometers traveled). Radiological risk is calculated for one-way travel while nonradiological risk is calculated for two-way travel. Accident dose risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values are rounded to one non-zero digit.

(c) OST transporter routes include routes from Pantex to LANL and SRS, LANL and SRS to Y-12, LANL to SRS, and SRS to LANL. Shipments on these routes would be made in OST transporters.

(d) Job Control Waste routes include routes from LANL and SRS to the WIPP facility and LANL to NNSS.

(e) Includes impacts from adulterant shipments from an assumed distance of 4,800 km to LANL or SRS.

Notes:

- A roadmap is provided in Table E-4 to orient readers to the activities that would occur at LANL or SRS for each of the sub-alternatives of the Preferred Alternative as well as the No Action Alternative. The Base Approach Sub-Alternative at LANL only includes PDP and NPMP activities (dilution and C&P would occur at SRS). The SRS NPMP Sub-Alternative at LANL only includes PDP (all other activities would occur at SRS). The All LANL Sub-Alternative includes all four activities: PDP, NPMP, dilution, and C&P. The All SRS Sub-Alternative includes all four activities: PDP, NPMP, dilution, and C&P.
- Columns may not sum to totals due to rounding.

The risks to various exposed individuals under incident-free transportation conditions have been estimated and are presented in Table E-8, considering all shipment types. Doses are presented on a per-event basis (person-rem per event, per exposure, or per shipment), because it is generally unlikely that the same person would be exposed to multiple events. For individuals who could have multiple exposures, the cumulative dose could be calculated. For example, a member of the public residing along the route would likely receive multiple exposures from passing shipments. The maximum dose to a crew member is based on the assumption that the same individual is responsible for driving every shipment for the duration of the campaign. Note that the potential exists for larger individual exposures under one-time events of a longer duration. For example, the maximum dose to a person stuck in traffic next to a shipment of LLW for 1 hour is calculated to be 0.0081 rem (8.1 mrem). This is generally considered a one-time event for that individual, although the individual may encounter another exposure of a similar or longer duration in his/her lifetime. An inspector inspecting the conveyance and its cargo would be exposed to a maximum dose rate of 0.019 rem (or 19 mrem) per hour if the inspector stood within 1 m of the cargo for the duration of the inspection.

Table E-8. Estimated Dose to Maximally Exposed Individuals under Incident-free Transportation Conditions

Receptor	Dose to Maximally Exposed Individual
Workers	
Crew member (truck driver)	2 rem per year[(a)]
Inspector	0.019 rem per event per hour of inspection
Public	
Resident (along the truck route)	2.6×10^{-7} rem per event
Person in traffic congestion	0.0081 rem per event per one hour stop
Person at a rest stop/gas station	0.00024 rem per event per hour of stop
Gas station attendant	0.00053 rem per event

DOT = U.S. Department of Transportation; DOE = U.S. Department of Energy.

(a) In addition to complying with DOT requirements, a DOE employee would also need to comply with 10 CFR Part 835, which limits worker radiation doses to 5 rem/yr; however, DOE's goal is to maintain radiological exposure as low as reasonably achievable. DOE has therefore established the Administrative Control Level of 2 rem/yr (DOE 2017). Based on the number of commercial shipments and the total crew dose to two drivers in Table E-6 and Table E-7, a commercial driver dose would not exceed this administrative control limit; therefore, the administrative control limit is reflected in this table for the maximally exposed truck crew member.

Source: Table E-11 in DOE 2015.

The cumulative dose to a member of the public along the route was calculated by assuming all shipments pass his or her home. The cumulative dose was calculated assuming that the resident is present for every shipment and is unshielded at a distance of 30 m from the route. Therefore, the cumulative dose depends on the number of shipments passing a particular point and is independent of the actual route being considered. If one assumes the maximum resident dose provided in Table E-7 for all waste transport types, then the maximum dose to this resident, if all the materials and wastes were shipped via this route, would be about 1.6 mrem, and the expected risk of developing an LCF would be 1×10^{-6}, or essentially no expected LCF. This dose corresponds to that for truck shipments under the Preferred Alternative, which includes an estimated 6,183 shipments over about a 27-year period.

The accident risk assessment and the impacts shown in Table E-6 and Table E-7 consider the entire spectrum of potential accidents, from a fender-bender to an extremely severe accident. To provide additional insight into the severity of accidents in terms of the potential dose to the maximally exposed individual and the public, an accident consequence assessment was performed for a maximum reasonably foreseeable hypothetical transportation accident with a likelihood of occurrence greater than 1 in 10 million per year.

The following assumptions were used to estimate the consequences of maximum reasonably foreseeable offsite transportation accidents:

- The accident is the most severe and has the highest release fraction (high-impact and high-temperature fire accident [highest severity category]).
- The individual is 100 m downwind from a ground release accident.
- The individual is exposed to airborne contamination for 2 hours with no interdiction or cleanup. A stable weather condition (Pasquill Stability Class F)[1] with a wind speed of 1 m/s is assumed.
- The population is assumed to have a uniform density within a radius of 80 km and to be exposed to the entire plume passage and 7 days of ground exposure without interdiction and cleanup. A neutral weather condition (Pasquill Stability Class D) with a wind speed of 4 m/s is assumed. Because the consequence is proportional to the population density, the accident is assumed to occur in an urban[2] area that has the highest density (see Table E-9).
- The type and number of containers involved in the accident are listed in Table E-2. When multiple Type B or shielded Type A shipping casks are transported in a shipment, a single cask is assumed to have failed in the accident. It is unlikely that a severe accident would breach multiple casks.

Table E-9 provides the estimated dose and potential LCFs that could result for an individual and population from a maximum foreseeable truck transportation accident that has the highest consequences under each alternative. (Only accidents with a probability greater than 1×10^{-7} per year are analyzed.) The accident is assumed to involve a severe impact (collision) in conjunction with a long fire duration. The highest consequences for the maximum foreseeable accident based on population dose are from accidents occurring in a suburban area involving the transport of plutonium oxide powder from LANL to SRS.

[1] Section 3.3.1 in Yuan et al. 1995 describes the atmospheric transport model implemented in Risks and Consequences of Radioactive Material Transport including the Pasquill stability classes.

[2] If the likelihood of an accident is equal to or greater than 1 in 10 million per year for both suburban and urban population zones, then the consequences are provided for the urban population zone.

Table E-9. Estimated Dose to the Population and to Maximally Exposed Individuals under the Maximum Reasonably Foreseeable Accident

Transport Mode	Material or Waste in the Accident	Applicable Alternatives	Range of Likelihood of the Accident (per year)[a]	Population Zone[a]	Population[b] Dose (person-rem)	Population[b] LCF	MEI[c] Dose (rem)	MEI[c] LCF
OST transporter from Pantex	Pits	Preferred[e]	1.0×10^{-6}	Suburban	110 (pit)	0 (0.07) (pit)	0.066 (pit)	0.00004 (pit)
OST transporter from SRS to LANL or LANL to SRS	Plutonium metal or oxide in Type B package[d]	Preferred[f]	2.0×10^{-7}	Suburban	7,900 (pit)	5 (pit)	4.4 (pit)	0.003 (pit)
		No Action and Preferred	1.2×10^{-6} to 2.4×10^{-6}	Rural	820 (non-pit)	0.5 (non-pit)	12 (non-pit)	0.007 (non-pit)
Truck transport to the WIPP facility	Diluted plutonium oxide CH-TRU waste in criticality control containers in TRUPACT-II	Preferred[g]	2.3×10^{-7}	Urban	110 (pit)	0 (0.07) (pit)	0.015 (pit)	9×10^{-6} (pit)
		No Action and Preferred	1.2×10^{-6} to 2.4×10^{-6}	Suburban	63 (non-pit)	0 (0.04) (non-pit)	0.040 (non-pit)	2×10^{-5} (non-pit)
Truck transport to the WIPP facility	CH-TRU waste in pipe overpack containers in TRUPACT-II	Preferred	2.0×10^{-7}	Suburban	12 (pit)	0 (0.007) (pit)	0.0075 (pit)	5×10^{-6} (pit)
OST transporter from SRS or LANL to Y-12	HEU	Preferred[h]	2.7×10-7 to 1.5×10^{-6}	Rural	0.19	0 (0.0001)	0.00026	2×10^{-7}
Truck transport to the WIPP facility	CH-TRU waste in drums in TRUPACT-II	Preferred	2.9×10^{-7} to 4.4×10^{-7}	Suburban	1.6 (pit)	0 (0.0009) (pit)	0.0010 (pit)	6×10^{-7} (pit)
		No Action	1.2×10^{-7} to 3.4×10^{-7}	Suburban	2.1 (non-pit)	0 (0.001) (non-pit)	0.0013 (non-pit)	8×10^{-7}) (non-pit)
Truck transport to NNSS	LLW or MLLW in drums	No Action	3.4×10^{-6}	Rural	0.00054	0 (3×10^{-7})	0.000016	9×10^{-9}
		Preferred	1.3×10^{-7}	Suburban	0.023	0 (0.00001)	0.000016	9×10^{-9}

CH-TRU = contact-handled transuranic; LANL = Los Alamos National Laboratory; HEU = highly-enriched uranium; LCF = latent cancer fatality; LLW = low-level radioactive waste; MEI = maximally exposed individual; MLLW = mixed low-level radioactive waste; NNSS = Nevada National Security Site; OST = Office of Secure Transportation; Pantex = Pantex Plant; SRS = Savannah River Site; TRUPACT-II = Transuranic Package Transporter Model-II; WIPP = Waste Isolation Pilot Plant; Y-12 = Y-12 National Security Complex.

(a) The likelihood shown is the range of likelihood estimated among the alternatives given the number of shipments over a specific time period. The population zones listed are those that have the likelihood of an accident occurring equal to or greater than 1 in 10 million per year. If the likelihood of an accident is equal to or greater than 1 in 10 million per year for both suburban and urban population zones, then the consequences are provided for the urban population zone.

(b) Population extends at a uniform density to a radius of 80 km. The weather condition was assumed to be Pasquill Stability Class D with a wind speed of 4 m/s (Yuan et al. 1995).

(c) The MEI is assumed to be 100 m downwind from the accident and exposed to the entire plume of the radioactive release. The weather condition is assumed to be Pasquill Stability Class F with a wind speed of 1 m/s.

(d) Doses are based on plutonium oxide.

(e) This accident characteristics is applicable to the All SRS Sub-Alternative, which considers the pit disassembly and processing would occur over 13 years at F-Area, or 15 years at K-Area. For all other sub-alternatives, pits are transported to LANL for processing over 27 years, with the likelihood of an accident occurring being 4.1×10^{-6} per year in a rural area and a population dose of 5.2 person-rem.

(f) The 7,900 person-rem is applicable to the Base Approach and the SRS NPMP Sub-Alternative. Plutonium pit metal or oxide in Type B packages is not shipped between LANL and SRS or SRS and LANL for the All LANL Sub-Alternative and All SRS Sub-Alternative.

