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Draft Supplement Analysis of the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory for Plutonium Operations

National Nuclear Security Administration

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Executive Summary

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the United States Department of Energy (DOE), is responsible for meeting the national security requirements to maintain and enhance the safety, reliability, and performance of the United States nuclear weapons stockpile. NNSA has both programmatic and site-specific environmental impact statements covering pit production activities designed to provide NNSA the flexibility to adapt decisions as needed in response to national security requirements. In 2008, the *Complex Transformation Supplemental Programmatic Environmental Impact Statement* (Complex Transformation SPEIS) evaluated, among other things, alternatives for producing 10-200 pits per year at different site alternatives, including the Savannah River Site (SRS) in South Carolina and at Los Alamos National Laboratory (LANL) in New Mexico. The site-specific *Final Site-Wide Environmental Impact Statement for the Continued Operations of Los Alamos National Laboratory* (DOE/EIS-0380) (2008 LANL SWEIS) evaluated producing 80 pits per year at LANL.

The United States has recognized the need to eventually produce 80 pits per year. Federal law requires the Secretary of Energy to produce not less than 80 war reserve plutonium pits during 2030 (50 U.S. Code (USC) 2538a). On January 27, 2017, the President directed the Department of Defense to conduct an updated *Nuclear Posture Review* (NPR) to ensure a safe, secure, and effective nuclear deterrent that protects the homeland, assures allies, and above all, deters adversaries. The 2018 NPR echoed the need for pit production. The 2018 NPR also confirmed that the United States will pursue initiatives to ensure the necessary capability, capacity, and responsiveness of the nuclear weapons infrastructure and the needed skill of the workforce, including providing the enduring capability and capacity to produce plutonium pits at a rate of no fewer than 80 pits per year. In 2018, Congress enacted as formal policy of the United States that LANL will produce a minimum of 30 pits per year for the national production mission and will implement surge efforts to exceed 30 pits per year to meet NPR and national policy (Public Law 115-232, Section 3120).

NNSA now must implement a strategy to provide the enduring capability and capacity to produce plutonium pits at a rate of not less than 80 pits per year during 2030. At a programmatic level, NNSA could adopt a Modified Distributed Centers of Excellence Alternative for plutonium operations from the Complex Transformation SPEIS. This would enable the production of a minimum of 50 pits per year at a repurposed Mixed-Oxide Fuel Fabrication Facility at SRS, and a production rate of a minimum of 30 pits per year at LANL, with additional surge capacity at each site, if needed. If this approach is adopted, it would meet the requirements of producing pits at a rate of not less than 80 pits per year during 2030 for the nuclear weapons stockpile. In early 2020, NNSA published a Supplement Analysis (SA) to the Complex Transformation SPEIS and determined that its proposed action at a programmatic level does not constitute a substantial change from actions analyzed previously and there were no significant new circumstances or information relevant to environmental concerns. However, in order to implement the proposed action as it relates to LANL, NNSA decided to prepare a site-specific SA to the 2008 LANL SWEIS (DOE/EIS-0236-S4-SA-02).

As a result, NNSA has prepared this SA to re-evaluate adopting elements of the Expanded Operations Alternative from the 2008 LANL SWEIS. NNSA's decision resulting from this SA would enable producing a minimum of 30 pits per year at LANL with additional surge capacity, if needed, to meet the programmatic requirements of producing pits at a rate of no fewer than 80 pits per year during 2030 for the nuclear weapons stockpile. In this SA, NNSA evaluates the potential environmental impacts of producing up to 80 pits per year at LANL. This approach provides a conservative analysis and affords NNSA the flexibility of adapting to shifting requirements. Based on analysis in this SA, NNSA preliminarily concludes that no further National Environmental Policy Act documentation for LANL at a site-specific level is required. However, NNSA will consider comments on this Draft SA prior to publishing a final SA.

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Table of Contents

Figures

Tables

Acronyms and Abbreviations

AoA	Analysis of Alternatives
AC/MC	analytical chemistry and materials characterization
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
CFR	Code of Federal Regulations
CMR	Chemistry and Metallurgy Research
CMRR	Chemistry and Metallurgy Research Replacement
CMRR-NF	Chemistry and Metallurgy Research Replacement Nuclear Facility
DOE	Department of Energy
DSA	documented safety analysis
EIS	Environmental Impact Statement
EA	Environmental Assessment
FTE	Full-time equivalents
HC	Hazard Category
KCNSC	Kansas City National Security Campus
LANL	Los Alamos National Laboratory
LCF	latent cancer fatality
LLW	low-level radioactive waste
MAR	material-at-risk
MEI	maximally exposed individual
MFFF	Mixed-Oxide Fuel Fabrication Facility
MLLW	Mixed low-level waste
NEPA	National Environmental Policy Act of 1969, as amended
NM	New Mexico
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NPR	Nuclear Posture Review
Pantex	Pantex Plant
PEIS	Programmatic Environmental Impact Statement

PF	Plutonium Facility
PGA	peak ground acceleration
PIDAS	Perimeter Intrusion, Detection, and Assessment System
PSHA	Probabilistic Seismic Hazards Assessment
RCRA	Resource Conservation and Recovery Act
RLWTF	Radioactive Liquid Waste Treatment Facility
ROI	region of influence
RLUOB	Radiological Laboratory/Utility/Office Building
ROD	Record of Decision
SA	supplement analysis
SEIS	Supplemental Environmental Impact Statement
SNM	special nuclear material
SPD	Surplus Plutonium Disposition
SPEIS	Supplemental Programmatic Environmental Impact Statement
SRS	Savannah River Site
SSM PEIS	Stockpile Stewardship and Management Programmatic Environmental Impact Statement
SWEIS	Site-Wide Environmental Impact Statement
TA	technical area
TRU	transuranic
U.S.	United States
USGS	U.S. Geological Survey
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 National Security Complex

1.0 INTRODUCTION

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the United States (U.S.) Department of Energy (DOE), is responsible for meeting the national security requirements established by Congress and the President. NNSA has a statutory mission to maintain and enhance the safety, reliability, and performance of the U.S. nuclear weapons stockpile including the ability to design, produce, and test, in order to meet national security requirements (50 USC 2401(b)). Plutonium pits are critical components of every nuclear weapon; nearly all current stockpile pits were produced from 1978 to 1989 (DOD 2018a p. 62). Today, the United States' capability to produce plutonium pits is limited.

As explained in the *Supplement Analysis of the Complex Transformation Supplemental Programmatic Environmental Impact Statement* (2019 SPEIS SA) (DOE 2019a) and to meet federal law and national security requirements, NNSA is pursuing the two-prong approach. This approach requires producing a minimum of 50 pits per year at Savannah River Site (SRS) in South Carolina and a minimum of 30 pits per year at Los Alamos National Laboratory (LANL) in New Mexico (NM), with additional surge capacity at each site, if needed. The two-prong approach would meet the requirements of producing pits at a rate of not less than 80 pits per year during 2030 for the nuclear weapons stockpile. Furthermore, this approach would provide an effective, responsive, and resilient nuclear weapons infrastructure with the flexibility to adapt to shifting requirements.

Pit

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

NNSA prepared this *Supplement Analysis of the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory for Plutonium Operations* to evaluate the potential environmental impacts of producing a minimum of 30 pits per year at LANL and implementing surge efforts to exceed 30 pits per year to meet *Nuclear Posture Review* (NPR) and national policy. Under federal law, the Secretary of Energy is required to produce not less than 80 pits per year during 2030 (50 USC 2538a). It is the policy of the United States, as established by Congress and the President, that LANL will produce a minimum of 30 pits per year for the national production mission and will implement surge efforts to exceed 30 pits per year to meet NPR and national policy (Public Law 115-232, Section 3120).

NNSA has multiple existing environmental impact statements (EISs), that are further defined in Section 1.4 and 1.5, which evaluate potential impacts of pit production at LANL with production levels between 10-200 pits per year. NNSA has undertaken this supplement analysis (SA) to evaluate whether those prior analyses remain adequate or whether NNSA would require further National Environmental Policy Act (NEPA) analysis prior to adopting the decision to produce a minimum of 30 pits per year for the national production mission and implement surge efforts to exceed 30 pits per year to meet NPR and national policy at LANL. In addition to this Draft SA (referred to hereafter as this SA) to the 2008 LANL Site-Wide Environmental Impact Statement (2008 LANL SWEIS) and the SA to the Complex Transformation Supplemental Programmatic

Environmental Impact Statement (Complex Transformation SPEIS), NNSA is also preparing a separate site-specific analysis of implementing production activities at SRS.

1.1. Purpose and Need

The purpose and need for the continued operation of LANL is to provide support for NNSA's core missions as directed by Congress and the President (DOE 2008a, ch. 1 p.11). Congress and the President have directed that during 2026 LANL will produce a minimum of 30 war reserve[1] pits per year for the national pit production mission and implement surge efforts to exceed 30 pits per year to meet NPR and national policy (50 USC 2538a; Public Law 115-232). As a result, to meet this direction, NNSA must consider implementing previously analyzed but unimplemented elements of the Expanded Operations Alternative from the 2008 LANL SWEIS as needed to produce a minimum of 30 pits per year for the national pit production mission and to implement surge efforts to exceed 30 pits per year to meet NPR and national policy.

The analysis in this SA will enable NNSA to decide whether a supplemental EIS, a new EIS, or no further NEPA documentation would be required prior to making site-specific decisions regarding pit production at LANL.

1.2. Scope

The scope of this SA is to identify (1) if there have been substantial changes related to pit production activities at LANL compared to those analyzed in the 2008 LANL SWEIS and (2) if there have been significant new circumstances or information relevant to environmental concerns bearing on the 2008 LANL SWEIS proposed action or its impacts (10 Code of Federal Regulations [CFR] 1021.314). While NNSA has taken efforts to identify pit production requirements at LANL, it is possible in the future that project needs or requirements could change or that additional elements of specific projects could be identified. If this happens, NNSA would evaluate those new project elements in accordance with NEPA as appropriate.

This SA is organized as follows:

Section 1.0 contains the introduction;
Section 2.0 describes the proposed action;
Section 3.0 discusses the process/methodology utilized, and contains the comparative environmental impact analyses;
Section 4.0 presents potential cumulative impacts;
Section 5.0 includes the preliminary conclusion and determination; and
Section 6.0 identifies references used.

1.3. Proposed Action

[1] "War Reserve" is generally considered to be war fighting material that is held in reserve as required by the U.S. Department of Defense.

NNSA's proposed action is to implement elements of the Expanded Operations Alternative as needed to produce a minimum of 30 war reserve pits per year during 2026 for the national pit production mission and to develop the ability to implement a short-term surge capacity to meet mission needs, if necessary. For purposes of estimating impacts in a conservative and bounding manner, potential surge efforts were defined and calculated at 80 pits per year. This also allows direct comparison with analyses from the 2008 LANL SWEIS and the Complex Transformation SPEIS. Section 2.0 provides more detail about those activities that would be required to implement this proposed action.

1.4. Relevant NEPA Analyses and other Documents

Background on Programmatic and Site-Specific NEPA for LANL Pit Production

For over two decades, NNSA has fulfilled its obligations under NEPA with respect to operations involving Category I and Category II levels of special nuclear materials[2] (SNM) through a tiered NEPA approach. With a tiered approach, NNSA maintains a programmatic environmental impact statement (EIS) for the functional areas of plutonium, uranium, and weapons assembly/disassembly/high explosives that identifies and analyzes impacts at a national level to ensure an evaluation of, among other things, cumulative impacts and connected actions. Through site-specific NEPA analyses that tier off of the programmatic EIS, NNSA evaluates impacts at various sites throughout the country in a more detailed manner. DOE and NNSA have periodically re-evaluated, validated, and updated the programmatic EIS and site-specific NEPA analyses related to pit production. The first programmatic EIS in the post-Cold war era was the 1996 *Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS). The most current programmatic EIS for plutonium operations is the Complex Transformation SPEIS (DOE 2008b).