(g) The 110 person-rem and 2.3×10^{-7} frequency is not applicable to the All LANL Sub-Alternative. The impacts for the All LANL Sub-Alternative would be 15 person-rem and 1.1×10^{-7} per year frequency.

(h) The 0.19 person-rem is applicable for the All SRS Sub-Alternative; the frequency for this sub-alternative is 2.7×10^{-7}per year. For all other Preferred Alternative sub-alternatives, including the All LANL Sub-Alternative, the frequency and the public dose are 1.5×10^{-6} per year and 0.12 person-rem, respectively.

E.8 Impact of Hazardous Waste and Construction and Operational Material Transport

This section evaluates the impacts of transporting hazardous wastes, as well as materials required to construct new facilities. Section E.9 of the 2015 SPD SEIS (DOE 2015) evaluated the potential impacts of transporting construction materials and the hazardous wastes. For construction materials, it was assumed that these materials would be transported 50 km one way (DOE 2015). Hazardous wastes were assumed to be transported about 2,000 km (DOE 2015). The truck accident and fatality rates that were assumed for construction materials were 7.69 accidents per 10 million truck-kilometers traveled and 4.08 fatalities per 100 million truck-kilometers traveled (Saricks and Tompkins 1999; Blower and Matteson 2003), which is representative of transportation in South Carolina. The truck accident and fatality rates that were assumed for transport of hazardous materials were 5.77 accidents per 10 million truck-kilometers traveled and 2.34 fatalities per 100 million truck-kilometers traveled (Saricks and Tompkins 1999; Blower and Matteson 2003), which is representative of the national mean.

A comparison of the identified construction materials (SRNS 2022; LANL 2022) to those used in the 2015 SPD SEIS (DOE 2015) shows that the volumes of the materials in the 2015 SPD SEIS are larger than those identified for this SPDP EIS. Therefore, the impacts of construction in the 2015 SPD SEIS are incorporated by reference here. The 2015 SPD SEIS (DOE 2015) identified hazardous materials for use under the No Action Alternative. The estimated impacts for the hazardous waste transport of these materials are incorporated by reference here.

Therefore, the estimated impacts of construction material transport related to the pit disassembly and conversion project in Table E-13 of the 2015 SPD SEIS (DOE 2015) are considered to be the maximum impacts for the construction material transport impacts in this SPDP EIS. For hazardous waste, the estimate provided in Table E-14 of the 2015 SPD SEIS (DOE 2015) for the pit disassembly and conversion project is also considered to be the maximum impact in this SPDP EIS. This is because the analyses in the 2015 SPD SEIS (DOE 2015) is based on the construction of a new PDP facility at the SRS F-Area, or K-Area, and in this SPDP EIS the PDP facility may use portions of the existing infrastructures, thereby leading to a smaller impact.

Table E-10 summarizes the impacts in terms of total number of kilometers, accidents, and fatalities for all preferred sub-alternatives.

Table E-10. Estimated Impacts of Construction Material and Hazardous Waste Transport

Material	Number of Shipments	Total Distance Traveled (two-way kilometers)	Number of Accidents	Traffic Fatality Risk
Construction Materials	43,000	4,300,000	3.3	0.2
Hazardous Waste	450	1,800,000	1.0	0.04

SEIS = supplemental environmental impact statement; SPD = surplus plutonium disposition; SPDP EIS = Surplus Plutonium Disposition Program Environmental Impact Statement; WIPP = Waste Isolation Pilot Plant.

Source: DOE 2015|Section E.9, Tables E-13, E-14|. The cited values represent the maximum impacts for the 2015 SPD SEIS WIPP Alternative, where surplus plutonium would be diluted and disposed at the WIPP facility. These impacts were used as the maximum impacts for the Preferred Alternative in this SPDP EIS.

E.9 Onsite Transports

Onsite shipment of radioactive materials and wastes would occur at both LANL and SRS. At LANL, the onsite shipments of transuranic (TRU) waste to the TRU waste facility are currently conducted as part of site operations. At SRS, onsite shipment of radioactive materials and wastes would also occur as part of site operations. In general, these shipments would not affect any members of the public because roads between processing areas are closed to the public; therefore, shipments would only affect onsite workers. Shipments of TRU waste, LLW, and MLLW to E-Area at SRS are currently conducted as part of site operations with no discernable impact on noninvolved workers. The transport of radioactive materials and wastes under the alternatives is not expected to significantly increase the risk to these workers.

As shown in this appendix, the risks from incident-free transport of radioactive waste and materials offsite over long distances (hundreds to thousands of kilometers) are very small; therefore, the risks from transporting radioactive waste and materials onsite, where distances would be less than 20 km (12 mi) and sometimes less than 5 km (3 mi), would be even smaller. For National Nuclear Security Administration OST shipments, onsite roads would be closed during transport, further limiting the risk of noninvolved worker exposure. All involved workers (drivers and escorts) are monitored, and the maximum annual dose to a transportation worker would be administratively limited to 2 rem (10 CFR Part 835, DOE-STD-1098-2017 [DOE 2017]). Impacts associated with accidents during onsite transport of radioactive materials and wastes would be less than the impacts assessed for the bounding accident analyses for the plutonium disposition facilities (see Sections 4.1.2.7.2 and 4.1.3.7.2 of the SPDP EIS), as well as the impacts for offsite transports, because of the much shorter distances traveled, onsite security measures, and lower onsite vehicle speeds. The onsite shipments in this SPDP EIS are bounded by those evaluated in Appendix E of the 2015 SPD SEIS (DOE 2015) and are incorporated by reference here.

E.10 Conclusions About Transportation Risks

Based on the results presented in the previous sections, the following conclusions have been reached (see Table E-6 and Table E-7):

- For all alternatives, it is unlikely that the transportation of radioactive material and waste would cause an additional fatality as a result of radiation, either from incident-free operation or postulated transportation accidents.
- The highest risk to the public due to incident-free transportation would be under the Preferred Alternative, under which up to 6,182 truck shipments of radioactive materials and wastes would be transported (see Table E-7).
- The nonradiological accident risks (the potential for fatalities as a direct result of traffic accidents) present greater risks than the radiological accident risks.
- Up to one (0.6) traffic fatality would be expected over the duration of the activities (which exceeds 27 years for all the alternatives) evaluated in this SPDP EIS. For comparison, the average number of traffic fatalities in the United States is about 34,860 per year for the 10-year period 2010 through 2019 (DOT 2021). The incremental increase in risk to the general population from shipments associated with the SPDP would therefore be very small and would not substantially contribute to cumulative impacts.

E.11 Uncertainty and Conservatism in Estimated Impacts

The sequence of analyses performed to generate the estimates of radiological risk for transportation includes the (1) determination of the inventory and characteristics, (2) estimation of shipment requirements, (3) determination of route characteristics, (4) calculation of radiation doses to exposed individuals (including estimation of environmental transport and uptake of radionuclides), and (5) estimation of health effects. Uncertainties are associated with each of these steps. Uncertainties exist in the way that the physical systems being analyzed are represented by the computational models; in the data required to exercise the models (due to measurement errors, sampling errors, natural variability, or unknowns caused simply by the future nature of the actions being analyzed); and in the calculations themselves (e.g., approximate algorithms used in the computer codes).

Section E.14 in the 2015 SPD SEIS (DOE 2015) provides more information about the uncertainty and conservatism in the estimated transportation impacts.

E.12 References

10 CFR Part 71. *Code of Federal Regulations*, Title 10, *Energy*, Part 71, "Packaging and Transportation of Radioactive Material." U.S. Nuclear Regulatory Commission. Available online: https://ecfr.federalregister.gov/current/title-10/chapter-I/part-71 (accessed January 5, 2022).

10 CFR Part 835. *Code of Federal Regulations*, Title 10, *Energy*, Part 835, "Occupational Radiation Protection." U.S. Department of Energy. Available online: https://ecfr.federalregister.gov/current/title-10/chapter-III/part-835 (accessed August 6, 2021).

23 CFR Part 658. *Code of Federal Regulations*, Title 23, *Highways*, Part 658, "Truck Size and Weight, Route Designations - Length, Width, and Weight Limitations." U.S. Department of Transportation. Available online: https://www.ecfr.gov/current/title-23/chapter-I/subchapter-G/part-658 (accessed December 20, 2021).

49 CFR Part 173. *Code of Federal Regulations*, Title 49, *Transportation*, Part 173, "Shippers - General Requirements for Shipments and Packagings." U.S. Department of Transportation. Available online: https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-C/part-173 (accessed December 20, 2021).

49 CFR Part 397. *Code of Federal Regulations*, Title 49, *Transportation*, Part 397, "Transportation of Hazardous Materials; Driving and Parking Rules." U.S. Department of Transportation. Available online: https://www.ecfr.gov/current/title-49/subtitle-B/chapter-III/subchapter-B/part-397 (accessed December 20, 2021).

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APPENDIX F

THE PUBLIC SCOPING PROCESS

In preparing an environmental impact statement (EIS), regulations established by the Council on Environmental Quality (CEQ; 40 CFR 1501.7) and the U.S. Department of Energy (DOE) (10 CFR Part 1021) require that an initial process be conducted to obtain public input on the scope of issues to be addressed in the EIS and to identify significant issues related to the proposed action. This scoping process is the first of several opportunities for public involvement in the EIS process (Figure F-1).

Figure F-1. The EIS Process Showing Opportunities for Public Involvement During Development of the EIS

On December 16, 2020, the National Nuclear Security Administration (NNSA) initiated public involvement in the Surplus Plutonium Disposition Program (SPDP) EIS development process with publication of a Notice of Intent (NOI) in the *Federal Register* (85 FR 81460). The NOI started a public scoping period that initially ran until February 1, 2021 and was extended until February 18, 2021.

Considering the public health concerns at the time, NNSA hosted two virtual public scoping meetings on January 25th and 26th, 2021. These meetings were convened at different times to help accommodate participation by members of the public located across multiple time zones. NNSA used the Cisco WebEx™ platform to host the virtual scoping meetings. People were able to participate in these meetings either by internet connection (providing audio and visual access) or by phone (providing only audio access). A Spanish translator was available during both meetings to facilitate communication for Spanish-speaking attendees.

As shown in Table F-1, public participation in the virtual scoping meetings included 90 people during the first meeting and 70 people during the second meeting.

Table F-1. Participation in the SPDP EIS Public Scoping Meetings

Date	Participation
Monday, January 25, 2021	By internet: 78
	By phone: 12
	Total: 90
Tuesday, January 26, 2021	By internet: 58
	By phone: 12
	Total: 70

The scoping meetings began with a presentation by NNSA providing information about the SPDP, the purpose and need for the proposed action, the preferred alternative, the proposed scope of the EIS, and the anticipated EIS production schedule. The presentation was followed by a public comment period.

Elected officials were given an opportunity to speak first; they were followed by other meeting participants, each of whom was given a maximum of 3 minutes to speak. After everyone had an opportunity to provide a comment, participants who had already spoken were given the opportunity to provide additional comments.

To facilitate public input during the scoping phase, NNSA provided a series of documents on the NNSA National Environmental Policy Act (NEPA) Reading Room website (https://www.energy.gov/nnsa/nnsa-nepa-reading-room). In addition to the NOI, these documents included English and Spanish versions of the following:

- an SPDP EIS fact sheet providing information about the purpose and need for the proposed action, preferred alternative, and anticipated EIS schedule,
- a Questions and Answers document providing general information about the NEPA process, including the scope of the EIS analysis and the purpose of scoping; how to submit scoping comments; and background information about surplus plutonium and activities involved in implementing the dilute and dispose strategy,
- a document providing guidance on how to submit comments, including tips for participating in the virtual public scoping meeting, and
- the slides presented during the virtual public scoping meetings.

Details regarding the dates and times for the virtual scoping meetings, how to connect to the meeting by internet or phone, and how to provide comments during the virtual meetings were posted on the NNSA NEPA Reading Room website. These details also were disseminated via the DOE website, (https://www.energy.gov/nepa/doeeis-0549-surplus-plutonium-disposition-program), existing communication channels (e.g., newsletters, webpage announcements) developed at the Savannah River Site (SRS) and Los Alamos National Laboratory (LANL), and via published advertisements in newspapers providing news coverage for the regions of interest for each of the sites involved in the SPDP.

NNSA provided multiple mechanisms for accepting public scoping comments, including by mail, email, phone message, and verbally during one of the scoping meetings. Individuals who had questions about the NNSA NEPA process were directed to contact the project NEPA Compliance Officer, either by mail or by email.

NNSA received 279 pieces of correspondence during scoping (see Table F-2). A piece of correspondence is defined as a single submittal of comments received by mail, email, or phone. In addition, the transcripts of verbal comments made during the public scoping meetings are each counted as a single piece of correspondence. Email and mail correspondence 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. Accounting for these campaign submittals, duplicate submittals, and non-comment submittals, the 279 pieces of correspondence included 88 unique submittals.

Table F-2. Summary of Public Correspondence Received During Scoping

Correspondence Type	Count[(a)]	Unique
U.S. mail	8	3
Email	268	55
Phone	1	1
January 25 meeting transcript	1	15
January 26 meeting transcript	1	14
Total Correspondence	**279**	**88**

(a) Includes 197 form letters, 8 duplicates, 4 email list requests, and 9 non-comments.

For scoping purposes, a comment is defined as a single statement or opinion concerning a specific topic. Any piece of correspondence may contain many separate comments and most pieces of correspondence contained multiple comments about several topics. All pieces of correspondence received during scoping, including the public meeting transcripts, were systematically reviewed by the EIS preparers to identify individual comments. Comment analysis identified 436 unique comments from the 88 pieces of unique correspondence.

To identify specific issues of public concern, the comments were categorized according to common issues, concerns, and topics. Table F-3 identifies the comment categories and the distribution of unique comments.

Table F-3. Summary of Unique Comments by Category

Category	Count
General Support for the SPDP EIS or NNSA	37
General Opposition to the SPDP EIS or NNSA	12
Purpose and Need for the EIS/Proposed Action	53
No Action Alternative	3
Preferred Alternative	69
Disposal at the WIPP facility	76
Other Alternatives	51
NEPA Process	40
Specific Impact Concerns	56
Cumulative Impacts	9
Outside the Scope of the SPDP	30
Total Number of Unique Comments	**436**

EIS = environmental impact statement; NEPA = National Environmental Policy Act; NNSA = National Nuclear Security Administration; SPDP = Surplus Plutonium Disposition Program; WIPP = Waste Isolation Pilot Plant.

A number of comments expressed general support for the SPDP EIS or NNSA and specifically for the removal of surplus plutonium from South Carolina and/or support for operations at SRS. Most of these comments were submitted as a form letter. Other comments expressed general opposition to the SPDP EIS or NNSA, including general opposition to plutonium disposal at the Waste Isolation Pilot Plant (WIPP) facility. Many of these comments also were submitted as a form letter.

Comments related to the purpose and need for the EIS/proposed action suggested that a programmatic EIS (PEIS) should be prepared to assess surplus plutonium disposition and management of transuranic (TRU) waste and/or that more research is needed to identify and define alternative actions. Comments also requested additional information about the inventory of surplus plutonium and how it is currently managed, the relationships between multiple DOE programs related to surplus plutonium, how downblending plutonium renders it not readily usable in nuclear weapons, and the Plutonium Management and Disposition Agreement (PMDA) and monitoring requirements of the International Atomic Energy Agency (IAEA). Other comments in this category suggested NNSA consider or address the following specific recommendations from the National Academy of Sciences (NAS) 2020 study (NASEM 2020):

- objections to the dilution of surplus plutonium to comply with disposal criteria,
- the risks and effects of failure to successfully implement the proposed action,
- maintaining a supply of surplus plutonium to support nuclear energy research and development,
- the independence of technical experts preparing the EIS, and
- the application of innovative approaches to EIS analyses and project management, including accelerating the SPDP timeline and establishing a diverse and inclusive SPDP staff.

Comments about the No Action Alternative expressed concerns about the acceptability of taking no action and the need for continued safe storage of surplus plutonium until a final disposition action is implemented.

Comments related to the preferred alternative (excluding those that did not explicitly address disposal at the WIPP facility) requested more detailed information about various aspects of the preferred alternative, suggested alternative activities, or suggested NNSA defer identifying a preferred alternative until after the EIS analysis was conducted. Some comments expressed general support for or general opposition to the preferred alternative based on multiple considerations and others expressed support or concerns specifically related to operating conditions, facilities, or activities at SRS, LANL, or Pantex Plant (Pantex).

While a number of comments related to disposal at the WIPP facility expressed general support, most comments expressed opposition based on specific concerns about compliance with the facility's permits, the strain on operational capacity, and violation of the "social contract" with the residents of New Mexico. Some comments requested information about changes to WIPP facility operations and permits required by the proposed action and other anticipated future actions. Other comments expressed specific concerns about the operating conditions, facilities, performance record, and activities at the WIPP facility.

Commenters suggested additional alternatives for consideration by NNSA. These included the following:

- disposal at sites other than the WIPP facility and/or developing a new geological repository
- immobilization
- dilution and storage at SRS
- long-term storage of surplus plutonium at SRS, Pantex, or another secure site
- storage of surplus plutonium onsite or as close as possible to existing sites
- pit conversion facility at Pantex
- direct disposal of pits without disassembly or dilution
- use of surplus plutonium in the Versatile Test Reactor (VTR) or another reactor
- deep borehole disposal

- demilitarization and disposal of pits
- selling surplus plutonium to France.

One commenter specifically recommended that NNSA not consider use of surplus plutonium in the VTR at Idaho National Laboratory as an alternative.

Comments related to the NEPA process expressed concerns about the adequacy of the SPDP EIS process; the need for a PEIS; and the need for improved communications, transparency, and stakeholder engagement. Specific comments requested details regarding Federal and State regulatory approvals; an extension of the scoping period for multiple reasons related to notifications, access, and timing; and that in-person meetings be held. Comments also made specific recommendations regarding the availability of reference documents, publication of scoping comments and responses, confirmation of receipt of comments, and meeting notifications.

Comments related to specific impact concerns requested that additional information and detailed analyses be included in the SPDP EIS on the following topics:

- radiological human health impacts (e.g., need for hazard and risk analysis for all SPDP aspects including accidents, safety, and radiation minimization programs),
- socioeconomic impacts,
- management of wastes generated by the proposed action,
- environmental justice (e.g., the need for detailed analysis at each site, special considerations for engagement with specific communities), and
- transportation (e.g., impacts on workers and public, emergency preparedness, transportation planning).

Comments related to cumulative impacts specifically requested this analysis consider other plutonium projects, impacts of climate change on this project, impacts of expanded activities on cleanup activities at LANL, and other nuclear-related activities in New Mexico.

A number of comments addressed topics considered to be outside the scope of the SPDP EIS. These included comments requesting that a PEIS be prepared for other DOE and NNSA ongoing projects, the cessation of all activities that produce surplus plutonium and produce nuclear weapons, information about the maintenance and design of new nuclear weapons, a permanent disposal site for all nuclear waste, and information about disposal of wastes from other projects or activities. They also included comments regarding the cost and schedule for the SPDP and a preference for wind and solar energy over nuclear energy.

As the comments were reviewed, they were evaluated to determine how they would be incorporated into or otherwise addressed in the EIS analyses. Within each comment category listed in Table F-3, comments raising similar concerns were grouped together, where appropriate. Many comments addressed issues that are discussed in the EIS, in one or more sections. Some comments addressed issues that are relevant to the SPDP EIS, but that are not discussed at length in the EIS. Other comments raised issues that are considered to be outside the scope of this EIS. Table F-4 lists the identified comments by category, along with information about how the comment was considered and/or incorporated into the EIS.

Table F-4. Comments and Responses by Category

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
Comments Concerning the Purpose and Need and Proposed Action			
1.1 NNSA should conduct more research/study and clarify alternatives before proceeding with the EIS.	NNSA should conduct additional research, including engineering and business case analyses, to identify and clearly define its preferred alternative and/or to demonstrate the technical, economic, and other feasibilities of its preferred alternative.	3	As discussed in Section 1.1 of this EIS, since the mid-1990s, NNSA has conducted multiple studies of potential disposition alternatives. The dilute and dispose strategy is based on proven technologies. As discussed in Section 2.1.1, NNSA used the dilute and dispose strategy to disposition surplus plutonium from Rocky Flats and other nuclear sites (Mason 2015; 63 FR 43386) and is currently using this strategy to disposition 13.1 MT of surplus non-pit plutonium. Recently, the NAS completed a multiyear review of the dilute and dispose strategy and concluded that it is technically feasible (NASEM 2020). NNSA has described each step involved in the Preferred Alternative in Section 2.1.1.1. The technical and economic feasibility of the dilute and dispose strategy has been analyzed in multiple reports: • 2014 DOE Plutonium Disposition Working Group Report (DOE 2014), • 2015 *National Defense Authorization Act*--mandated federally funded research and development center independent assessment (National Defense Authorization Act for Fiscal Year 2016), • Independent Red Team Review led by Oak Ridge National Laboratory's Thom Mason (2015), and • Office of Cost Estimating and Program Evaluation Surplus Plutonium Disposition Dilute and Dispose Option Independent Cost Estimate Report (DOE 2018c).