At a programmatic level, with respect to plutonium operations, the Complex Transformation SPEIS analyzed impacts associated with pit production at levels of 125 to 200 pits per year. In June 2019, NNSA announced its re-evaluation of programmatic and site-specific NEPA analyses and its strategy to fulfill national requirements for pit production (84 FR 26849). The original Distributed Centers of Excellence Alternative, in the Complex Transformation SPEIS, considers one large enduring consolidated pit production facility within the Complex[3], but current national security policy requires a more resilient enterprise. Therefore, through the 2019 SPEIS SA, NNSA analyzed the impacts of a modified Distributed Centers of Excellence Alternative that includes two smaller capacity pit production facilities rather than a single facility. NNSA also included an analysis of actions across the Complex associated with transportation, waste management, and ancillary support (*e.g.*, staging, testing, and utilities). Based on the analysis in the 2019 SPEIS SA (DOE 2019a), NNSA determined that the proposed action of two smaller

[2] Special nuclear material—As defined in Section 11 of the Atomic Energy Act: "(1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the U.S. Nuclear Regulatory Commission determines to be special nuclear material, or (2) any material artificially enriched by any of the foregoing."
[3] Refers to the NNSA Nuclear Complex that support plutonium pit production: SRS, Pantex, Kansas City National Security Campus (KCNSC), Los Alamos National Laboratory (LANL), Nevada National Security Site (NNSS), Y-12 Plant, Sandia National Laboratories, and Lawrence Livermore National Laboratory (LLNL).

capacity production facilities did not constitute a substantial change from actions analyzed previously, and there were no significant new circumstances or information relevant to environmental concern. As a result, NNSA determined no further NEPA documentation was required at a programmatic level and that NNSA may amend the existing Complex Transformation SPEIS Record of Decision (ROD). Prior to implementing specific actions, the 2019 SPEIS SA states that NNSA will prepare site-specific documents. This SA to the 2008 LANL SWEIS is that site-specific documentation for LANL.

The 1999 *Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (1999 LANL SWEIS) tiered from the SSM PEIS and evaluates an Expanded Operations Alternative with pit production levels of 80 pits per year at LANL. The No Action Alternative includes an evaluation of 14 pits per year. NNSA announced that it would not implement more than the 20 pits per year production level at LANL until completion of a future NPR.

The 2008 LANL SWEIS tiers from the 2008 Complex Transformation SPEIS and analyzes three alternatives: a Reduced Operations Alternative, a No Action Alternative (20 pits per year), and an Expanded Operations Alternative (80 pits per year). Under the Expanded Operations Alternative, NNSA analyzed existing space at LANL in the Plutonium Facility and other infrastructure to support production of up to 80 pits per year (DOE 2008a). Federal law and national policy now require that NNSA produce no fewer than 30 pits per year at LANL during 2026 and implement surge efforts to exceed 30 pits per year to meet NPR and national policy (Public Law 115-232, Section 3120); this is not fundamentally different from the Expanded Operations Alternative in the 2008 LANL SWEIS. However, NNSA previously identified a specific support facility (the Chemistry and Metallurgy Research Replacement Nuclear Facility or CMRR-NF)[4] at LANL as necessary to support pit production. The CMRR-NF was never envisioned to house pit production, but it was thought necessary to support analytical chemistry and materials characterization (AC/MC) capabilities for pit production. However, in the ensuing years, alternatives for AC/MC capabilities were identified which have separate and sufficient NEPA analysis, and the CMRR-NF was not required to support LANL pit production capabilities.

This SA, to the 2008 LANL SWEIS, analyzes reasonably foreseeable infrastructure and support needs required to implement the proposed pit production mission. The analysis also includes an evaluation of the impacts previously analyzed in the 2008 LANL SWEIS Expanded Operations Alternative and other relevant NEPA documents for pit production mission. The other relevant NEPA documents are discussed below. This SA considers whether new circumstances and relevant information constitute a significant change that would warrant additional NEPA analysis. It reanalyzes the impacts associated with pit production at LANL through an integrated and comprehensive review of existing NEPA analyses and other relevant documents. These

[4] NNSA prepared the Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR SEIS) (DOE 2011). The 2011 CMRR SEIS evaluated critical analytical chemistry and materials characterization capabilities and addressed changes to the proposed facility regarding seismic concerns identified in the 2008 LANL SWEIS and modification of the CMRR-NF design.

documents are incorporated into this SA and are grouped below by programmatic documents, LANL-specific plutonium-related documents and other relevant documents. For each document, a description is provided of how it is relevant to this SA and how it relates to pit production at LANL.

Programmatic NEPA Documents and Related Documents

Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (SSM PEIS) (DOE 1996)

The SSM PEIS evaluates alternatives for maintaining the safety and reliability of the United States nuclear weapons stockpile and preserving competencies in nuclear weapons after the post-Cold War era. The SSM PEIS evaluates how the United States would meet these requirements without the use of underground nuclear testing and without a large-scale pit production facility. The SSM PEIS evaluates pit production of 80 pits per year at LANL and SRS, which was significantly lower than historic production levels. Tiering from the SSM PEIS, the site-specific 1999 LANL SWEIS also analyzed pit production levels of 80 pits per year at LANL.

Final Complex Transformation Supplemental Programmatic Environmental Impact Statement (Complex Transformation SPEIS) (DOE 2008b)

In 2008, the Complex Transformation SPEIS supplemented the SSM PEIS and analyzed the environmental impacts of alternatives for transforming the nuclear weapons complex (Complex) into a smaller, more efficient enterprise that could respond to changing national security challenges and ensure the long-term safety, security, and reliability of the nuclear weapons stockpile. The Complex Transformation SPEIS considers how to configure facilities that hold Category I and Category II quantities of SNM across the Complex including the three functional areas of plutonium, uranium operations, and weapons assembly/disassembly/high explosives. These alternatives were categorized into the Distributed Centers of Excellence Alternative, the Consolidated Centers of Excellence Alternative, and the Capability-Based Alternative. The Complex Transformation SPEIS also analyzed the No Action Alternative.

Under the four alternatives, the Complex Transformation SPEIS evaluated: (1) constructing and operating a new Greenfield pit production facility to produce 125 pits per year at SRS, LANL, Y-12 National Security Complex (Y-12), Pantex (Pantex Plant), and/or Nevada National Security Site (NNSS); (2) constructing and operating pit production facilities that would use the Mixed-Oxide Fuel Fabrication Facility (MFFF) and Pit Disassembly and Conversion Facility infrastructure at SRS to produce 200 pits per year; and (3) upgrading two existing facilities at LANL (Los Alamos Upgrade Alternative), one to support production of 200 pits per year and one to support production of 50-80 pits per year (DOE 2008b, ch. 3 p. 20, ch. 5 p. 3, 236). In the 2008 Programmatic ROD (73 FR 77644), NNSA decided to implement its preferred programmatic alternative, which was a combination of the Distributed Centers of Excellence Alternative and the Capability-Based Alternative and did not make any new decisions related to pit production.

Final Supplement Analysis of the Complex Transformation Supplemental Programmatic Environmental Impact Statement (2019 Complex Transformation SPEIS SA) (DOE 2019a)

The 2019 Complex Transformation SPEIS SA analyzed NNSA's proposed action to implement, with respect to plutonium operations, elements of the Modified Distributed Centers of Excellence Alternative. The elements implemented would enable NNSA to produce a minimum of 30 pits per year at LANL and a minimum of 50 pits per year at a repurposed MFFF at SRS, with additional surge capacity at each site, if needed. This would enable NNSA to meet the requirements of producing pits at a rate of no fewer than 80 pits per year during 2030 for the nuclear weapons stockpile. In addition, the 2019 Complex Transformation SPEIS SA analyzed pit production support activities across the Complex associated with transportation, waste management, and ancillary support (e.g., staging, testing, and utilities). Based on the analysis in the 2019 Complex Transformation SPEIS SA, NNSA determined that no further NEPA documentation was required at a programmatic level, and NNSA may amend the existing Complex Transformation SPEIS ROD. However, to date NNSA has not issued an Amended ROD for the Complex Transformation SPEIS.

Waste Isolation Pilot Plant (WIPP) Disposal Phase Final Supplemental Environmental Impact Statement (WIPP SEIS-II) (DOE 1997)

Potential environmental impacts associated with disposing of transuranic (TRU) waste at the Waste Isolation Pilot Plant (WIPP) were analyzed in the 1997 WIPP SEIS. DOE's proposed action and subsequent ROD were to dispose at WIPP up to 175,600 cubic meters of TRU waste generated from defense activities (63 FR 3624).

Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations (2016 WIPP SA) (DOE 2016a)

Following two accidents in February 2014 and the WIPPs subsequent closure, the 2016 WIPP SA evaluated the potential environmental impacts and safety and operational measures to restart waste operations at WIPP. DOE evaluated changes in conditions of environmental resource areas, assessed for potential impacts, and considered new NEPA guidance. Following this 2016 WIPP SA, DOE restarted WIPP operations in January 2017. NNSA determined that the analysis for TRU waste disposal in the WIPP SEIS-II remained valid and no further NEPA analysis was required for TRU waste disposal at WIPP.

LANL Site-Specific NEPA Documents

Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico (1999 LANL SWEIS) (DOE 1999a)

The 1999 LANL SWEIS analyzes all capabilities at LANL that support DOE missions including plutonium operations and pit production. It served as a basis for the development of the 2008 LANL SWEIS. The 1999 LANL SWEIS analyzes four alternatives, including a No Action Alternative, an Expanded Operations Alternative (analyzing a pit production rate of 80 pits per year), a Reduced Operations Alternative, and a "Greener" Alternative. DOE decided to conduct pit production at a nominal rate of 20 pits per year. The elements of the Expanded Operations

Alternative of the 1999 LANL SWEIS adopted by NNSA became the No Action Alternative for the 2008 LANL SWEIS.

The Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico (2008 LANL SWEIS) (DOE 2008a)

The 2008 LANL SWEIS evaluates the potential environmental impacts from ongoing LANL operations and new activities and analyzes three specific alternatives: (1) a Reduced Operations Alternative, (2) a No Action Alternative, and (3) an Expanded Operations Alternative. The Expanded Operations Alternative analyzed the use of existing space in the Plutonium Facility to produce up to 80 pits per year. The 2008 LANL SWEIS also evaluates the impacts of constructing and operating a consolidated plutonium center (as well as a consolidated nuclear production center of excellence) at LANL, which entailed consolidation of special nuclear materials storage and production of 125 pits with a potential surge capacity of 200 pits annually. The impacts of constructing and operating a consolidated nuclear production center at LANL were included in the cumulative impacts section of the 2008 LANL SWEIS, Section 5.13. In the associated ROD, NNSA reserved a decision on pit production until completion of a future NPR.

2018 Supplement Analysis of the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory (2018 SWEIS SA) (DOE 2018a)

The 2018 LANL SWEIS SA evaluates projects and impacts of activities conducted since publication of the 2008 LANL SWEIS, and projects being proposed from 2018 through 2022. NNSA determined that ongoing operations, new and modified projects, and modifications in site operations at LANL do not constitute a substantial change in the actions previously analyzed in the 2008 LANL SWEIS. The 2018 LANL SWEIS SA was completed in April 2018, before the announcement of national policy on pit production.

Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR EIS) (DOE 2003a)

DOE prepared the 2003 CMRR EIS to evaluate alternatives for replacing the AC/MC capabilities provided in the Chemistry and Metallurgy Research (CMR) Building. The CMRR project was to provide the physical means for conducting mission-critical CMR capabilities, to consolidate like activities for operational efficiency, and to potentially provide extra space for future modifications. The ROD (69 FR 6967) announced the decision for construction and operation of a two-building replacement for the CMR Building to be located in Technical Area (TA)-55. These buildings were to consist of: (1) a Radiological Laboratory/Utility/Office Building (RLUOB) and (2) a nuclear facility (CMRR-NF) housing Hazard Category (HC)-2 nuclear operations.[5] After publication of the CMRR SEIS ROD, NNSA first announced a delay

[5] Title 10, CFR Part 830 assigns hazard categories to nuclear and radiological facilities in accordance with the potential consequences in the event of a radiological accident. PF-4 is a HC-2 nuclear facility. Facilities with smaller inventories of radioactive material would be HC-3 or below HC-3. The nuclear facilities at LANL are either HC-2 or HC-3 (DOE 2008a, ch. 1 p. 11). DOE has determined threshold quantities for individual radionuclides that define

in construction of the CMRR-NF (DOE 2012) and then cancelled funding (DOE 2015b). The 2003 CMRR EIS analyzes construction of new administrative and support buildings that would support pit production at LANL.