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
1.2 NNSA should prepare a comprehensive PEIS for surplus plutonium disposition and management of TRU waste.	NNSA should prepare a new PEIS to (1) evaluate the potential impacts of all options, including all sites, transportation, and activities involved in the dilute and dispose process, and (2) develop a comprehensive and coordinated plan for surplus plutonium disposition and management of TRU waste, including anticipated future waste management needs. Reasons cited for needing a PEIS included that the 1996 PEIS for Surplus Plutonium Disposal did not consider either the dilution and disposal alternative or geologic disposal at the WIPP facility, the proposed action is clearly national in scale and scope, the total volume of waste being considered for disposal at the WIPP facility has not been defined at a programmatic level, and/or the 2020 NAS study recommended that a PEIS be prepared.	50	In 1996, NNSA prepared a PEIS (DOE 1996b) followed by several NEPA reviews that tiered from the 1996 PEIS to evaluate alternative means of assuring that surplus plutonium can never again be readily used in a nuclear weapon. In the Surplus Plutonium Disposition (SPD) Supplemental EIS (DOE 2015), NNSA analyzed the impacts of the WIPP Alternative (also referred to as “plutonium downblending” or “dilute and dispose”). The SPD Supplemental EIS is tiered from the 1996 PEIS (DOE 1996b). Thus, the analyses found in the PEIS, and subsequent tiered documents, are incorporated by reference in this SPDP EIS, which concentrates on issues specific to the dilute and dispose strategy. Based on CEQ and DOE regulations related to PEISs, tiering an EIS is an appropriate NEPA approach to undertake for the 34 MT of surplus plutonium described in the purpose and need. It should be noted that there is no regulatory difference between the EIS process and the PEIS process. The resources considered in the assessment of impacts and the requirements for public involvement are the same. This SPDP EIS is part of an overall NNSA NEPA strategy for surplus plutonium disposition as discussed in Section 1 and Appendix A of the EIS. This SPDP EIS focuses on specific options for disposition of the 34 MT of surplus plutonium that was previously intended for use in fabricating mixed oxide (MOX) fuel. This SPDP EIS encompasses environmental analysis and impacts of all sites, transportation, and activities involved in the 34 MT dilute and dispose strategy and incorporates prior analyses by reference where appropriate. In regard to WIPP facility disposal, NNSA estimated the volume of contact handled (CH) transuranic (TRU) waste that would

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			result from implementing the Preferred Alternative (see Section 4.2.3.3). However, TRU waste volume estimates, such as those provided in NEPA documents, cannot be used to determine compliance with the WIPP *Land Withdrawal Act* (LWA) total TRU waste disposal volume capacity limit. The TRU waste inventory estimates in the Annual TRU Waste Inventory Report change each year. Compliance with the WIPP LWA disposal capacity limit is demonstrated by proven and audited procedures and processes implemented for the WIPP facility by the Carlsbad Field Office (CBFO). The CBFO monitors and tracks the actual defense-related TRU waste volume emplaced at the WIPP facility to verify compliance with the WIPP LWA. CBFO will take action in accordance with U.S. Environmental Protection Agency (EPA) and New Mexico regulations to verify that compliance is maintained, and the needs of the DOE complex are met.
1.3 NNSA should include and document the relationships between multiple DOE surplus plutonium programs and other programs.	NNSA should include and document the relationships between multiple types of DOE surplus plutonium programs and other programs.	2	NNSA provided a summary of NEPA reviews that are related to the SPDP in Appendix A of this EIS. Related programs are discussed in the EIS as appropriate. This SPDP EIS is focused on disposition of 34 MT of surplus plutonium that had been intended for use in fabricating MOX fuel.
1.4 NNSA should provide a more detailed description of the amount of surplus plutonium that exists in the United States, how it is currently managed, and how it will be dispositioned in the future.	NNSA should provide a more detailed description of the amount of surplus plutonium that exists in the United States, how it is currently managed, and how it will be dispositioned in the future. In addition, it should provide details about the inventory of TRU waste.	1	As discussed in Section 1.1 of this EIS, in 1994 the United States declared 52.5 MT of plutonium to be surplus to the defense needs of the Nation. In 2007, an additional 9 MT was declared surplus. The surplus plutonium is managed by several DOE programs because the plutonium varies in physical and isotopic composition, and some may be appropriate for non-defense uses. Subsets are subject to different policy and legal

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			mandates. These declarations were described in previous EIS documents, which provided the public with an opportunity for review and comment. This SPDP EIS is focused on alternatives for disposition of 34 MT that was previously intended for use in fabricating MOX fuel. There will be an opportunity for public review and comment on this SPDP EIS. Sections 1 and 2 of this SPDP EIS also discuss the 7.1 MT of non-pit surplus plutonium that is the subject of a 2020 Supplement Analysis and Amended Record of Decision (AROD) (85 FR 53350) and is part of the 34 MT. Section 1.1 also discusses the 6 MT that was addressed in the 2016 Record of Decision (ROD) (81 FR 19588) but is not part of the 34 MT. Section 4.2.3.3 provides an estimate of the volume of CH-TRU waste that would result from implementing the Preferred Alternative and provides the WIPP LWA volume capacity limit for TRU waste disposal. Surplus plutonium TRU waste that has been downblended with an adulterant, has been considered for disposal at the WIPP facility in the past. It has been described in several documents that were subject to public review and comment (e.g., a Final Environmental Impact Statement for WIPP, (DOE 1980); WIPP Design Validation Final Report, October 1986 (DOE 1986) also found in Appendix DVR (Design Validation Report), in the 1996 Compliance Certification Application submittal to EPA; DOE 1996a). The WIPP facility has received and safely disposed of surplus plutonium TRU waste in the past from generators/storage sites such as but not limited to Rocky Flats and the SRS.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
1.5 Dilution of surplus plutonium to comply with disposal criteria is inappropriate.	Dilution of surplus plutonium simply to facilitate disposal is not an appropriate action.	14	The WIPP LWA (P.L. 102-579 as amended by P.L. 104-201) and the WIPP Permit allow for disposal of defense TRU and TRU mixed waste in the WIPP facility as long as the waste stream is determined to be TRU waste by Acceptable Knowledge and Non-Destructive Assay. The waste stream must comply with the WIPP Waste Acceptance Criteria (WAC) and the WIPP Permit Waste Analysis Plan by passing a TRU waste certification audit, an inspection by the EPA, and the New Mexico Environment Department (NMED) approval of the final audit. The dilute and dispose strategy was not developed for the purpose of complying with the WIPP WAC. As discussed in Section 1 of this SPDP EIS, the dilute and dispose strategy was selected as the Preferred Alternative because it meets the purpose and need to safely and securely disposition plutonium that is surplus to the Nation's defense needs so that it is not readily usable in a nuclear weapon. It also has been shown to be less expensive and less risky than other approaches discussed in Section 2.2, including the fabrication of MOX fuel. The dilute and dispose strategy is based on existing, proven technology and can be implemented decades sooner than other disposition alternatives discussed in Section 2.2 of this EIS.
1.6 NNSA should explain what it means that downblended plutonium can never be readily used in nuclear weapons.	NNSA should include a discussion of its determination that a disposition alternative will safely and securely disposition the surplus plutonium such that it can never be readily used in nuclear weapons.	1	As discussed in Section 1.3 of this SPDP EIS, DOE's Plutonium Disposition Working Group in its report, Analysis of Surplus Weapon Grade Plutonium Disposition Options (DOE 2014), indicated that although downblending and disposal does not change the isotopic composition of the plutonium, it meets 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 surface in an underground

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			salt formation at the WIPP facility and the chemical barrier is the adulterant.
1.7 NNSA should preserve as much surplus plutonium as possible to support nuclear energy research and development.	NNSA should preserve as much usable plutonium as possible to support important research related to nuclear energy, including advanced reactor design.	1	As described in Section 1.2 of this SPDP EIS, 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 a nuclear weapon. NNSA has committed to disposition of 34 MT of surplus plutonium in accordance with international agreements. Preserving surplus plutonium for research and advanced reactors does not meet NNSA's purpose and need. Without a decision to build a research or advanced reactor, the decision to preserve surplus plutonium for a possible future use is speculative. Planning for disposition of the entire 34 MT is prudent and does not exclude plutonium determined to be surplus in the future from being designated for research or advanced reactor use.
1.8 The EIS should assess the risks and effects of potential SPDP failure.	The EIS should include an evaluation of the risks and effects of potential failure of successful implementation of the proposed action.	1	Section 1.1 summarizes NNSA experience with the dilute and dispose strategy, including the ongoing process of diluting up to 6 MT of non-pit surplus plutonium, as well as the initial dilution of 7.1 MT of non-pit surplus plutonium that was evaluated in the September 2020 Supplement Analysis (DOE 2020d) and associated AROD (85 FR 53350). Section 2.1.1 discusses the use of the dilute and dispose strategy as demonstrated in support of the closure of the Rocky Flats Environmental Technology Center (Mason 2015; 63 FR 43386). The technical and economic feasibility of the dilute and dispose strategy has also been analyzed in multiple reports as referred to in the response to Issue 1.1. DOE's Plutonium Disposition Working Group report, *Analysis of Surplus Weapon Grade Plutonium Disposition Options* (DOE 2014), indicated that the

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			technical aspects of downblending and disposal are well known and in use. NNSA and the DOE sites manage the potential for risk in terms of the use and availability of DOE facilities and capabilities to process up to 34 MT of surplus pit and non-pit plutonium. Risk management is an integral part of DOE's project management process, DOE Order 413.3B (2021).
1.9 NNSA should involve independent technical experts in the preparation of this EIS.	NNSA should involve independent technical experts in the preparation of this EIS.	37	CEQ Regulations (40 CFR 1502.1) state that the primary purpose of an environmental impact statement is to "serve as an action-forcing device to insure that the policies and goals defined in [NEPA] are infused into the ongoing programs and actions of the Federal Government". Further, the regulations in 40 CFR 1502.6 indicate that agencies should use an interdisciplinary approach, which was used on this SPDP EIS, but an independent evaluation is not required. Section 6 provides a list of organizations and individuals that contributed to the preparation of this EIS. Staff involved in preparing this EIS include specialists that have technical expertise in a broad cross-section of environmental sciences, economics, and other social sciences. This includes staff at NNSA as well as at Pacific Northwest National Laboratory and Leidos.
1.10 The EIS should evaluate innovative approaches to all management aspects of the project.	The EIS should evaluate innovative approaches to project management (financing, contracting, reporting, staffing), stakeholder communications and collaboration, and workforce development (from K-12 through higher education).	1	NNSA continues to optimize its management of the SPDP and preparation of this EIS and will continue to implement innovative approaches to stakeholder engagement (e.g., the virtual scoping meetings in response to the COVID-19 pandemic). However, an analysis of management innovation is not related to the purpose of this EIS. NNSA sites have traditionally supported local schools in the area related to science, technology, engineering, and math

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			(STEM) education and some partner with local community colleges and technical schools to provide specific programs and apprenticeships addressing the future nuclear workforce needs. However, STEM education is not related to the purpose of this SPDP EIS.
1.11 The EIS should evaluate NAS recommendations regarding safeguards and security, transportation, and regulatory compliance.	The EIS should evaluate NAS recommendations regarding safeguards and security, transportation, and regulatory compliance.	3	NNSA has reviewed and considered the NAS recommendations regarding safeguards, security, transportation, and regulatory compliance. This EIS addresses transportation in Section 4.1.6 and Appendix E. Regulatory Compliance is addressed in Section 5. Safeguards and security are the subjects of other reports that are separate from this EIS and because of classification requirements are not accessible to the public.
1.12 NNSA should provide detailed information about the PMDA with Russia and IAEA monitoring.	NNSA should provide detailed information about the PMDA with Russia and its current status. IAEA inspection and safeguards are an important part of the PMDA requirements to provide international confidence that waste is properly disposed and must be addressed in the EIS.	14	Section 1.1 discusses 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, or PMDA) that was signed in 2000 (United States of America and Russian Federation 2000). Despite Russia's purported unilateral suspension of the PMDA, 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). Discussions with the IAEA will occur separately from the analysis of environmental impacts in this EIS.
1.13 NNSA should examine how it can accelerate the SPDP timeline.	NNSA should examine how it can accelerate the SPDP timeline to expedite surplus plutonium disposition.	1	NNSA is in agreement with the comment to dispose of the surplus plutonium in a timely manner and NNSA has undertaken multiple efforts to accelerate the SPDP timeline including amending the 2016 ROD (81 FR 19588) for the 6 MT

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			evaluated in the SPD Supplemental EIS to include preparation of an additional 7.1 MT of non-pit surplus plutonium for disposal as CH-TRU waste at the WIPP facility (85 FR 53350). In addition, DOE's Plutonium Disposition Working Group report, Analysis of Surplus Weapon Grade Plutonium Disposition Options (DOE 2014), indicated that additional gloveboxes could be installed to increase the plutonium oxide dilution throughput. The SPD Supplemental EIS (DOE 2015) addressed and evaluated the installation of gloveboxes in K-Area, as explained in Section 2.1.1.2.3 of this EIS. These gloveboxes are currently being installed in K-Area Complex at SRS as part of the SPDP.
1.14 NNSA should be intentional in forming a diverse and inclusive staff to support all aspects of the program.	DOE and SRS should be intentional in forming a diverse and inclusive staff to support all aspects of the program so that all communities will reap the benefits from forming a diverse and inclusive team.	1	DOE, SRS, and NNSA follow the hiring guidelines set by the Office of Management and Budget for the Federal government, which address diverse and inclusive employment (OPM 2021). NNSA will optimize its management of the SPDP.
Comments Concerning the Preferred Alternative			
2.1 More detailed information is needed regarding the preferred alternative.	NNSA should provide more specific information about activities that will occur under the preferred alternative. This should include details about the nature of all materials used in the dilution process (including the adulterant) and generated wastes; specific processes that will be undertaken; numbers of shipments, specific facilities at each site that will be used, modified, and/or constructed; hazards and risks associated with processes or materials; compatibility of materials; stability of the downblended plutonium, its mobility in subsurface brines, and potential to generate gas	19	Section 2.1.1 provides information about dilute and dispose activities that have already been undertaken. Section 2.1 provides information about the nature of the adulterant that will be used in the dilution process. 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 Safeguards and Security requirements (NNSA 2020). Because of classification requirements, further description of the adulterant is not available to the public.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
	in the repository; and potential impacts from accidental releases, and monitoring procedures. NNSA should include information describing dilute and dispose activities already undertaken.		Section 4 provides information about generated wastes; numbers of shipments; specific facilities; and hazards and risks to the environment including from accidental releases. Appendix B describes the specific facilities that are used for the Preferred Alternative and sub-alternatives. Documents providing details related to environmental impacts including impacts from accidental releases at the WIPP facility are listed in Appendix A.
2.2 There is opposition to the preferred alternative due to concerns about safety, transportation, and other factors.	There is opposition to the preferred alternative due to concerns about safety, transportation, and other factors.	5	NNSA acknowledges receipt of these comments. Safety is discussed in various sections of this EIS primarily in Sections 3.2.7 and 3.3.7, although the emphasis and purpose of this EIS is to discuss environmental impacts. Activities that are conducted at facilities operated by DOE must adhere to regulations found in 10 CFR Part 830 Nuclear Safety Management and 10 CFR Part 835 Occupational Radiation Protection, and transportation safety must adhere to regulations found in 10 CFR Part 71. DOE follows these requirements for all activities that make up the dilute and dispose strategy.
2.3 There is general support for the preferred alternative.	NNSA's preferred dilute and dispose alternative, including disposal at the WIPP facility, is a safe and effective option for the disposition of surplus plutonium and it will meet the NNSA commitment to remove surplus plutonium from South Carolina.	178	NNSA acknowledges receipt of these comments. These comments did not directly result in modifications to the analyses performed in this EIS.
2.4 There is support for deep geologic disposal of surplus plutonium as a safe and irreversible option.	The preferred alternative resulting in deep geologic disposal of surplus plutonium represents a safe, largely irreversible option that renders future diversion or recovery of the plutonium highly unlikely.	1	NNSA acknowledges receipt of this comment. This comment did not directly result in modifications to the analyses performed in this EIS. A performance assessment for the WIPP facility is discussed in Section 4.1.5.2.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
2.5 NNSA should delay identifying a preferred alternative until after the evaluation for the EIS.	NNSA should not identify a preferred alternative until the EIS analysis has been conducted.	1	In accordance with applicable regulations and guidance, it is appropriate for an agency to identify a preferred alternative that it believes would fulfill its statutory mission and responsibilities considering economic, environmental, technical, and other factors. Doing so informs the public of the agency's intent. In a statement about termination of the MOX program, the Secretary of Energy indicated that dilute and dispose was the Department's preferred alternative for disposition of the 34 MT (DOE 2018b).
2.6 The EIS should evaluate the impacts of an interruption of the SPDP after it has started.	NNSA should evaluate the potential impacts of an interruption of the SPDP after it has started.	1	Appendix B of the EIS indicates that the storage capacity for plutonium is limited at LANL and SRS facilities. If a significant interruption related to operational issues at LANL, SRS, or the WIPP facility or from legal challenges occurs, then shipping to the sites may be reduced or stopped and activities would be reduced or stopped until the issue or challenges were mitigated. Then process activities including pit disassembly and processing, non-pit metal processing, dilution, characterization and packaging, and disposal would continue. There is flexibility in the schedule, and the throughput could be increased on a temporary basis as needed, as discussed in Sections 4.0 and 4.7.
2.7 There are specific concerns about operating conditions, facilities, and activities to be conducted at SRS.	There are specific concerns about operating conditions, facilities, and activities to be conducted at SRS, including the age and quality of the buildings, the use of 24/7 operations and potential for additional space that could be used in the Savannah River Plutonium Processing Facility.	3	Appendix B of the EIS includes information related to the age and condition of the facilities being used as well as the potential for 24/7 operations. Section 4.2.3 discusses past, present, and reasonably foreseeable future activities at SRS that use the same resources. Sections 2.1.1.2.3 and B.1.3.1 address the potential use of space in Building 226-F.
2.8 There are specific concerns about operating conditions, facilities,	There are specific concerns about operating conditions, facilities, performance record, and activities to be conducted at LANL, including the	5	Appendix B of the EIS includes information related to the age and condition of the facilities and whether they meet seismic standards at SRS. Section 4.2.3 discusses past, present, and

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
performance record, and activities to be conducted at LANL.	age and quality of the buildings including Plutonium Facility 4, the cleanup mission, ability to meet seismic standards, and conflicts between the plutonium oxidation mission and the pit production mission.		reasonably foreseeable future activities at LANL that could impact the same resources. Section 4.2.2 discusses the "Footprint Reduction" program to shut down and remove aging facilities.
2.9 There are specific concerns about operating conditions, facilities, and activities to be conducted at Pantex.	There are specific concerns about operating conditions, facilities, and activities to be conducted at Pantex.	2	The current operating conditions at Pantex are covered by the Pantex Supplement Analysis (SA; DOE 2018a). The activities related to the Preferred and No Action Alternatives are described in Section 2 of this SPDP EIS.
2.10 NNSA should consider consolidation of all pit-processing activities at Pantex.	Under the preferred alternative, NNSA should consider consolidation of all pit-processing activities at Pantex despite potential political considerations.	1	Section 2.2 describes the consolidation of all pit-processing activities at Pantex and provides the reasons why this is not considered further in this EIS.
2.11 There are concerns about the preferred alternative due to the risks of transporting material.	Cross-country transportation of surplus plutonium that would occur under the preferred alternative presents risk in terms of increased radiation exposures of populations along transportation routes, potential accidents, and potential security breaches.	16	Sections 2.1.1.2.6 and 2.1.2.5 describe the transportation routes associated with the Preferred Alternative and the No Action Alternative, respectively. Section 4.1.6 presents the results of the impact assessment of these transportation activities including accidents that could occur during transportation. Appendix E presents the details of the evaluation of human health effects related to transportation including accidents. Sections 4.1.2.7.4 and 4.1.3.7.4 discusses the evaluation of transportation-related intentional destructive acts.
2.12 DOE should dilute samples of depleted uranium with adulterant to test its effectiveness.	DOE should dilute samples of depleted uranium with adulterant to have independent laboratories test its effectiveness.	1	Depleted uranium does not have the same characteristics as plutonium and the results would not be meaningful to this analysis. The effectiveness of the adulterant has been tested by multiple DOE experts.
2.13 NNSA should discuss how the preferred alternative meets the	NNSA should address how the preferred alternative meets the required "spent fuel	4	Plutonium is not nuclear spent fuel. DOE's Plutonium Disposition Working Group in its report, Analysis of Surplus Weapon Grade Plutonium Disposition Options (DOE 2014),

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required "spent fuel standard."	standard" and conduct a proliferation risk assessment.		indicated that downblending does not meet the "spent fuel standard" because it only meets two of the three criteria that standard is based on. (The spent fuel standard is a general metric used to compare recoverability of usable plutonium following disposition. It compares the accessibility and attractiveness of recovering usable plutonium to the plutonium that exists in spent nuclear fuel from commercial power reactors (NASEM 2020)). The dilute and dispose strategy does not change the isotopic composition of the plutonium as would occur during the irradiation of plutonium as MOX fuel, but it does meet two of the attributes for minimizing accessibility through physical and chemical barriers. The physical barrier is its placement 2,150 ft below the surface in an underground salt formation at the WIPP facility and the chemical barrier is the adulterant.
Comments Concerning Disposal at the WIPP facility			
3.1 There is general support for disposal of surplus plutonium at the WIPP facility.	There is general support for disposal of surplus plutonium at the WIPP facility.	5	NNSA acknowledges receipt of these comments. Because these comments are not related to the purpose of this SPDP EIS, they did not directly result in modifications to the analyses discussed in this EIS.
3.2 WIPP facility disposal would be out of compliance and violates the social contract with New Mexico.	Disposal of this amount of surplus plutonium at the WIPP facility will be out of compliance with the facility's permits, exceed volume and timeline agreements, strain operational capacity, violate the "social contract" with the residents of New Mexico, and have a negative impact on the State.	62	Section 4.1.5 of this EIS discusses the WIPP facility site, the impacts of the Preferred Alternative and the No Action Alternative on the site, NNSA's analysis of impacts from operation of the WIPP facility and associated NEPA compliance documents. DOE would follow all requirements for the disposal of TRU waste at the WIPP facility. Surplus plutonium TRU waste that has been downblended with an adulterant has been considered for disposal at the WIPP facility in the past and has been described in several documents that were subject to public review and comment