Final Supplemental Environmental Impact Statement for the Nuclear Facility Portion of the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR SEIS) (DOE 2011)

NNSA prepared the 2011 CMRR SEIS for the CMRR-NF in 2011 to address changes to the proposed facility regarding seismic concerns and modification of the CMRR-NF design (DOE 2011). NNSA evaluated the potential environmental impacts from revised alternatives for constructing and operating the CMRR-NF and from ancillary projects that had been proposed since publication of the CMRR EIS. On October 18, 2011, in an amended ROD (76 FR 64344), NNSA selected the Modified CMRR-NF Alternative for constructing and operating the CMRR-NF portion of the CMRR project. The 2011 CMRR SEIS provided an analysis of construction areas for support facility related to pit production. The analysis of construction areas at and adjacent to TA-55 are used in this SA.

Supplement Analysis for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory, Los Alamos, New Mexico (CMRR SA) (DOE 2015a)

Following a DOE decision to cancel the CMRR-NF (DOE 2015b), NNSA issued the 2015 CMRR SA that addressed modifications to NNSA's approach for assuring AC/MC capabilities at LANL. This entailed performing AC/MC work in RLUOB and making space available at Plutonium Facility building 4 (PF-4). Under those modifications, RLUOB would continue to operate as a radiological facility but with an increased allowable quantity of actinides such as plutonium-239. NNSA determined that no additional NEPA documentation was needed to implement this modified approach.

Other Relevant Documents

Atomic Energy Defense Act (50 USC 2538a)

The Secretary of Energy is charged with producing no less than 80 war reserve plutonium pits during 2030 and submitting an annual certification to Congress and the Secretary of Defense that the programs and budget of the Secretary of Energy will enable the nuclear security enterprise to meet those requirements.

National Defense Authorization Act for Fiscal Year 2020 (Public Law 116-92)

In Section 3116 of Public Law 116-92, Congress expressed the sense that "(1) rebuilding a robust plutonium pit production infrastructure with a capacity of up to 80 pits per year is critical to maintaining the viability of the nuclear weapons stockpile; (2) that effort will require cooperation from experts across the nuclear security enterprise; and (3) any further delay to

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the lower boundaries for the hazard categories: a DOE HC-3 Nuclear Facility is 38.6 grams of plutonium-239 and 2,610 grams of plutonium-239 for a HC-2 facility (DOE 2014a Attachment 2, Table 1).

achieving a plutonium sustainment capability to support the planned stockpile life extension programs will result in an unacceptable capability gap to our deterrent posture." Public Law 116-92 also amended the Atomic Energy Defense Act to require production of not less than 80 pits per year during 2030.

John S. McCain National Defense Authorization Act for Fiscal Year 2019 (2019 National Defense Authorization Act (Public Law 115-232)

In Section 3120 of Public Law 115-232, Congress enacted as formal policy of the United States that LANL will produce a minimum of 30 pits per year for the national production mission and will implement surge efforts to exceed 30 pits per year to meet 2018 NPR and national policy (Public Law 115-232).

Final Report for the Plutonium Pit Production Analysis of Alternatives (Pit Production AoA) (DOE 2017a)

The purpose of the pit production analysis of alternatives (AoA) was to identify and assess alternatives across DOE sites that could deliver the infrastructure to meet the sustained plutonium pit requirements of no less than 80 pits per year during 2030. To achieve the required annual pit production rate, the AoA report considered the construction of new facilities, and the refurbishment to existing facilities. The AoA report identifies SRS and LANL as the two preferred locations to accomplish this enduring mission (DOE 2017a p. 1).

Fiscal Year 2020 Stockpile Stewardship and Management Plan, a Report to Congress (DOE 2019b)

The Stockpile Stewardship and Management Plan describes NNSA's plans to ensure the safety, security, and effectiveness of the United States nuclear weapons stockpile mission to carry out national security responsibilities by maintaining a safe, secure, and effective nuclear deterrent; preventing, countering, and responding to the threats of nuclear proliferation and terrorism worldwide; and providing naval nuclear propulsion.

2018 Nuclear Posture Review (2018 NPR) (DOD 2018a)

In February 2018, the Office of the Secretary of Defense issued the 2018 NPR report. This report assessed previous nuclear policies, strategy, and corresponding capabilities needed to protect the Nation in the deteriorating threat environment that confronts the United States, its allies, and partners. The 2018 NPR provided guidance for the nuclear force posture and policy requirements needed now and in the future.

2018 Joint Department of Defense/NNSA Statement on the Recapitalization of Plutonium Pit Production (DOD 2018b)

A Joint Statement on pit production was issued on May 10, 2018, by the Under Secretary of Defense for Acquisition and Sustainment and the NNSA Administrator. This Joint Statement announced the two-prong approach to produce a minimum of 50 pits per year at SRS and a minimum of 30 pits per year at LANL.

1.5. Relationship of NEPA Documents to Pit Production at LANL

As the description of NEPA analyses and supporting documents indicate, there have been extensive NEPA analyses conducted for pit production at LANL. This extensive series of NEPA analyses and supporting documents, and relationships between them, provides the basis in this SA. These documents are used to evaluate pit production and the potential impacts at LANL.

Pit production, at a level of 80 pits per year at LANL, was first analyzed in the SSM PEIS (DOE 1996). The SSM PEIS "high case" analysis for pits was 100 pits per year. The 80 pits per year production level at LANL was reanalyzed in the 1999 LANL SWEIS (DOE 1999a), and DOE selected a pit production rate of 20 pits per year. Part of the basis for the selected alternative relates to the legacy CMR building at TA-03 of LANL. In 2003, DOE issued the CMRR EIS that analyzed two replacement facilities that would house AC/MC operations and allow for decommissioning of the CMR facility (DOE 2003a). The 2008 LANL SWEIS tiers from the 1999 LANL SWEIS and the Complex Transformation SPEIS, as appropriate, and incorporates information from those documents by reference (DOE 2008a, ch. 1 p. 2). The 2008 LANL SWEIS also incorporates NEPA analyses conducted since the issuance of the 1999 LANL SWEIS that include the 2003 CMRR EIS (DOE 2008a, ch. 1 p. 28-30).

The CMRR-NF was analyzed in the 2011 CMRR SEIS (DOE 2011), and NNSA selected the Modified CMRR-NF Alternative. After the CMRR-NF portion of the CMRR project was cancelled in 2014, NNSA prepared an SA to the 2003 CMRR EIS (2015 CMRR SA) analyzing AC/MC operations within existing space at RLUOB and PF-4 (DOE 2015a, p. 2). The 2015 CMRR SA found that the potential impacts of conducting AC/MC operations in RLUOB and PF-4 was less than the impacts analyzed in the 2003 CMRR EIS. Pit production relies on AC/MC operations, but these operations do not specifically require the CMRR-NF (DOE 2015a, p. 49).

In 2018, NNSA issued an SA to the 2008 LANL SWEIS that evaluated current operations and changed environmental conditions since issuance of the 2008 LANL SWEIS (DOE 2018a). The 2018 LANL SA, to the 2008 LANL SWEIS, noted that DOE evaluated the production of 80 pits per year in the Expanded Operations Alternative in the 2008 LANL SWEIS and may issue a new ROD in the future for an increase in pit production. No specific decisions on pit production were analyzed in the 2018 LANL SA, but support facilities such as office buildings and parking garages were analyzed.

In summary, the 2008 LANL SWEIS and the 2011 CMRR SEIS, in addition to the programmatic NEPA analyses, provide the primary underlying NEPA analysis for pit production and related support activities at LANL. The 2008 LANL SWEIS tiers from previous documents and incorporates related NEPA analyses (*i.e.,* 1999 LANL SWEIS and 2003 CMRR EIS) (DOE 2008a, ch. 1 p. 33-34). The 2008 LANL SWEIS, support documents, and subsequent analyses (*i.e.,* 2011 CMRR SEIS and 2015 CMRR SA) are referenced in this SA so to define when and where pit production for LANL has been previously analyzed and if those analyses remain valid.

1.6. Public Process

Although it is not required, NNSA is making this SA available for public review and comment on the NNSA NEPA reading room (https://www.energy.gov/nnsa/nnsa-nepa-reading-room). Comments on the Supplement Analysis may be provided to NNSA by U.S. mail or email at the following addresses:

Mail: NNSA Los Alamos Field Office
Comments: LANL SWEIS SA
3747 West Jemez Road
Los Alamos, NM 87544

Or

Email: lanlsweissa@nnsa.doe.gov, Subject line: LANL SWEIS SA comment

2.0 PROPOSED ACTION

NNSA's proposed action is to implement elements of the 2008 LANL SWEIS Expanded Operations Alternative as needed to produce a minimum of 30 war reserve pits per year during 2026 for the national pit production mission and to implement surge efforts to exceed 30 pits per year to meet NPR and national policy. This SA refers to these actions as pit production. Pit production includes resources needed for operations, such as supporting infrastructure (*e.g.,* office buildings, parking, and training facilities), increased work force, waste management facilities, ancillary support (*e.g.,* staging, testing, and utilities), and transportation.

Pit production has fundamentally remained the same since the end of the Cold War and its impacts are well understood. NNSA has analyzed and reanalyzed the impacts associated with pit production at LANL over many decades and has made such information available to the public. Although NNSA previously analyzed pit production, no decisions were made to expand pit production beyond the 20 pits per year authorized by the ROD. NNSA will meet federal law and national policy by implementing elements of the Expanded Operations Alternative. Through this SA, NNSA is evaluating these changes under NEPA to determine whether the changes are substantial and is further evaluating whether there are new circumstances or information relevant to environmental concerns bearing on the proposed action or its impacts that are significant within the meaning of NEPA. The analysis in this SA will enable NNSA to decide whether a supplemental EIS, a new EIS, or no further NEPA documentation is required prior to making site-specific decisions regarding pit production at LANL.

2.1. Pit Production at LANL

Pit production at LANL is concentrated at TA-55 (Figure 2-1), which houses the primary operations facility for pit production in PF-4, a Security Category 1 and an HC-2 nuclear facility (Figure 2-2) (DOE 2008a, ch. 2 p. 60). Pit production operations include shipping, receiving, staging, packaging, and moving nuclear materials and components; performing nondestructive analysis; purifying metal and managing related residues; foundry operations; machining; inspecting; assembling and post-assembly testing; waste management; and chemical/materials analyses. These operations are described in both the 1999 LANL SWEIS and the 2008 LANL SWEIS (DOE 1999a, ch. 2 p. 28-33; DOE 2008a, ch. 3 p. 56-59).

The NNSA pit production mission at LANL is operating below the level of 20 pits per year that was identified in previous NNSA decisions. Actions to support the production of 20 pits per year would include the hiring of additional staff (approximately 1,600); 24-hour operations; the construction of office space, personnel training and parking facilities; waste management facilities, ancillary support (*e.g.*, staging, testing, and utilities); transportation; and equipment removal and installation at PF-4. These supporting pit production actions were not analyzed in this SA because NNSA has already decided to operate at this level (64 FR 50797, 73 FR 55833), and those support actions were previously analyzed in the 2008 LANL SWEIS and other NEPA analyses (DOE 1999a, 2003a, 2008a, 2011, 2015a).