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			(e.g., a final EIS for WIPP; DOE 1980); WIPP Design Validation Final Report, October 1986 (DOE 1986); and in Appendix DVR, (Design Validation Report) in the 1996 Compliance Certification Application submittal to EPA (DOE 1996a). The WIPP facility has received and safely disposed of surplus plutonium TRU waste in the past from generators/storage sites including but not limited to Rocky Flats and SRS. TRU waste volume estimates, such as those provided in NEPA documents, cannot be used to determine compliance with the WIPP LWA total TRU waste disposal volume capacity limit. Compliance with the WIPP LWA disposal capacity limit is demonstrated by proven and audited procedures and processes implemented for the WIPP facility by the CBFO. The CBFO monitors and tracks the actual defense-related TRU waste volume emplaced at the WIPP facility to verify compliance with the WIPP LWA total TRU waste disposal capacity limit. CBFO will take action in accordance with the EPA and New Mexico regulations to verify compliance is maintained and the needs of the DOE complex are met. The WIPP LWA (P.L. 102-579 as amended by P.L. 104-201) and the WIPP Resource Conservation and Recovery Act Permit allow for disposal of defense TRU and TRU mixed waste in the WIPP facility as long as the waste stream is determined to be TRU waste by Acceptable Knowledge and Non-Destructive Assay. The waste stream must comply with the WIPP WAC and the WIPP Permit Waste Analysis Plan by passing a TRU waste certification audit, an inspection by EPA, and NMED approval of the final audit.

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			CBFO conducts ongoing discussions with New Mexico stakeholders and the public as part of its efforts to continue a transparent outreach program. This outreach includes members of the public, local stakeholders, the State regulator, and State and local officials. In particular, CBFO implements a thorough public pre-submittal engagement process to obtain public and stakeholder input before formal submittal of Class 2 and Class 3 Permit Modification Requests to the New Mexico Environment Department.
3.3 There are specific concerns about operating conditions, facilities, performance record, and activities at the WIPP facility.	There are specific concerns about operating conditions, facilities, performance record, and activities at the WIPP facility including DOE's ability to monitor wastes in the WIPP facility, past accidents and safety lapses, work on the new filtration building and opposition to expanding the WIPP facility indefinitely.	3	Section 4.1.5 provides limited information about operating conditions, facilities, and activities conducted at the WIPP facility. The WIPP facility environmental and operating conditions, improvements, and enhancements in performance, and conduct of operations were thoroughly discussed in the *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE 2016) and current operating conditions are discussed in the *Supplemental Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE 2021). In addition, the new filter building, and utility shaft were evaluated and discussed in the *Supplement Analysis for the New Permanent Ventilation System* (DOE 2017).
3.4 More information is needed about WIPP facility operations and permit changes required by this proposed action and future anticipated actions.	NNSA should clarify the amount of surplus plutonium that it proposes to dispose of in the WIPP facility as part of this proposed action and future anticipated actions; evaluate impacts on the WIPP facility in terms of operational changes, regulatory changes, volume/capacity constraints, operational timeline, associated hazards/risks, and competing demands from other DOE programs; and verify that future	23	The 34 MT of surplus plutonium that NNSA proposes to dispose of in the WIPP facility is discussed in Section 4.1.5 of this EIS. This 34 MT includes the plutonium oxide blended with adulterant and is considered separately from the CH-TRU job control waste generated during the process. Section 4.1.5.2 describes the long-term performance assessment for the WIPP facility. No laws would need to be changed nor does NNSA anticipate the WIPP Permit would need to change to dispose of 34 MT of

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
	compliance and certification of the WIPP facility is attainable.		surplus plutonium CH-TRU waste at the WIPP facility. TRU waste volume estimates, such as those provided in NEPA documents, cannot be used to determine compliance with the WIPP LWA total TRU waste disposal volume capacity limit. Compliance with the WIPP LWA (P.L. 102-579 as amended by P.L. 104-201) disposal capacity limit is determined by proven and audited procedures and processes implemented for the WIPP facility by the CBFO. The CBFO monitors and tracks the actual defense-related TRU waste volume emplaced at the WIPP facility to verify compliance with the WIPP LWA and will take action as appropriate in a timely and appropriate manner to verify compliance is maintained and the needs of the DOE complex are met. DOE has regular discussions and meetings with NMED about regulatory issues, including: • annual updates to the TRU waste inventory estimates, • DOE's plans for surplus plutonium TRU waste, and • future planned Permit Modification Requests to keep the WIPP Permit current with changes and upgrades to the WIPP facility infrastructure and changes to hazardous waste disposal units. Diluted surplus plutonium TRU waste has already been disposed of at the WIPP facility by verifying that the TRU waste stream complies with the DOE, U.S. Nuclear Regulatory Commission (NRC), EPA, and NMED characterization, certification, and packaging regulatory criteria and procedures and the WIPP WAC.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
Comments Concerning the No Action Alternative			
4.1 There is no true No Action Alternative that does not impose too big a burden on South Carolina.	The No Action Alternative is not viable, in part because it imposes too big a burden on South Carolina.	2	The No Action Alternative is described in Section 2.1.2 of the EIS. It includes continued management of up to 34 MT of surplus plutonium. It also includes disposition of 7.1 MT of non-pit surplus plutonium as previously announced in NNSA's 2020 AROD (85 FR 53350). The decision in the AROD will accelerate the removal of defense plutonium from the State of South Carolina. On August 31, 2020, DOE and the State of South Carolina signed a settlement agreement with respect to the State's lawsuit and the ongoing removal of 9.5 MT of plutonium from the State. The settlement agreement provides an upfront payment of $600 million to the State of South Carolina and allows DOE more time (through 2037) to safely remove the plutonium from the State without the threat of lawsuits (DOE 2020c).
4.2 NNSA needs to safely store surplus plutonium under the No Action Alternative.	NNSA needs to safely store surplus plutonium at all sites until a final disposition action is implemented.	1	As discussed in response to Issue 4.1 above, the No Action Alternative is described in Section 2.1.2 of this EIS. NNSA will continue to rely on existing approved storage facilities and locations and surveillance programs to for safe storage of surplus plutonium. No new facilities or locations are anticipated for storage of surplus plutonium in the No Action Alternative.
Comments Concerning Other Alternatives			
5.1 Various additional alternatives were suggested.	NNSA should consider additional alternatives. Specific suggestions include: (1) Disposal at sites other than the WIPP facility and/or developing a new geological repository (2) Immobilization	63	Section 2.2 discusses alternatives that were considered but dismissed from detailed study. These include the commenter's numbered suggestions, as listed in the summary column: (1) Disposal at sites other than the WIPP facility and/or developing a new geological repository, (2) Immobilization,

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	(3) Dilution and storage at SRS (4) Long-term storage of surplus plutonium at SRS, Pantex, or another secure site (5) Storage of surplus plutonium onsite or as close as possible to existing sites (6) Pit conversion facility at Pantex (7) Direct disposal of pits without disassembly or dilution (8) Use of surplus plutonium in the VTR or other reactors (9) Deep borehole disposal (10) Demilitarization and disposal of pits (11) Selling surplus plutonium to France.		(6) Pit conversion facility at Pantex, (7) Direct disposal of pits without disassembly or dilution, (8) Use in the VTR or other reactors, (9) Deep borehole disposal, (10) Demilitarization and disposal of pits, and (11) Selling surplus plutonium to France. The continued storage of surplus plutonium at Pantex (4) is a part of the No Action Alternative, as described in Sections 2.1.2.1 and 4.1.1. For suggestions (3), (4) and (5), continued storage of surplus plutonium at SRS (including in a diluted form), Pantex, or other secure sites does not meet the intent of the purpose and need 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, as discussed in Section 1.2.
5.2 NNSA should not consider use of the surplus plutonium in the VTR as an alternative.	NNSA should not consider use of the surplus plutonium in the VTR as an alternative.	1	Section 2.2 discusses alternatives that were considered but dismissed from detailed study, including the alternative of using surplus plutonium in the VTR or other reactors. DOE has recently considered the use of surplus plutonium as feedstock for preparation of fuel for the proposed VTR. However, the VTR is in the early stages of design, and the location for and details about what facilities, activities, and processes would be required to make surplus plutonium available as a VTR feedstock are not currently known. Therefore, an alternative that considers VTR as a potential disposition path is premature at this time. If DOE/NNSA 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

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			changes to allow use of surplus plutonium as feedstock for VTR fuel production would be the subject of future NEPA analysis.
Comments Concerning the NEPA Process			
6.1 The NEPA process is inadequate and should not take place until a comprehensive PEIS is developed.	There is no adequate technical or legal basis for developing the SPDP EIS until a comprehensive PEIS is developed.	17	In 1996, NNSA prepared a PEIS followed by several NEPA reviews that tiered from the 1996 PEIS to evaluate alternative means of assuring that surplus plutonium can never again be readily used in a nuclear weapon. In the SPD Supplemental EIS (DOE 2015), NNSA analyzed the impacts of the WIPP Alternative (also referred to as “plutonium downblending” or “dilute and dispose”). The SPD Supplemental EIS is tiered from the 1996 PEIS (DOE 1996b). Thus, the analyses found in the PEIS, and subsequent tiered documents, are incorporated by reference in this SPDP EIS, which concentrates on issues specific to the dilute and dispose strategy. Based on CEQ and DOE regulations related to PEISs, tiering an EIS is an appropriate NEPA approach to undertake for the 34 MT of surplus plutonium described in the purpose and need. It should be noted that there is no regulatory difference between the EIS process and the PEIS process. The resources considered in the assessment of impacts, and the requirements for public involvement are the same.
6.2 The EIS should include details related to required Federal and State regulatory approvals.	The EIS should include detail for required Federal and State regulatory approvals.	1	Section 5 of this EIS identifies the statutory requirements and environmental standards that are applicable to the activities for the disposition of surplus plutonium. All applicable Federal, State, and local laws, regulations, and other requirements are included.
6.3 Reference documents should be posted online or be included as part of the public record.	All documents referenced in this EIS and in the Federal Register Notice for the project should be posted online.	3	In accordance with CEQ’s direction to make references available (40 CFR 1501.12), Section 8 provides citations for all references used in this EIS and includes URLs for references that are available on the internet at the time of publication.

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			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 upon request to NNSA if 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.
6.4 All scoping comments and responses should be published in the Draft SPDP EIS.	All scoping comments and responses should be published in the Draft EIS.	1	CEQ regulations in 40 CFR 1502.19 indicate that scoping "comments (or summaries thereof where the responses has been exceptionally voluminous) received during the scoping process that identified alternatives, information and analyses for the agency's consideration" should be included in an appendix. Section 1.6 and this appendix (Appendix F) provide summaries of the scoping comments and NNSA responses.
6.5 NNSA should improve communications, transparency, and stakeholder engagement.	NNSA should continue to encourage collaboration and engagement with the public, affected States, Federal agencies, and Congressional delegations regarding the scope of surplus plutonium disposition.	38	Section 1.6 and this appendix (Appendix F) provide a description of the scoping activities conducted for the SPDP EIS. NNSA will continue providing opportunities for interested parties to provide input about the SPDP EIS. In particular, the release of this Draft EIS initiates a public review phase. For the public hearings on the Draft SPDP EIS, NNSA is conducting both in-person and virtual meetings to provide multiple ways of attending meetings to encourage the maximum amount of participation and accessibility.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
6.6 NNSA should provide confirmation of the receipt of all public comments and their preservation for the NEPA record.	NNSA should provide confirmation of the receipt of all public comments and the preservation of all comments received for the NEPA record. Important comments received after the close of the comment period should be considered when developing the EIS.	3	CEQ guidance in 40 CFR Part 1502 does not require confirmation of receipt of public comments. The comments received from the public during scoping have been retained, reviewed, and responded to in this appendix (Appendix F). Comments were considered during the development of this EIS and will be retained in the Administrative Record. The comment period originally ended on February 1, 2021 but was extended to February 18, 2021 (SRS 2021). Comments were considered beyond the end date of the extended scoping period to the extent practicable.
6.7 Public meetings should be held in-person in affected locations.	Public meetings should be held in-person in affected localities.	2	In light of public health concerns, NNSA hosted internet- and telephone-based virtual public scoping meetings in January 2021 in place of in-person meetings. For the public hearings on the Draft SPDP EIS, NNSA is conducting both in-person and virtual meetings to provide multiple ways of attending meetings to encourage the maximum amount of participation and accessibility.
6.8 NNSA should provide notices for public meetings in the *Federal Register*.	NNSA should provide notice of public meetings as early as possible, both in the *Federal Register* and elsewhere.	2	NNSA provided notice of the scoping meetings and will provide notice of any future meetings in accordance with established guidelines/requirements set forth in the NEPA regulations. As required by DOE's NEPA implementation procedures (10 CFR 1021.313(b)) NNSA will announce the public hearing at least 15 days in advance.
6.9 The scoping comment period should be extended.	The scoping comment period was inadequate and/or should be extended for various reasons.	9	The DOE NEPA implementation procedures (10 CFR Part 1021) require a 30-day scoping period for EISs; however, NNSA initially established a 45-day scoping period for this EIS process to give the public more time to comment during this unprecedented pandemic. The scoping period was extended an additional 15 days for a total of 60 days. In addition, comments submitted after the extension are considered to the extent practicable.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
General Comments in Support of the SPDP EIS or NNSA			
7.1 There is general support for the SPDP and for removal of surplus plutonium from South Carolina.	General support for the SPDP and support for the removal of surplus plutonium from South Carolina.	12	NNSA acknowledges receipt of these comments. Because these comments are not related to the purpose of this SPDP EIS, they did not directly result in modifications to the analyses in this EIS.
7.2 There is general support for the SRS and its operations.	General support expressed for the staff and operations of the SRS.	185	NNSA acknowledges receipt of these comments. Because these comments are not related to the purpose of this SPDP EIS, they did not directly result in modifications to the analyses in this EIS.
General Comments in Opposition to the SPDP EIS or NNSA			
8.1 There is general opposition to the SPDP, the EIS, or the NNSA and changes in direction of this program over time.	General opposition to the SPDP, opposition to proceeding with the SPDP EIS, or opposition to NNSA and the changes in direction of this program over time.	41	NNSA acknowledges receipt of these comments. Because these comments are not related to the purpose of this SPDP EIS, they did not directly result in modifications to the analyses in this EIS.
8.2 There is general opposition to the ultimate disposal of plutonium at the WIPP facility.	There is opposition to the SPDP based on the plan for ultimate disposal at the WIPP facility.	26	NNSA acknowledges receipt of these comments. Because these comments are not related to the purpose of this SPDP EIS, they did not directly result in modifications to the analyses in this EIS.
Comments Not Related to the Purpose of this SPDP EIS			
9.1 PEISs are needed to assess nationwide impacts related to pit production and TRU waste disposal.	PEISs are needed, instead of site-specific NEPA impacts at LANL and SRS, to evaluate nationwide pit production impacts including waste disposal at the WIPP facility.	2	An analysis of the impacts of pit production activities is not related to the purpose of this EIS. Three separate NEPA documents were developed to address pit production including an EIS for activities at SRS (DOE 2020a), a final SA for the Complex Transformation Supplemental PEIS at LANL (DOE 2019), and the final SA to the 2008 site-wide EIS for Continued Operations of LANL (DOE 2020b).

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			As discussed in the response to Issue 1.2, TRU waste volume estimates, such as those provided in NEPA documents, cannot be used to determine compliance with the WIPP LWA (P.L. 102-579 as amended by P.L., 104-201) total TRU waste disposal volume capacity limit. Determining compliance with the WIPP LWA (P.L. 102-579 as amended by P.L., 104-201) disposal capacity limit is determined by proven and audited procedures and processes implemented for the WIPP facility by the CBFO. The CBFO monitors and tracks the actual defense-related TRU waste volume emplaced at the WIPP facility to comply with the WIPP LWA and will take action as appropriate in a timely and appropriate manner so that compliance is maintained, and the needs of the DOE complex are met.
9.2 The United States must permanently cease all activities that produce surplus plutonium and must stop making nuclear weapons.	Stop making surplus plutonium and nuclear weapons.	6	Decisions regarding the production of nuclear weapons, and the related production of plutonium are outside of the scope of this EIS. Future declarations of additional quantities of plutonium that are surplus to the defense needs are speculative and are not related to the purpose of this EIS.
9.3 NNSA should explain how plutonium disposition affects the maintenance and design of new weapons.	NNSA should discuss the impact that plutonium disposition has on the maintenance of current weapon stockpiles and the design of future weapons.	1	The plutonium proposed to be dispositioned has been determined to be surplus to defense needs and therefore there is no impact to the current stockpile and the design of future weapons.
9.4 A permanent disposal site is needed for all nuclear waste.	Actions are needed to dispose of all nuclear waste from uranium mines, nuclear power plants, and nuclear weapons, and the cost of future waste management should always be factored in.	3	NNSA understands concerns about other nuclear wastes, but the scope of this EIS is limited to disposition of surplus plutonium that is managed by NNSA. Cost considerations are beyond the scope of this EIS but are analyzed by the decision-makers when making determinations. For example, waste management costs from activities specific to SPDP are a part of the overall cost of the plutonium disposition project.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
9.5 NNSA should describe any plans to dispose of waste from the Holtec interim storage facility at the WIPP facility.	A description should be included in the EIS related to any plans to take interim waste from Holtec and store it at the WIPP facility.	1	The purpose of the Holtec facility is to provide interim storage of spent nuclear fuel from domestic commercial nuclear power reactors, whereas the purpose of the WIPP facility is to dispose of TRU waste generated by DOE programs. The spent fuel that is proposed for storage at the Holtec facility does not meet the criteria for waste that is acceptable at the WIPP facility. The LWA (P.L. 102-579 as amended by P.L., 104-201) prohibits the disposal of spent fuel at the WIPP facility. The Holtec facility is not related to the disposal of surplus weapons-grade plutonium and therefore is not analyzed or described in this EIS. However, it is mentioned in Section 4.2.2 as being in the vicinity of the WIPP facility site.
9.6 Waste from the West Valley Demonstration Project should have been disposed at the WIPP facility.	There are no plans for disposing of waste from the West Valley site; it was supposed to be shipped to the WIPP facility per the 2003 EIS, but that never happened.	1	The activities at and shipment of material from the West Valley site are not related to the purpose of this SPDP EIS. However, the LWA (P.L. 102-579 as amended by P.L. 104-201) specifies that the WIPP facility can only accept waste from defense-related activities and the West Valley waste is not from defense-related activities.
9.7 Wind and solar energy are better options than nuclear energy.	Wind and solar energy are more cost-effective power sources than nuclear and do not produce nuclear waste.	1	This SPDP EIS considers disposition of surplus plutonium and does not discuss energy production. The analysis of different energy sources is not related to the purpose of this SPDP EIS.
9.8 NNSA should explain the high cost of the MOX program and compare it to the cost of the oxidation process.	NNSA should provide information about the costs of the MOX program in comparison to the dilute and dispose strategy.	3	Section 1.1 provides a brief history of the MOX program. Congress directed DOE to prepare a lifecycle cost estimate for disposal of surplus plutonium using the dilute and dispose strategy (GAO 2017). The completed cost estimate indicated that the estimate-to-complete lifecycle cost of the dilute and dispose strategy would be substantially lower than the cost of the remainder of the MOX project (DOE 2018c). In a letter dated May 10, 2018, the Secretary of Energy certified "that the remaining lifecycle cost for the Dilute and Dispose approach

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
			will be less than approximately half of the estimated remaining lifecycle cost of the MOX fuel program" (DOE 2018b). Cost and schedule are among the factors that decision-makers may consider when selecting an alternative for implementation, but they would not have any bearing on the analysis of potential environmental impacts and therefore are not discussed in this SPDP EIS.
9.9 NNSA must reevaluate its cost and schedule estimates for all alternatives.	NNSA must provide more information and reevaluate its cost and schedule estimates for all alternatives, using Government Accounting Office (GAO)-approved procedures, and conduct a comprehensive cost/benefit analysis prior to finalizing any NEPA reviews. NNSA should look for opportunities to expedite the timeline.	18	Cost and schedule are among the factors that decision-makers may consider when selecting an alternative for implementation, but they would not have a bearing on the analysis of potential environmental impacts and therefore are not discussed in this SPDP EIS.
Comments Concerning Radiological Health			
10.1 A hazard and risk analysis should be performed for all aspects of the SPDP.	A hazard and risk analysis for plutonium stabilization, downblending with adulterant, transportation, and disposal at the WIPP facility should be performed.	3	The human health consequences of accidents reported in the following sections of this EIS are based on hazard and risk analyses: *Site-Specific & Transportation Impacts* • Section 4.1.2.7 (LANL) • Section 4.1.3.7 (SRS) • Section 4.1.6.3.2 (Transportation). Section 4.1.5 of the EIS refers to the WIPP Final Supplemental Environmental Impact Statement (DOE 1997) for the human health consequences of accidents. Section 4.1.5.2 addresses the long-term repository performance and health consequences of disposal of CH-TRU waste at the WIPP facility.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
10.2 Health impacts from adulterant and plutonium should be identified.	Health impacts from adulterant and plutonium, including any differences from various plutonium valence phases, should be identified.	4	The following sections of this EIS discuss the human health impacts from plutonium: *Site-Specific & Transportation Impacts* • Section 4.1.2.7 (LANL) • Section 4.1.3.7 (SRS) • Section 4.1.6.3 (Transportation). *Cumulative Impacts* • Section 4.2.3.1.2 (LANL) • Section 4.2.3.2.2 (SRS) • Section 4.2.3.4 (Transportation). The adulterant consists of nonhazardous inorganic materials (NNSA 2022). Therefore, no health impacts are anticipated.
10.3 Health impacts of accidents should be addressed.	Impacts of accidents (e.g., criticality and transportation) must be identified and addressed.	2	The following sections of this EIS address health impacts from accidents: *Site-Specific & Transportation Impacts* • Section 4.1.2.7.2 (LANL) • Section 4.1.3.7.2 (SRS) • Section 4.1.6.3.2 and 4.1.6.4.2 (Transportation). Additional details are found in: • Appendix D – Evaluation of Human Health Effects from Facility Accidents • Appendix E – Evaluation of Human Health Effects from Transportation.
10.4 NNSA should identify safety and radiation minimization programs.	The EIS should identify safety programs and how radiation exposures are being minimized.	3	The following sections of this EIS discuss the safety programs at the individual sites: • Section 3.2.7 (LANL) • Section 3.3.7 (SRS).