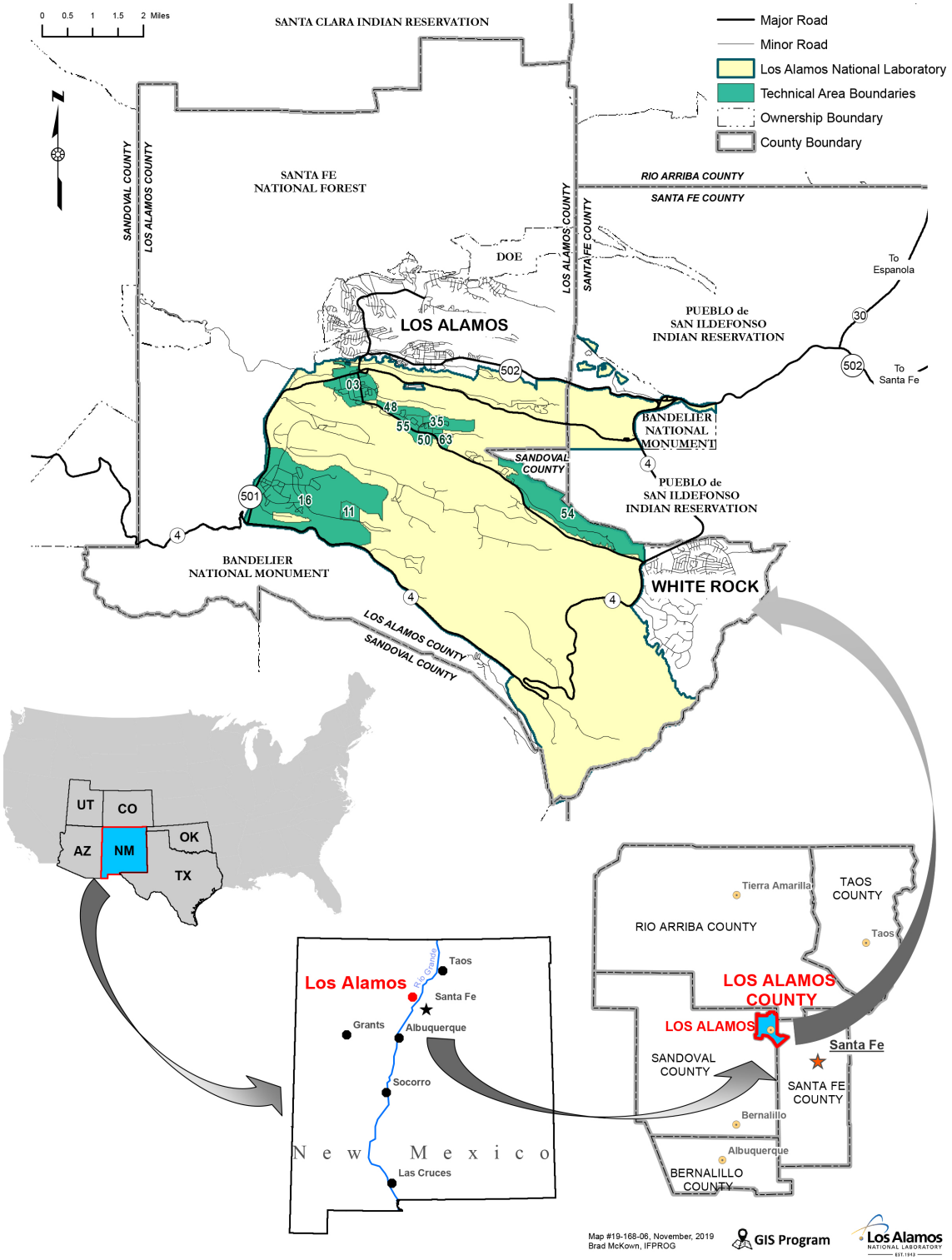

Figure 2-1. Map illustrating the location of Los Alamos National Laboratory and relevant technical areas.

Figure 2-2. The Plutonium Facility Complex at TA-55 with (PF-4) identified.

2.2. Actions for Proposed Pit Production

For purposes of NEPA analyses, actions needed to implement the proposed pit production at LANL were categorized into two groups: (1) actions to produce a minimum of 30 pits per year and (2) actions to provide the ability to implement a short-term surge capacity (up to 80 pits per year) to meet mission needs, if necessary. Actions for 30 pits per year and any surge capacity constitute pit production. It is assumed that actions for 30 pits per year are completed prior to developing the ability to implement a short-term surge capacity. For pit production, NNSA would implement the following actions.

- Remove legacy equipment and install new equipment
- Hire and train approximately 400 additional staff
- Upgrade existing support facilities and construct new support facilities
- Repackage and dispose of MFFF fuel rods
- Implement Replacement Office Buildings Project
- Implement elements of the Security-Driven Traffic Modifications Project
- Management and disposition of additional wastes generated
- Transport additional materials, parts, and waste

Remove Legacy Equipment and Install New Equipment

Equipment that requires removal and/or replacement would be decontaminated and reduced in size to fit into disposal containers. Wastes generated through removal of legacy equipment would include TRU, low-level radioactive waste (LLW), mixed-low-level radioactive waste (MLLW), and chemical waste. Decontamination activities would occur at existing facilities, such as PF-4 at TA-55; the Waste Characterization, Reduction, and Repackaging Facility at TA-50; and the Decontamination and Volume Reduction System and Radioassay Nondestructive Testing Facility at TA-54.

NNSA would install and operate new equipment for pit production to replace aging equipment to meet mission needs in a more efficient manner. The new equipment would provide the ability to produce a minimum of 30 pits per year, with surge efforts to produce 80 pits per year if needed to meet NPR and national policy. This equipment would consist of gloveboxes, hoods, lathes, furnaces, instrumentation, and utility infrastructure. Temporary construction areas for warehouses, management trailers, and laydown areas to support equipment installation, decontamination, and removal would be located within the Perimeter Intrusion, Detection, and Assessment System (PIDAS) at TA-55.

Hire and Train Staff

In order to support a production rate of 30 pits per year, LANL would increase staff by approximately 400 people. Staff reassignments would be required to support any surge efforts, and LANL would evaluate the need for more workers above the initial 400 to support as necessary. Staffing at this level would be sufficient. New staff performing pit production, protective force, and health and safety programs would be assigned to multiple shifts.

Peak annual construction employment would be approximately 200 individuals. Construction workers would be stationed within the Pajarito Corridor for equipment installation activities for approximately five years.

Before new support facilities would be constructed, LANL would provide office space for new staff by reconfiguring space in existing buildings, office trailers, and leased spaces. Prior to the construction of new training facilities, newly hired radiological workers with duties inside PF-4 would receive training at existing facilities or at leased facilities nearby.

Upgrade Existing Facilities and Construct New Support Facilities

NNSA would upgrade existing support facilities and construct new support facilities for pit production. These facilities would provide office space, parking, training space, administrative space, locker rooms, storage, and cafeteria space for staff. The new support facilities are in pre-conceptual design and could be expected to occupy approximately 21 acres. This construction could occur at TAs -3, -48, and -54 (Figure 2-3). To support upgrade and construction efforts, NNSA would establish temporary construction areas within the Pajarito Corridor including warehouses, construction and management trailers, and laydown and staging areas for equipment and personnel.

New office buildings would be sized to accommodate the anticipated hiring needs and would likely be located in TA-48 to be adjacent to the Plutonium Facility Complex. A new multipurpose training facility may have floors designated for training and classrooms, laboratories, office space, conference rooms, a large auditorium, and a cafeteria. Multi-story parking for new staff would be made available onsite (TAs -3, -48, and -54) and offsite (Los Alamos and White Rock) with shuttles to transport staff parking offsite to the Pajarito Corridor. It is anticipated that the new training facility and new parking will be located at TA-48. Co-locating the office, parking, and training facilities near PF-4 would increase the effectiveness of staff and facility support.

During the period of construction (approximately five years), NNSA would use interim measures for providing parking and office space for new staff through (1) leasing and/or purchasing trailers for staff onsite, (2) leasing space in Los Alamos and White Rock, and (3) remodeling existing facilities to make additional office space. Remodeling of existing buildings would be minimal modifications to interiors of existing buildings within the Pajarito Corridor as well as TA-3.

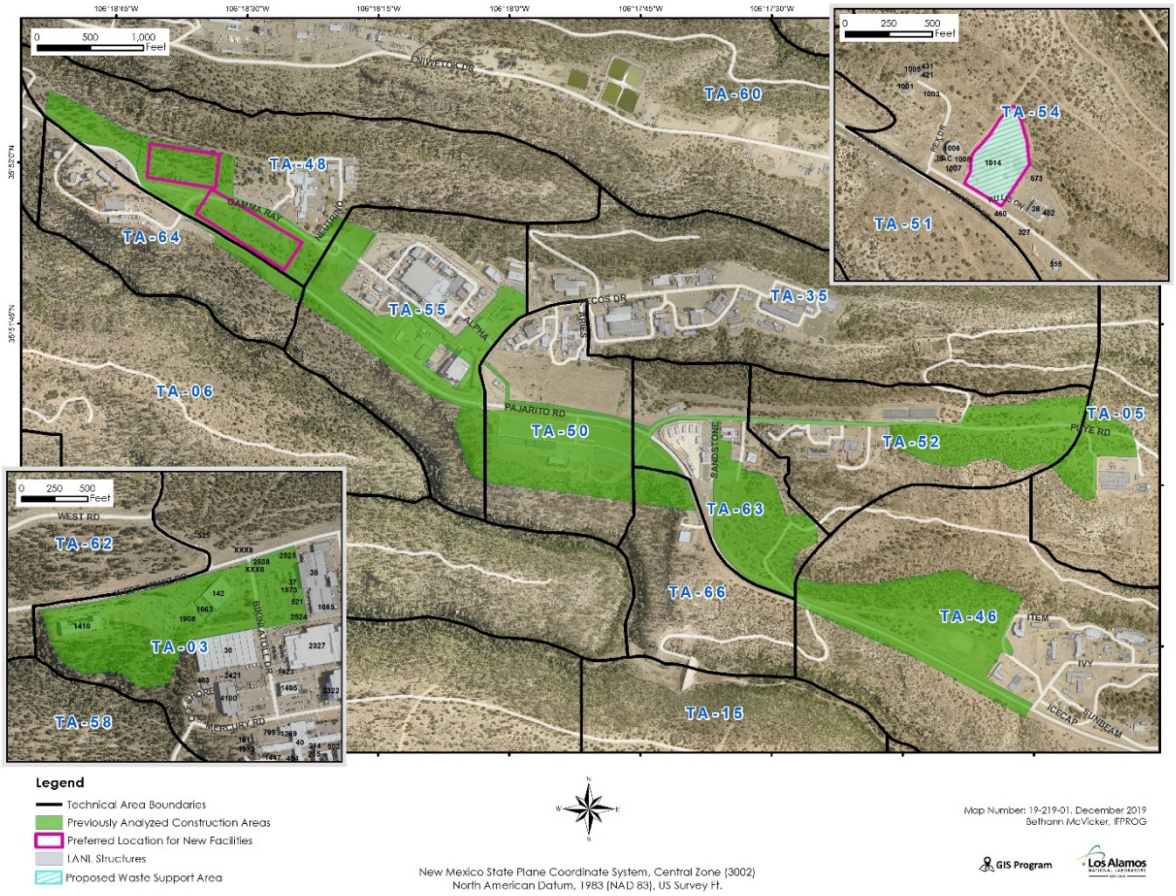

Figure 2-3. Proposed Areas for Support Facilities

Repackage and Dispose of MFFF Fuel Rods

PF-4 provides storage for SNM including fuel rods. Storage, shipping, and receiving of these fuel rods were included in the capabilities and activity levels of the Plutonium Facility Complex in the 2008 LANL SWEIS (DOE 2008a, ch. 3 p. 56-59). NNSA is reconsidering repackaging and disposing of these fuel rods in accordance with the analysis in the 2008 LANL SWEIS under the Expanded Operations Alternative in order to provide space for pit production activities. The fuel rods would be cut into smaller pieces, repackaged, and shipped as TRU waste to WIPP for disposal (*see* Section 3.0 for discussion on waste management impacts).

Implement Replacement Office Buildings Project

NNSA would construct replacement office buildings that would accommodate staff for pit production. NNSA is reconsidering elements of the Replacement Office Buildings Project from the Expanded Operations Alternative in the 2008 LANL SWEIS. Although evaluated in the 2008 LANL SWEIS, this project has not been implemented. These replacement office buildings would provide the flexibility for LANL to house staff in a location that is near TA-55. In order to transport staff from these new office buildings, a shuttling service would be used to take staff to TA-55. Potential impacts from the Replacement Office Buildings Project are analyzed in the 2008 LANL SWEIS (DOE 2008a, ch. 3 p. 115, Table 3-21). These new buildings would be sited in previously disturbed areas primarily in TA-3. NNSA would establish temporary construction areas within the Pajarito Corridor including warehouses, construction and management trailers, and laydown and staging areas for construction equipment and personnel. Construction of these new office buildings would occur at TA-3.