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
Comments Concerning Socioeconomics			
11.1 NNSA should perform a detailed socioeconomic impact analysis.	The socioeconomic impact analysis must be detailed and must include specific community infrastructure impacts and macroeconomic impacts such as employment impacts detailed by activity/option.	3	The following sections of this EIS discuss the site-specific and cumulative socioeconomic impacts associated with the Preferred Alternative: *Site-Specific Impacts* • Section 4.1.2.9 (LANL) • Section 4.1.3.9 (SRS). *Cumulative Impacts* • Section 4.2.3.1.4 (LANL) • Section 4.2.3.2.4 (SRS).
Comments Concerning Waste Management			
12.1 NNSA should provide complete waste management information.	NNSA must provide the volume, types, characterization, and location(s) for waste disposal from the downblending process and facility decontamination and decommissioning.	4	The following sections of this EIS discuss the current affected environment as well as the site-specific and cumulative impacts associated with waste management: *Affected Environment* • Section 3.2.11 (LANL) • Section 3.3.11 (SRS). *Site-Specific Impacts* • Section 4.1.2.11 (LANL) • Section 4.1.3.11 (SRS) • Section 4.1.5.1 (WIPP facility). *Deactivation Decontamination and Decommissioning Impacts* • Section 4.3.3 (LANL) • Section 4.3.4 (SRS).

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
Comments Concerning Environmental Justice			
13.1 NNSA should perform a detailed environmental justice impact analysis at each activity site.	Detailed and rigorous environmental justice impact analysis of program activities at each activity site is needed.	6	NNSA has included an environmental justice impact analysis in this EIS. NNSA discusses the current affected environment related to environmental justice in Sections 3.2.12 for LANL and 3.3.12 for SRS. NNSA has included the environmental impact analysis in the following sections of this EIS discuss the site-specific and cumulative environmental justice impacts associated with the Preferred Alternative: *Site-Specific Impacts* • Section 4.1.2.12 (LANL) • Section 4.1.3.12 (SRS). *Cumulative Impacts* • Section 4.2.3.1.6 (LANL) • Section 4.2.3.2.6 (SRS). The environmental justice impact analysis in this EIS was developed in accordance with: • Council on Environmental Quality Guidance, Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997) • Executive Order 12898 (59 FR 7629), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, as amended by Executive Order 12948 (60 FR 6381) • Executive Order 14008, Tackling the Climate Crisis at Home and Abroad (86 FR 7619) • Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (86 FR 7009).

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
13.2 Engagement of communities will require special efforts throughout the NEPA process.	Local minority communities will require special efforts to be fully engaged and communicated to regarding this NEPA process—especially in limited English proficiency and Native American communities.	4	NNSA took these comments into consideration when developing the public/tribal involvement opportunities for the Draft SPDP EIS. With regard to the Notice of Intent and the virtual public scoping meetings, due to the large number of Spanish-speaking communities around the SPDP project areas, NNSA provided Spanish translations for those documents. All meeting materials for the scoping meetings were provided in Spanish and in English. A Spanish translator was available for the virtual public scoping meetings as well. Similar efforts will be made for the public hearings on the Draft EIS. NNSA indicated in media notices for the public hearings on the Draft EIS that additional translation services and reasonable accommodations for those with disabilities can be provided upon request. In light of public health concerns, NNSA hosted internet- and telephone-based, virtual public scoping meetings in place of in-person meetings. For the public hearings on the Draft SPDP EIS, NNSA is conducting both in-person and virtual meetings to provide multiple ways of attending meetings to encourage the maximum amount of participation and accessibility.
Comments Concerning Transportation			
14.1 NNSA should evaluate transportation impacts on workers and the public.	The NNSA should evaluate transportation impacts and the EIS should include exposures of workers and the public, exposures at rest stops, impacts on local communities, the amount of plutonium being shipped, severe accidents, contamination after an accident, effects of wind	22	The following sections of this EIS discuss the transportation-related impacts: • Section 4.1.6 • Section 4.2.3.4 (Cumulative) • Appendix E.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
	speed, routes, costs, short and long-term impacts and risks, miles, numbers of shipments, consideration of climate change and use of actual data, effects of aging infrastructure, transport near water, risks of transporting radioactive material multiple times, and domestic and foreign terrorism. Analysis should place the total number of shipments within the context of nuclear materials shipments to/from LANL.		
14.2 NNSA should evaluate emergency preparedness along transportation routes.	Provide detailed information about emergency preparedness and emergency response equipment, personnel, and training in New Mexico and nationwide. Include discussion of whether emergency responses will be affected by the impacts of climate change (for example, fires).	13	Emergency response for transportation is briefly discussed in Appendix E.3 of this EIS. It refers to a larger discussion of Emergency Response and Preparedness in Section E.4 of the SPD Supplemental EIS (DOE 2015).
14.3 The transportation plan is problematic due to long distances and the large number of shipments.	The transportation plan is problematic.	1	The transportation routes, including the distances and the number of shipments anticipated, are shown in Section 4.1.6 of this EIS and additional information is provided in Appendix E in Section E.4.1. The impacts are described in terms of radiological risk and nonradiological risk. The radiological impacts are those associated with the effects of low levels of radiation emitted during incident-free transportation and an accidental release of radioactive material. The nonradiological impacts are independent of the nature of the cargo being transported and are expressed as traffic accident fatalities resulting only from the physical forces that accidents impart to humans.

Issue	Summary	No. of Commenters	EIS Reference or NNSA Response
Comments Concerning Cumulative Impacts			
15.1 NNSA should consider the cumulative impacts of other plutonium projects.	The EIS should consider the cumulative impacts of the plutonium proposed for disposal along with the impacts of plutonium associated with other projects, such as the VTR and future pit production.	1	Cumulative impacts, including those from transuranic waste disposal at the WIPP facility are addressed in Section 4.2 of this EIS. CEQ defines cumulative impacts as effects on the environment that result from implementing any of the alternatives when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7). The geographic area over which past, present and reasonably foreseeable future actions could contribute to cumulative impacts is dependent on the type of resource considered. For example, pit production activities occurring at LANL are considered a cumulative impact for resources that are also affected by SPDP activities at LANL.
15.2 NNSA should consider the impacts of this project on climate change.	The EIS should consider the impacts of the project on climate change.	1	Section 4.2.4.2 discusses cumulative impacts associated with global climate change projections.
15.3 NNSA should consider the cumulative impacts of expanded pit production and LANL site cleanup.	The EIS should analyze the impacts of the proposed project at LANL, including the impacts of the expanded pit production process and the impacts of diverting resources away from ongoing site cleanup activities.	3	Cumulative impacts are addressed in Section 4.2 of this SPDP EIS. Section 4.2.2 discusses past, present, and reasonably foreseeable future activities at LANL that could impact the same resources.
15.4 The EIS should consider the cumulative impacts of other nuclear-related activities in New Mexico.	The EIS should consider the cumulative impacts of other nuclear-related activities in New Mexico.	2	CEQ indicates that the geographic area over which past, present, and reasonably foreseeable future actions could contribute to cumulative impacts is dependent on the type of resource considered (40 CFR 1508.7). Cumulative impacts are addressed in Section 4.2 of this EIS for resources that are affected by multiple projects (nuclear and non-nuclear related).

AROD = Amended Record of Decision; CBFO = Carlsbad Field Office; CEQ = Council on Environmental Quality; CH-TRU = contact-handled transuranic; DOE = U.S. Department of Energy; DVR = Design Validation Report; EIS = environmental impact statement; EPA = U.S. Environmental Protection Agency; GAO = Government Accounting Office; IAEA =

International Atomic Energy Agency; LANL = Los Alamos National Laboratory; LWA = *Land Withdrawal Act*; MOX = mixed oxide (fuel); NAS = National Academies of Sciences; NEPA = *National Environmental Policy Act*; NMED = New Mexico Environment Department; NNSA = National Nuclear Security Administration; NRC = U.S. Nuclear Regulatory Commission; Pantex = Pantex Plant; PEIS = programmatic environmental impact statement; PMDA = Plutonium Management and Disposition Agreement; ROD = Record of Decision; SA = Supplement Analysis; SPD = Surplus Plutonium Disposition; SPDP = Surplus Plutonium Disposition Program; SRS = Savannah River Site; STEM = science, technology, engineering, and math; TRU = transuranic; VTR = Versatile Test Reactor; WAC = Waste Acceptance Criteria; WIPP = Waste Isolation Pilot Plant.

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APPENDIX G

CONFLICT OF INTEREST DISCLOSURE STATEMENTS

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF THE ***DRAFT SURPLUS PLUTONIUM DISPOSITION PROGRAM ENVIRONMENTAL IMPACT STATEMENT***

Council on Environmental Quality (CEQ) Regulations at 40 CFR 1506.5(c), which have been adopted by the DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for purposes of this disclosure is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 8026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." 46 FR 18026-18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (a) or (b) to assure consideration of your proposal).

(a) ___X___ Offeror and any proposed subcontractor have no financial or other interest in the outcome of the project.

(b) ________ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

<u>Financial or Other Interests</u>

1.
2.
3.

Certified by

Cindy Powell 09/01/2022

Signature and Date

Cindy Powell, Acting Division Director, Earth Systems Science Division

Printed Name and Title

Battelle Memorial Institute, Operator of Pacific Northwest National Laboratory for the U.S. Department of Energy under Contract DE-AC05-76RL01830

Company

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF THE ***DRAFT SURPLUS PLUTONIUM DISPOSITION PROGRAM ENVIRONMENTAL IMPACT STATEMENT***

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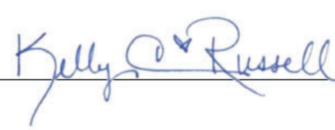
<u>Financial or Other Interests</u>

1.
2.
3.

Certified by



07/18/2022

Signature and Date

Kelly C. Russell / Contracts Manager

Printed Name and Title

Leidos, Inc.

Company