Improvements or upgrades to existing utility infrastructure to support new office buildings would occur within existing utility corridors. These include repairing, re-routing, or upgrades of existing utility lines; addition or moving of fencing or security barriers; extending roads to service new proposed buildings; and other support and maintenance activities.

Implement Elements of the Security-Driven Transportation Modifications

NNSA is reconsidering elements of the Security-Driven Transportation Modification Project from the Expanded Operations Alternative in the 2008 LANL SWEIS. This project considered two parking lots at TA-48 and TA-63 for LANL staff. The lots would include government and personal vehicle parking, with bus transportation to TA-55 (DOE 2008a, Appx. J, p. 3). An option considered in the 2008 LANL SWEIS was for personal vehicles to be parked in TA-48 and TA-63 with bus transportation to TA-55. This option could be implemented if the Replacement Office Buildings Project at TA-3 were constructed. None of the elements analyzed as part of the Security-Driven Transportation Modifications Project have been implemented. Implementing these elements would provide NNSA with flexibility for construction efforts and support for staff in the proposed action.

Waste Management

NNSA would continue waste management operations in addition to supporting pit production. Waste management activities were described in the 2008 LANL SWEIS under the Waste Management Operations: Solid Radioactive and Chemical Waste Facilities and Activity Levels.

These activities include waste characterization, packaging, and labeling; waste transport, receipt, and acceptance; waste treatment; and waste storage (DOE 2008a, ch. 3 p. 52-53). Waste management activities would increase operations for managing TRU, LLW, MLLW, and chemical wastes generated by pit production. Projected estimates of waste produced from proposed pit production are provided in more detail in Section 3.3.5.

Transportation of Material, Parts, and Waste

At LANL, NNSA ships and receives radioactive and other hazardous materials to and from other DOE and non-DOE facilities, including commercial facilities. Transportation activities for material and waste shipments would increase as discussed in Section 3.3.6. If needed, LANL may provide SRS with materials and parts to support the SRS pit production efforts which may include plutonium, beryllium, graphite molds, or metallic and ceramic components.

LANL requires support from other DOE sites (*e.g.*, SRS, Pantex, Kansas City National Security Campus (KCNSC), WIPP, NNSS, and Lawrence Livermore National Laboratory (LLNL)) to provide nuclear and non-nuclear components and materials that are necessary for pit production and offsite waste disposal. The transportation activities and support functions needed by LANL from other sites were addressed in the 2019 Complex Transformation SPEIS SA (DOE 2019a). Table 2-1 depicts the origins of the transportation activities and destinations involving major facilities that support pit production at LANL.

Table 2-1. Types of Shipments, their origination, and their Final Destination to Support Pit Production at LANL

Type of Shipments	Origination	Destination
Existing Pits	Pantex	LANL
New Pits	LANL	Pantex
Plutonium Metal	NNSS, SRS and Pantex	LANL
Enriched Uranium	Y-12	LANL
Nonnuclear Parts	KCNSC	LANL
TRU waste	LANL	WIPP
LLW[a]	LANL	NNSS plus other locations
MLLW	LANL	NNSS
Material Testing	LANL	LLNL
Material Testing	LLNL	LANL

[a] See (LANL 2019d, Tables 3-10, 3-13, and 3-16) for additional facilities LANL's Chemical and LLW.

Construction and Operational Estimates of Pit Production

Table 2-2 provides construction estimates for implementing the proposed action for pit production. The table lists key construction parameters for the proposed action and construction parameters previously analyzed in existing NEPA analyses (2008 LANL SWEIS and 2011 CMRR SEIS). Project designs for constructing support buildings and equipment installation in PF-4 for producing 80 pits per year and producing 30 pits per year would be no greater than the estimates of project designs previously analyzed in existing NEPA analyses (2008 LANL SWEIS and 2011 CMRR SEIS). The estimates for the proposed action is generally smaller since most of the infrastructure has been or would be established through the efforts for 20 pits per year.

Table 2-2. Construction Estimates at LANL

Parameter	This SA Proposed Action	80 Pits Per Year 2008 LANL SWEIS and the 2011 CMRR SEIS
Land Disturbance (acres)	21	134[a]
Construction Duration (years)	5[b]	9[c]
Peak Construction Workforce (persons)	200	790[d]
Peak Electricity (megawatts-electric [MWe])	1.0	12[b]
Peak Water (gallons/year)	2,000,000	4,000,000[d]
Nonhazardous Solid Waste (tons)	3,500	7,100[e]

[a.] This projection is derived from 115 acres of land disturbance from construction activities analyzed in the 2011 CMRR SEIS (DOE 2011, Table 4-14, ch. 4 p. 29); and 13 acres of land disturbance from construction of Replacement Office Buildings Project in 2008 LANL SWEIS (DOE 2008a, Appx. G p. 23); and from 6 acres of land disturbance from construction activities at TA-48 analyzed in the 2008 LANL SWEIS (DOE 2008a, Appx. J p. 13).

[b.] Construction to support 80 pits per year design would take place during the construction period for 30 pits per year design.

[c.] DOE 2011, ch. 4 p. 34.

[d.] DOE 2011, ch. 4 p. 54.

[e] This projection is derived from the 2,600 tons of construction waste analyzed in the 2011 CMRR SEIS (DOE 2011 Table 3-34, ch. 4 p. 68); and 2,550 tons of construction waste analyzed for Replacement Office Buildings Project in 2008 LANL SWEIS (DOE 2008a, Appx. G p. 29); and 1,950 tons of construction waste analyzed for Security Traffic Modifications Project in 2008 LANL SWEIS (DOE 2008a, Appx. J p. 29).

Producing pits at LANL is anticipated to be achieved using multiple shift operations. Table 2-3 presents operational estimates, as analyzed in the 2008 LANL SWEIS Expanded Operations Alternative (DOE 2008a) and as proposed in this SA, for pit production at LANL. The estimates in Table 2-3 indicate (1) producing 30 and 80 pits per year, (2) previous analysis in the 2008 LANL SWEIS, and (3) the site total in the 2008 LANL SWEIS. As shown in Table 2-3, operational estimates associated with the proposed action would be no greater than or not significantly different than estimates previously analyzed in the 2008 LANL SWEIS.

Table 2-3. Operational Estimates at LANL for Pit Production

Parameter	This SA Proposed Action	Prior 2008 LANL SWEIS Analysis (80 Pits Per Year)	Site Totals from 2008 LANL SWEIS
Workforce (persons)	400	1,890[a]	15,394
Radiation Workers (persons)	250	2,344 – 3,849[b]	2,344 – 3,849[b]
Peak Electrical (MWe)	0.6 – 0.4[c]	1.4[d]	124
Domestic Water (gallons per year)	8,200,000[e]	8,200,000[e]	522,000,000
Wastes			
LLW Solid (cubic yards per year)	2,355 – 855[f]	1,400[g]	13,000
MLLW (cubic yards per year)	3.7 – 1.4	20	140
TRU Solid (including Mixed TRU) (cubic yards per year)	400 – 140[f]	690[g]	860
TRU Liquid (cubic yards/year)	5[f]	248[h]	248[h]

[a] (DOE 2008a, ch. 5 p. 121). Staffing for the Expanded Operations Alternative.
[b] (DOE 2008a, ch. 5, p. 104). This estimate includes radiological workers associated with remediation. Not all workers are associated with pit production.
[c] (LANL 2019e)
[d] (DOE 2008a, ch. 5 p. 134). The peak load estimate is for additional load beyond 20 pits per year.
[e] (DOE 2008a, ch. 5 p. 32).
[f] (LANL 2019g)
[g] (DOE 2008a, Table 5-47 ch. 5 p. 149).
[h] (DOE 2008a, Table 5-48 ch. 5 p. 150).

2.3. Considerations for Proposed Pit Production

There are several considerations in existing NEPA documents and decisions that are addressed in this SA for pit production. Considerations that relate to or have bearing on pit production pertain to changes to environmental resource areas since issuance of NEPA documents, changes at LANL regarding programs and operations since issuance of NEPA documents, and changes in NNSA decisions since issuance of NEPA documents. Considerations identified in previous NEPA analyses are considered in this SA to be of relative minor impact or are included in further discussion of potential impacts later in the impacts analysis of this SA (Section 3.0). Considerations are categorized as (1) transportation considerations, (2) the Los Alamos Upgrade Alternative in the Complex Transformation SPEIS, (3) changes to environmental conditions, actions, and decisions in the 2008 LANL SWEIS and the 2018 SWEIS SA, and (4) the changes to the CMRR project as analyzed in the 2003 CMRR EIS, the 2011 CMRR SEIS, and the 2015 CMRR SA.

2.3.1. General Considerations

General considerations from previous NEPA documents as they pertain to the proposal for pit production include:

This SA assumes that the population along the transportation routes has increased in a manner consistent with the overall change of population in the United States. Since 2008, the United States population has increased by approximately eight percent; from 304 million people to approximately 328 million people (Census 2019).

All offsite transportation of pits, plutonium metal, and enriched uranium is assumed to occur by the DOE's Office of Secure Transportation fleet over Federal and State highways to the extent practicable.

2.3.2. Complex Transformation SPEIS

Considerations of the Los Alamos Upgrade Alternative from the Complex Transformation SPEIS (DOE 2008b) for producing up to 80 pits per year at LANL include:

The Los Alamos Upgrade Alternative required upgrade and/or expansion to existing facilities or construction of new facilities to support pit production.

Potential environmental impacts analyzed for the Los Alamos Upgrade Alternative were focused on completion of the CMRR facility and no other construction activities at TA-55. However, several existing and planned LANL facilities were included in the No Action Alternative as they were required to support pit production levels previously decided by NNSA. Resource areas related to this include land use (acres disturbed), utility use (electricity, water, and gas), employment (construction workers), and waste management.

2.3.3. 2008 LANL SWEIS

Considerations of changes in the 2008 LANL SWEIS and the 2018 SWEIS SA as they pertain to the proposal for pit production include: (1) changes to environmental resource areas since the 2008 LANL SWEIS was issued, (2) changes to programs at LANL regarding pit production and environmental management actions, and (3) considerations of construction and operations supporting pit production. Changes to environmental resource areas were reviewed in the 2018 SWEIS SA. Since issuance of the 2018 SWEIS SA, there have been no additional substantial changes to environmental resource areas.

Both the 1999 and 2008 LANL SWEIS describe LANL's plutonium operations including the production of pit components (DOE 2008a, ch. 3 p. 56-59; DOE 1999a, ch. 2 p. 28-33). Processes and procedures for pit production, as analyzed in the 2008 LANL SWEIS (DOE 2008a, ch. 3, p. 56-57), have not fundamentally changed from those described and analyzed in the 1999 LANL SWEIS (DOE 1999a).

The 2008 LANL SWEIS evaluated cumulative impacts associated with constructing and operating a consolidated plutonium center of excellence which would entail storage and production of 125 pits with a potential surge capacity of 200 pits annually (DOE 2008a, ch. 5 p. 212).

The Expanded Operations Alternative in the 2008 LANL SWEIS analyzed potential environmental resource impacts from production of 80 pits per year at LANL. These impact projections from production are used for the basis of the analysis in this SA.

NNSA notes that LANL has a new management and operating contractor and that DOE-Office of Environmental Management hired their own legacy clean up contractor in 2018. The NNSA LANL management and operating contractor and the DOE-Environmental Management legacy clean up contractor continue to execute their respective NNSA and DOE-Environmental Management mission activities at LANL. Portions of TA-54 are operated by DOE-Environmental Management.

Several of the new support facilities associated with pit production are in a pre-conceptual design stage. The best available design information was used for the analysis in this SA. Where appropriate, reasonable but bounding estimates were used so that implementation of any final designs are expected to result in lesser impacts than those presented in this SA. Although the impacts of the final design are not certain at this time, LANL does implement administrative controls[6] and processes to minimize potential impacts. Both construction and operational impacts are considered for all resources. Construction impacts are generally short-term (approximately five years), while operational impacts are expected to be long-term (*i.e.*, would occur annually over a 50-year operating period).

[6] These controls include LANL's Integrated Review Tool used to solicit input from over 40 subject matter experts when a project is first conceived; the use of engineered controls, administrative procedures, or personnel protective equipment as part of LANL's As-Low-As-Reasonably-Achievable program; best management practices; controls from air and water permitting; Cultural Resources Management Plan; and the Habitat Management Plan.

Potential security and waste management support facilities, like those proposed for pit production (Figure 2-3), are analyzed in the 2008 LANL SWEIS in Appendix L, Support Activities (DOE 2008a) and in the 2018 LANL SWEIS SA to the 2008 LANL SWEIS (DOE 2018a). LANL would conduct a project review to identify the requirements that could lessen the potential of environmental impacts from constructing such support facilities.

2.3.4. 2003 CMRR EIS, 2011 CMRR SEIS, and 2015 CMRR SA

Considerations from the CMRR project as analyzed in the 2003 CMRR EIS, the 2011 CMRR SEIS, and the 2015 CMRR SA include:

The 2003 CMRR EIS analyzed construction of new administrative and support buildings that would support pit production at LANL (DOE 2003a, ch. 1 p. 9; ch. 2 p. 10). These facilities have not been built. The support buildings were to be located outside of the PIDAS, similar to support buildings identified in the proposed action of this SA (DOE 2003a, ch. 2 p. 10).

The 2015 CMRR SA to the 2003 CMRR EIS proposed action addressed changes to the proposed relocation of AC/MC capabilities. The proposed locations were at a new radiological facility and PF-4. Other changes to the proposed action include installing new equipment in PF-4 and RLUOB, removing aging equipment through decontamination and size reduction, and constructing new support facilities to house offices, parking garages, and training facilities (DOE 2015a, p. 5-6). Installation of equipment is ongoing while construction of new support facilities has not been initiated.

3.0 POTENTIAL IMPACTS

3.1. Introduction

The analysis in this section is to determine (1) if the potential impacts of pit production would be different from those analyzed in the 2008 LANL SWEIS and other relevant NEPA documents, and (2) if so, whether those differences would be considered significant in the context of NEPA (40 CFR 1508.27) which could require preparation of a supplement to the 2008 LANL SWEIS or a new EIS. Identifying and qualifying potential environmental impacts from pit production informs NNSA's decision to implement pit production beyond what has been previously decided.

Potential impacts evaluated in this SA are those impacts associated with the production of a minimum of 30 pits per year and those associated with the production of 80 pits per year. This SA compares potential impacts of pit production to those impacts that were identified in the 2008 LANL SWEIS and other relevant NEPA documents. The evaluation of potential impacts is based on the considerations for pit production as identified in Section 2 of this SA. Any potential impact that would be no greater than or equal to those impacts analyzed in the 2008 LANL SWEIS is a strong indicator that no additional NEPA documentation would be required.

3.2. Potential Environmental Impacts

Resource Areas with Minor or Negligible Impacts

As part of the environmental impact analysis for this SA, NNSA analyzed each of the environmental resource areas identified in the 2008 LANL SWEIS for potential impacts. The environmental resource areas that are considered to have minor or negligible impacts and are not different from what was analyzed in previous NEPA analyses are summarized in Table 3-1. These resource areas include land use, visual resources, geology and soil (excluding seismic), water resources, air quality, noise, ecological resources, cultural resources, infrastructure, facility accidents, and intentionally destructive acts. Potential impacts to environmental resources associated with pit production are compared to the impacts previously analyzed in the 2008 LANL SWEIS, 2018 LANL SWEIS SA, and other relevant NEPA documents to evaluate whether the previous analysis remains sufficient. In Table 3-1, NNSA presents a qualitative analysis that identifies differences of environmental impacts between previous analyses and the proposed action described in this SA

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
Land Use	The 2003 CMRR EIS has been incorporated by reference into the 2008 LANL SWEIS, and it analyzes approximately 27 acres of disturbance at TA-55 from constructing a new CMRR facility, associated support buildings, and parking areas. The 2003 CMRR EIS determined that the approximate land disturbance was consistent with the 1999 LANL SWEIS analysis (DOE 2003a, ch.4 p. 12) and the 2000 LANL Comprehensive Site Plan designations of the area (LANL 2000). In addition to the 27 acres analyzed, the 2011 CMRR SEIS analyzed approximately 60 acres (50 undeveloped acres) that would be disturbed under the Modified CMRR-NF Alternative by construction and laydown areas along Pajarito Corridor (DOE 2011, ch 4 p 29). Lastly, the Security-Driven Transportation Modifications Project in the 2008 LANL SWEIS did evaluate approximately 30 acres for the project, including parking at TA-48 and TA-63. These areas are also being considered in this SA (DOE 2008a, Appx. J).	(1) Potential impacts to land use include developing undisturbed land. The construction of support facilities or additions to existing structures that would support producing 80 pits per year would disturb approximately 21 acres. Development and operations for producing 80 pits per year would be consistent with surrounding land use. (2) Construction, development, and operations regarding land use required for producing 30 pits per year would not be greater than those for producing 80 pits per year would.	**No.** Potential impacts to land use from construction, development, and operations associated with the proposed action would be no greater than the impacts previously analyzed (DOE 2003a, 2008a, 2011).
Visual Resources	The 2011 CMRR SEIS analyzed impacts to visual resources from construction projects along the Pajarito Corridor in the Modified CMRR-NF Alternative. Construction would occur within or adjacent to developed areas along the Pajarito	(1) Potential impacts to viewsheds are related to the construction of new support buildings for producing 80 pits per year. Construction activities would be short-term and temporary. Any permanent changes would be consistent with	**No.** Potential visual impacts from construction would be no greater than those

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
	Corridor. There would be little change in the industrial appearance of the area. New construction in these areas would not represent a significant change in the visual environment (DOE 2011, ch 4 p. 32).	adjacent developed areas. Internal or external modification to existing buildings would have no visual impacts. Installation of equipment inside PF-4 would have no impacts to visual resources. No permanent changes to viewsheds are expected from operations for producing 80 pits per year. (2) Potential impacts to viewsheds related to construction of new support buildings for producing 30 pits per year would not be greater than those for producing 80 pits per year No permanent changes to viewsheds are expected from operations for producing 30 pits per year.	impacts previously analyzed (DOE 2011)
Geology and Soils (seismic addressed in Section 3.3.1)	The 2008 LANL SWEIS analyzed impacts to geology and soils from construction projects and demonstrated that impacts were directly linked to the amount of land disturbance associated with construction. With appropriate mitigation and Best Management Practices (BMP) in place, impacts to geology and soil would be minimized. Proposed facility construction and demolition are not likely to alter LANL subsurface conditions (DOE 2008a, ch. 5, p. 20-24). The 2011 CMRR SEIS also analyzed impacts to geology and soils, such as soil erosion, removal of soil and mineral resources, and temporary stockpiling of soils, from construction projects within TAs -48, -55, and -63 (DOE 2011, ch. 4 p. 44).	(1) Impacts to geology and soils would be associated with ground disturbance (construction of support buildings, building modifications, or modifications to existing roads and infrastructure) in support of producing 80 pits per year. Potential impacts to geology and soils are anticipated to be minor and temporary. Appropriate mitigation measures, permits, and BMPs would be used to minimize soil erosion and loss of soil and mineral resources. No potential impacts to geology and soils are anticipated from operations for producing 80 pits per year. (2) Potential impacts to geology and soils from ground disturbance for producing 30 pits per	**No.** Potential impacts to geology and soils from the proposed action would be no greater than impacts previously analyzed (DOE 2008a, ch. 5 p. 20; (DOE 2011, ch. 4 p. 44). Potential impacts related to seismic conditions are discussed in more detail in Section 3.3.1.

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
		year would not be greater than those for producing 80 pits per year. No potential impacts to geology and soils are anticipated from operations for producing 30 pits per year.	
Water Resources	The 2008 LANL SWEIS analyzed impacts to water resources from construction and decontamination activities and impacts to groundwater from liquid effluent discharge from operations. Minor short-term impacts to water quality from construction activities were anticipated, including accelerated erosion that could result in sediment transport offsite. Potential impacts to groundwater quality include liquid effluent releases to permitted outfalls. Compliance with requirements under the Clean Water Act, the National Pollutant Discharge Elimination System Construction General Permit, and Section 404 and 401 permits are monitored regularly, and any instances of contamination are minimized and mitigated through installation of erosion and sediment controls specified in storm water pollution prevention plans (DOE 2008a, ch 5, p. 31-41). The 2011 CMRR SEIS analyzed impacts to water resources from construction. Construction was estimated to use up to five million gallons of water over nine years (DOE 2011, ch. 4 p. 33, Table 4-15). Potential impacts	(1) Potential impacts to water resources are associated with construction and building modifications in support of producing 80 pits per year. Two million gallons per year is estimated for use during construction over five years. Storm water runoff could potentially impact downstream surface-water quality. Storm water and sediment controls, pollution prevention plans, and BMPs would be implemented to minimize sediment transport and impacts to surface water and groundwater resources. Construction is not anticipated to change the annual liquid effluent discharge volumes from PF-4 to Outfall 03A181 in Mortandad Canyon. No potential impacts from operations are anticipated from producing 80 pits per year as there are no anticipated liquid effluent discharge volumes from PF-4 to Outfall 03A181. (2) Potential impacts to water resources from construction for producing of 30 pits per year would not be greater for producing 80 pits per year. No potential impacts from operations are anticipated from producing 30 pits per year as	**No.** Potential impacts from construction and building modifications in the proposed action would be no greater than the impacts previously analyzed (DOE 2008a, ch. 5, p. 31, 40; (DOE 2011, ch. 4 p. 47-48). Potential impacts from operations for the proposed action would be no greater than the impacts previously analyzed (DOE 2008a, ch 5 p. 34).

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
	to surface-water quality would be mitigated through implementation of storm water pollution prevention plans and BMPs. Impacts to groundwater are not anticipated from construction activities (DOE 2011, ch. 4 p.47-48).	there are no anticipated liquid effluent discharge volumes from PF-4 to Outfall 03A181.	
Air Quality	The 2018 LANL SWEIS SA evaluated non-radiological air emissions of criteria pollutants, hazardous air pollutants, and volatile organic compounds from 2008 through 2016. The 2018 LANL SWEIS SA determined that these emissions were well below the facility-wide Title V Operating Permit limits at LANL (DOE 2018a, p. 86). Most of the non-radiological emissions from PF-4 were not associated with pit production (DOE 2008a, ch. 5 p. 53-54). The 2018 LANL SWEIS SA analyzed impacts from greenhouse gas emissions at LANL to anticipated demand for electrical power (DOE 2018a, p. 144-145). The 2011 CMRR SEIS analyzed potential impacts from greenhouse gas emissions with 32,600 tons of carbon dioxide equivalent (CO_2^e)[7] from construction activities (DOE 2011, ch. 4 p. 40, Table 4-21).	(1) Potential impacts to air quality from non-radiological air emissions include construction activities, waste management operations, decontamination activities, and commuting staff supporting production of 80 pits per year. Temporary impacts are anticipated from construction and decontamination activities, and are anticipated to be minor and would not result in violations of the National Ambient Air Quality Standards. Minor impacts are anticipated from waste management operations (DOE 2008a, Appx. C p. 21, Table C-13) and commuting staff (DOE 2008a, ch. 3 p. 88-102, Table 3-19). The projected increase in LANL staff would cause a minor increase in vehicle emissions along existing routes used to access the site. Production of 80 pits per year would not result in a significant increase in greenhouse gas emissions from operations.	**No.** Potential impacts from non-radiological air emissions and greenhouse gases from construction and operations in the proposed action would be no greater than the impacts previously analyzed (DOE 2008a, ch. 5 p. 53-54). Potential impacts from radiological air emissions during operations would be no greater than radiological emissions previously analyzed

[7] Carbon dioxide equivalent (CO_2^e) is a quantity that describes the amount of CO_2 that would have the same global warming potential when measured over a specified timescale (typically 100 years). CO_2^e includes CO_2, methane (CH_4), and nitrous oxide (N_2O).

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
	The 2008 LANL SWEIS Expanded Operations Alternative analyzed potential radiological air emissions from operations at PF-4. A small annual release (3.6×10^{-5} curies per year) was estimated from production of up to 80 pits per year (DOE 2008a, Appx. C p. 21).	NNSA estimates that production of 80 pits per year would result in an emission of 1.2×10^{-7} curies per year (LANL 2019j). (2) Potential impacts from non-radiological air emissions and greenhouse gas emissions for producing 30 pits per year would not be greater for producing 80 pits per year. Impacts from radiological air emissions are anticipated to be minor for producing 30 pits per year (4.5×10^{-8} curies per year) (LANL 2019j).	(DOE 2008a, Appx. C p. 21).
Noise	The 2011 CMRR SEIS Modified CMRR-NF Alternative analyzed minor increases in noise from construction activities and traffic (DOE 2011, ch. 4, p. 42-43). Noise impacts are not expected to exceed Los Alamos County noise ordinances (DOE 2008a, ch. 5, p. 71-72).	(1) Potential impacts from noise are associated with construction of support buildings and increased traffic for producing 80 pits per year. Construction activities may temporarily increase the ambient noise in construction areas along the Pajarito Corridor, TA-3, and TA-16. Noise receptors may notice an increase from additional traffic and minor interior construction. Short-term increase in ambient noise would be associated with an increase in commuting workers and 24-hour operations. No long term impacts from noise are anticipated for operations of producing 80 pits per year. (2) Potential impacts from construction and traffic noise for producing 30 pits per year would not be greater for producing 80 pits per year.	**No.** Potential impacts from noise from construction would be no greater than those impacts previously analyzed (DOE 2008a, ch. 5 p. 71-72; DOE 2011, ch. 4 p. 42-43).

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
		Operational noise from producing 30 pits per year is not anticipated to be greater than current ambient noise levels.	
Ecological Resources	The 2008 LANL SWEIS Expanded Operations Alternative addressed potential impacts from construction, land disturbance, water use and discharge, and noise to ecological resources (*e.g.,* forests, wildlife, protected and sensitive species, and wetlands) (DOE 2008a, ch. 5, p. 75-77). There is limited acreage of undeveloped land that may be cleared. Clearing this land could contribute to potential loss of habitat and displacement of wildlife. Construction impacts could impact both core and buffer[8] habitat of the Mexican Spotted Owl. NNSA received concurrence from the U.S. Fish and Wildlife Service that construction may affect, but is unlikely to adversely affect, the Mexican Spotted Owl due to removal of a small portion of potential habitat (DOE 2011, ch. 4 p. 49-52). TA-55 is mostly located on developed land, therefore minor impacts to vegetation and no impacts to wetlands would occur.	(1) Potential impacts to ecological resources would be associated with construction of support buildings for producing 80 pits per year. The Pajarito Corridor includes core and buffer habitats for the Mexican spotted owl in undeveloped areas. Habitat disturbance from construction activities would be minor (less than one acre), with some tree and vegetation removal. LANL and NNSA would follow the Laboratory's habitat management plan to ensure that potential impacts to ecological resources are minimized. If requirements outlined in the *Threatened and Endangered Species Habitat Management Plan* (LANL 2017b) are followed, no significant impacts to ecological resources would be expected. Preferred construction areas for the project are not located in core habitat. If project changes occur that result in potential impacts to core habitat, DOE would prepare a biological assessment and submit to the U.S. Fish and	**No.** Potential impacts to ecological resources from construction would be no greater than those impacts previously analyzed (DOE 2008a, ch. 5 p. 75-77; DOE 2011, ch. 4 p. 49-52).

[8] Suitable habitats for federally listed species on the LANL site have been designated as Areas of Environmental Interests are managed for species protection, and consist of core and buffer habitats. Core habitat protects areas essential to the existence of a species; buffer habitat protects core areas from undue disturbance and habitat degradation (LANL 2017b).

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
		Wildlife Service for consultation and concurrence. Potential impacts to aquatic and wetland resources related to construction are not anticipated. No impacts are anticipated to ecological resources from operations of producing 80 pits per year. (2) Potential impacts to ecological resources from construction for producing 30 pits per year would not be greater for producing 80 pits per year. No impacts are anticipated to ecological resources form operations of producing 30 pits per year.	
Cultural Resources	The 2008 LANL SWEIS identified that new construction projects under the Expanded Operations Alternative would potentially impact cultural resources (DOE 2008a, ch. 5 p. 111). Construction activities associated with pit production that have the potential for adverse effects on cultural resources would be evaluated and mitigated according to the LANL's Cultural Resources Management Plan (LANL 2017a) and the Programmatic Agreement (DOE 2017b). The 2011 CMRR SEIS analyzed potential impacts to cultural resources from the construction of new support buildings in the Pajarito Corridor (DOE 2011, ch. 4 p. 53).	(1) Potential impacts to cultural resources would be associated with construction of support buildings for producing 80 pits per year where resources are present. There is one identified archaeological site within the proposed area to construct new support facilities in TA-48. LANL and NNSA would follow the LANL's Cultural Resources Management Plan (LANL 2017a) and the Programmatic Agreement (DOE 2017b) between DOE and stakeholders for complying with the National Historic Preservation Act and minimize potential impacts to cultural resources. Potential impacts to cultural resources that require mitigation would be consulted on with the NM State Historic Preservation Office. Based on	**No.** Potential impacts to cultural resources associated with construction in the location of the proposed action would be no greater than those impacts previously analyzed (DOE 2008a, ch. 5 p. 111; DOE 2011, ch. 4 p. 53). The potential impacts from pit production would be reduced by following

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
	The 2008 LANL SWEIS discussed potential impacts from construction activities and operations to traditional cultural properties (TCPs[9]) at LANL. A consultation process is in place to address possible impacts to these properties at LANL (DOE 2008a).	information regarding TCPs and consultations with descendant communities presented in the 1999 LANL SWEIS and 2008 LANL SWEIS analyses, no potential impacts to cultural resources are anticipated from operations of producing 80 pits per year. (2) Potential impacts to cultural resources from construction for producing 30 pits per year would not be greater for producing 80 pits per year. No impacts to cultural resources are anticipated from operations of producing 30 pits per year.	the requirements for protecting sensitive areas. Adverse impacts are not anticipated if requirements outlined in the Cultural Resources Management Plan are followed (LANL 2017a). If sites cannot be avoided, a consultation with the NM State Historic Preservation Office, descendant communities, and/or the relevant Tribal Historic Preservation Officers in accordance with Section 106 of the National Historic Preservation Act would be conducted

[9] Traditional cultural properties (TCPs) are tangible and intangible resources that are integral to the traditional practices and cultural affiliation of Native American and other ethnic groups. Examples of TCPs located at LANL can be, but are not limited to: ceremonial and archaeological sites, natural features, ethnobotanical sites, artisan material sites, and subsistence features (DOE 2008a).

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
			(DOE 2011, ch. 4 p. 54). A consultation process is in place to address possible impacts to these properties at LANL
Infrastructure	The 2008 LANL SWEIS identified minor incremental increase in utility demands for pit production. TA-55 could require an additional 1.4 megawatts in electric peak load and 8.2 million gallons of water annually (DOE 2008a, ch. 5, p. 124-134). The 2018 LANL SWEIS SA estimates that LANL would use approximately 103 megawatts in electric peak load by 2022. The site capacity for electric peak load would be 168 megawatts by 2022 (DOE 2018a p. 108). LANL would consume approximately 351 million gallons of water across the site by 2022. The site capacity is estimated to be 542 million gallons annually (DOE 2018a, p. 109). TA-55 generally contributes less than five percent of LANL's consumption of water and electricity (DOE 2008a, ch. 5 p. 134) and LANL operates well under capacity (DOE 2018a, Section 3.11.2).	(1) Potential impacts regarding infrastructure would be associated with utilities needed for construction of support buildings and an incremental increase in utility demands for producing 80 pits per year. Construction of support buildings would require approximately 1.0 megawatt of electric peak load and approximately 2 million gallons of water for dust suppression, during the construction period of five years. Operations of producing 80 pits per year would require approximately 0.6 megawatts in electric peak load (LANL 2019e) and 8.2 million gallons per year (DOE 2008a, ch. 5 p. 134). (2) Potential impacts from construction of support facilities for producing 30 pits per year would not be greater for producing 80 pits per year. Approximately 0.4 megawatts of peak power (LANL 2019e) and 1.7 million gallons of water would be required for construction activities associated with pit production.	**No.** Potential infrastructure impacts from the proposed action would not be greater than the impacts previously analyzed (DOE 2008a, ch. 5, p. 124-134).

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
Facility Accidents	Radiological and chemical accidents were analyzed in the 2008 LANL SWEIS. The accident scenarios that resulted in potential release include facility fires, wildfires, and earthquakes. Based on the postulated accident scenarios, the Maximally Exposed Individual (MEI)[10] could receive a dose[11] of 150 rem from an earthquake resulting in an increased latent cancer fatality (LCF) risk of 0 (0.17). The resultant dose to the population within 50 miles would be 14,000 rem which could result in nine LCFs (DOE 2008a, ch. 5, p. 191, Table 5-71). The 2008 LANL SWEIS analyzed operational accident dose and LCF risk to non-involved workers, the MEI, and the offsite population at 50 miles from a material staging area fire at PF-4. Non-involved workers could receive a collective dose of 1,600 rem with a LCF risk of 1.0. The MEI could receive a dose of 73 rem with an LCF risk of 0 (0.087). The offsite population could	(1) Potential impacts related to consequences of accidents are dependent on the amount of material-at-risk (MAR)[12] in a facility and not the number of pits produced. MAR is administratively limited in TA-55 to reduce potential consequences to human health and the environment and is documented in the 2018 Documented Safety Analysis (DSA) for TA-55 (LANL 2018a). The 2018 DSA projected potential exposure to the MEI in a seismic event with a fire to be 16.8 rem (LANL 2018a, ch. 3 p. 321) resulting in an increased LCF risk of 0.01. Production of 80 pits per year would not increase the amount of plutonium available for an accident because the MAR limit would remain the same within PF-4 (LANL 2018a). Probabilities of risk postulated in the accident scenarios are expected to remain unchanged from those analyzed in the 2008 LANL SWEIS (LANL 2018a, ch. 1 p. 27).	**No.** The potential impacts from facility accidents associated with the proposed action would not be greater than those previously analyzed (DOE 2008a, ch. 5 p. 191; LANL 2018a). The population in the Region of Influence (ROI) has increased approximately six percent since 2008 (NM-IBIS 2018), which does not constitute a significant change and would not significantly increase

[10] Maximally exposed individual—a hypothetical individual whose location and habits result in the highest total radiological or chemical exposure (and thus dose) from a particular source for all exposure routes (*i.e.*, inhalation, ingestion, direct exposure, resuspension).
[11] Dose—a generic term meaning absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or committed equivalent dose. For ionizing radiation, the energy imparted to matter by ionizing radiation per unit mass of the irradiated material (*e.g.*, biological tissue). The units of absorbed dose are the rad and the gray. In many publications, the rem is used as an approximation of the rad.
[12] Material-at-risk (MAR) is nuclear material that may be involved in a postulated accident. MAR quantities used in accident analyses are based on conservative bounding assumptions that balance risk of consequences from accident scenarios along with capabilities in nuclear facilities.

Table 3-1. Potential Impacts of pit production

Resource Area	Impacts Analyzed in the 2008 LANL SWEIS or other Relevant NEPA Documents	Potential Impacts from Production of (1) 80 Pits Per Year, and (2) 30 Pits Per Year	Is there a Significant Difference in Environmental Impacts?
	receive a dose of 9,000 person-rem and the LCF risk would be 5.4 (DOE 2008a, ch. 5, p. 181-182, Table 5-63 and Table 6-64).	(2) Potential impacts to the MEI for producing 30 pits per year would not be greater than those for producing 80 pits per year, because the MAR limit in PF-4 is not anticipated to change (LANL 2018a).	potential population doses from accidents.
Intentionally Destructive Acts	NNSA prepared a classified Appendix for the 2008 LANL SWEIS, which analyzed the potential impacts of intentional destructive acts (*e.g.*, sabotage, terrorism). The conclusion in the classified Appendix can be summarized as follows: "Depending on the malevolent, terrorist, or intentionally destructive acts, impacts may be similar to or could exceed bounding accident impacts analyses prepared for the SWEIS" (DOE 2008a, ch. 5, p. 204).	(1) Potential impacts of intentional destructive acts are generally a function of the MAR quantity in the facility. Pit production at the Plutonium Facility Complex would not increase the amount of plutonium in the facility at any one time and would not increase the risk postulated in the intentional destructive acts scenarios. In preparing this SA, NNSA reviewed the classified Appendix that was prepared for the 2008 LANL SWEIS addressing intentional destructive acts. As a result of that review, NNSA concluded that the classified Appendix analysis is reasonable and adequate to represent the proposed action in this SA and does not need to be revised (LANL 2019f).	**No.** The potential impacts from intentional destructive acts in the proposed action would not be greater than impacts previously analyzed (DOE 2008a, ch. 5 p. 204) and is consistent with the review of the classified Appendix (LANL 2019f).

3.3. Potential Environmental Impacts Discussion

Environmental resource areas that require additional analysis or to address public concerns are reviewed in more detail in the following subsections. These resource areas consist of seismic geology and earthquakes (facility accidents), human health, socioeconomics, environmental justice, waste management, and transportation. Criteria for this additional discussion may include perceived risk or issues raised by public comments to the 2019 Complex Transformation SPEIS SA (DOE 2019a).

Potential impacts to environmental resources associated with pit production are discussed in three parts. First, a description of the affected environment associated with that resource is provided. This description incorporates the 2008 LANL SWEIS (DOE 2008a) and the 2018 LANL SWEIS SA (DOE 2018a) by reference as the baseline for consideration of potential changes to environmental conditions and potential impacts from the proposed action as well as any new information related to resource areas since issuance of these documents. Specific potential environmental impacts that pertain to the evaluated resources from the 2008 LANL SWEIS, or other relevant documents, are also presented. Second, a brief description and analysis of any potential impacts to that resource area from the proposed action are presented. Finally, NNSA describes how those impacts are different from impacts in previous NEPA documents.

3.3.1. Geology – Seismic and Earthquakes

Affected Environment, Existing NEPA Analysis, and New Information

The 2008 LANL SWEIS describes the geologic conditions as related to seismic activity and risk surrounding LANL. LANL sits on the Pajarito Plateau, on the eastern flank of the Jemez Mountains and along the active western margin of the Rio Grande rift. The geology of the LANL area is the result of complex faulting, sedimentation, volcanism, and erosion over the past 20 to 25 million years. The dominant contributor to seismic risk at LANL is the Pajarito fault system, which forms the local active western boundary of the Rio Grande rift in the vicinity of LANL. The main element of the system is the Pajarito fault; secondary elements include the Rendija Canyon fault, the Guaje Mountain fault, and the Sawyer Canyon fault (DOE 2008a, ch. 4 p. 15-22). In 2007, a comprehensive update to the 1995 seismic hazard analysis of LANL was completed and incorporated in the 2008 LANL SWEIS analysis (DOE 2008a). The 2007 comprehensive update (URS 2007) indicated that the seismic hazard was higher than previously understood.

DOE evaluates seismic hazards and risk to structures that hold nuclear materials to ensure that nuclear material is not released into the environment from a seismic event. The evaluation considers the design of the facility, MAR quantities, the likelihood and severity of a potential seismic event, and the impact that event would have on the structure. A potential seismic hazard is based on a prediction of ground motion that can be produced from an earthquake. The U.S. Geological Survey (USGS) produces National Seismic Hazards Maps that contain data and maps that describe earthquake ground motions at various probability levels. The most recent publication of the National Seismic Hazards Maps is depicted in the 2014 USGS Report. USGS National Seismic Hazards Maps are derived from seismic hazard curves that describe the annual

frequency of exceeding the set of ground motions in relation to probabilistic ground motion occurrence. Spectral accelerations are calculated based on the anticipated hazard curves and annual frequency to determine the potential impact ground motion would have on structures. The spectral accelerations based on the USGS National Seismic Hazards Maps are often applied to seismic provisions in civic building codes (*i.e.*, American Society of Civil Engineers [ASCE]-7), insurance rate structures, risk assessments, and other public policy.

NNSA used the USGS online tool to identify the peak ground acceleration (PGA) at firm rock and the modified PGA at the surface.[13] These two PGAs were used to determine if the earthquake hazard based on PGA, as depicted in the 2014 USGS Report, has significantly changed since the issuance of the 2008 USGS Report. The modified PGA at the surface is calculated to account for local site amplification. To compute the modified PGAs for LANL, NNSA assumed a site Class D and a Risk Category III structure. A site Class D is an area with stiff soil and is more susceptible to elevated ground motion (Kelly 2006). A Risk Category III structure is a critical facility most commonly associated with utilities that is required to protect the health and safety of a community (ASCE-7 Table 1604.5).

At LANL, the coordinates of PF-4 (35.8367 N, 106.3029 W) were entered into the USGS online tool to calculate an estimate of the PGA at firm rock with two percent probability of exceedance in 50 years for both the USGS 2008 Report and the USGS 2014 Report. Based on the calculation, the PGA at LANL changed from approximately 0.224 g[14] in 2008 to approximately 0.225 g in 2014, which represents an increase in predicted ground motion of less than 0.5 percent. NNSA also evaluated the PGA at rock values on contour maps provided by USGS in order to check the values obtained using the online calculator. The mapped values for LANL are well within the online calculator values.

The USGS online tool calculated that the modified PGA at the surface, corrected for site Class D, with two percent probability of exceedance in 50 years, changed from approximately 0.303 g in 2008 to approximately 0.31 g in 2014. The change represents an increase in predicted ground motion of about two percent.

DOE has developed a set of design criteria (DOE 2016b) that incorporates more stringent requirements than ASCE-7 or the International Building Code for the development of natural

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[13] In 2014, the U.S. Geological Survey (USGS) issued a report entitled "Documentation for the 2014 Update of the United States National Seismic Hazards Maps (USGS 2014 Report) (Petersen et al. 2014). The USGS 2014 Report provides seismic hazard maps by geographic area of the entire country. The USGS provides an on-line tool where specific geographic coordinates (latitude/longitude) can be entered to obtain various parameters that help identify potential seismic hazards in a geographic area. A similar tool is provided by the American Society of Civil Engineers (ASCE) that incorporates USGS data to help compute ground motion parameters. Access to the USGS design ground motion values for a particular latitude, longitude, risk category, and site class, may be obtained at https://earthquake.usgs.gov/ws/designmaps/. The ground motion values for the 2008 National Hazards Maps may be obtained either by using the 2009 National Earthquake Hazard Reduction Program Standard or 2010 ASCE Y Standard. The values for the 2014 National Hazards Maps may be obtained using either the 2015 National Earthquake Hazard Reduction Program Standard or the 2016 ASCE 7 Standard.

[14] A gravitational force of 1 g is equal to the conventional value of gravitational acceleration on Earth's surface (9.8 meters per second per second).

phenomena hazards assessments. Since DOE requirements are more stringent than ASCE-7 building codes, DOE nuclear facilities must meet the applicable DOE orders. DOE requires a site-specific probabilistic seismic hazards assessment (PSHA) for the design of critical facilities, including high-risk structures. The site-specific PSHA involves extensive field work including geologic mapping, fault excavation, geophysics, geologic age dating, evaluation of seismic (vibratory ground motion) wave propagation through rock and soil layers, expert judgement, and peer review. Many parameters for specific siting of facilities are evaluated including PGA, peak ground velocity, and peak ground displacement to define potential hazards. The development of these values is achieved by developing seismic source models and ground motion models. These parameters, and subsequent models, are affected by local variables such as bedrock type, depth to bedrock, and local soil thickness. The incorporation of these parameters and extensive evaluations in a focused PSHA site study can increase or decrease design ground motions as compared to the USGS National Seismic Hazards Maps.

Although data from the USGS National Seismic Hazards Maps are used in the development of PSHAs, the USGS maps are not a substitute for a PSHA. Each site-specific PSHA study, as well as the USGS, follows a similar basic framework in producing seismic hazard analyses. However, LANL site-specific PSHA studies incorporate detailed, site-specific geologic, geophysical, and geotechnical information that are not readily available to researchers at the USGS to determine hazard curves. Figure 3-1 shows the difference in the site-specific hazard curves as derived from 2008 and 2014 USGS data and PSHA studies for TA-55 and LANL site-wide. Based on the hazard curves presented in Figure 3-1, site-specific seismic hazard predictions determined in PSHA studies are greater than those based on the USGS National Seismic Hazards Maps. By incorporating PSHA studies in critical facility design criteria, a more conservative approach to seismic hazard mitigation, is implemented into LANL high-risk structure design. To ensure that seismic risk is mitigated at PF-4, structural upgrades at PF-4 are ongoing to reduce risks posed by a seismic event and to meet DOE seismic code requirements (LANL 2019c, p. 1).

PF-4 structural and safety upgrades to address seismic risk include (1) glovebox support stands, (2) structural modifications identified in LANL's Seismic Analysis of Facilities and Evaluation of Risk Project, (3) carbon fiber reinforced polymer to strengthen roof girders, (4) shear strengthening of short basement columns, (5) addition of seismic rattle space in basement columns that were constrained by reinforced masonry walls, (6) upgrades to confinement system safety, and (7) anchorage upgrades to a number of safety class components. Additional safety upgrades are ongoing for PF-4 including ventilation system modifications, fire alarm system replacements, and fire suppression modifications.

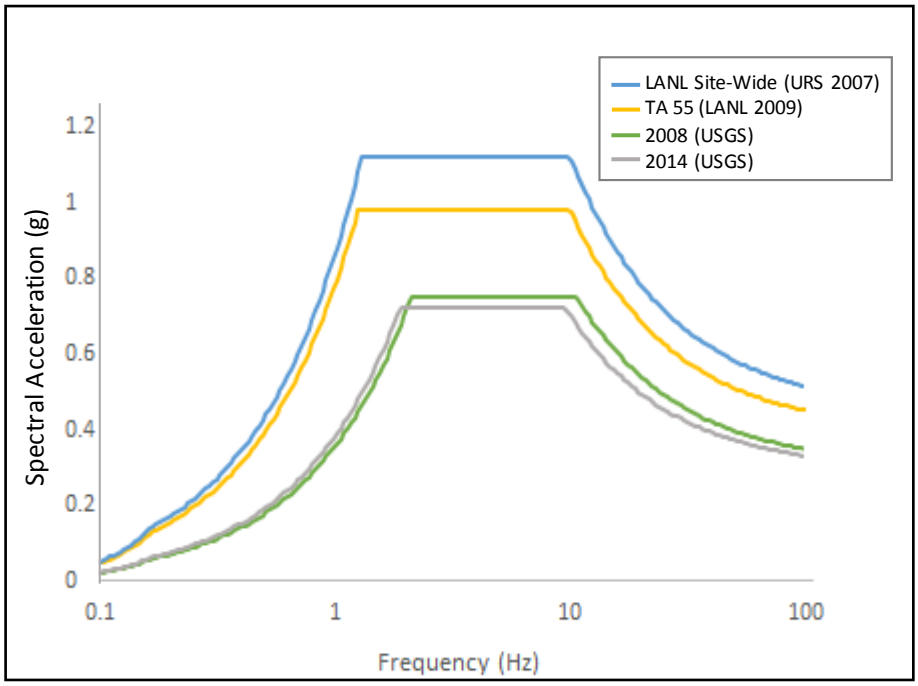

Figure 3-1. Hazard Curves

The 2018 DSA for TA-55 evaluated seismic conditions. This evaluation did not identify any new seismic information at LANL (LANL 2018a, ch. 1 p. 22). The report describes the facility's (1) structural ability to withstand seismic hazards and (2) safety systems to prevent a fire from occurring during a seismic event. The 2018 DSA analyzed structural improvements to PF-4 that meet seismic requirements and it further details what consequences could potentially occur if a seismic event took place. The PF-4 Seismic Performance Reassessment Project is ongoing and aims to determine the seismic performance of the PF-4 building (LANL 2019c). LANL's Seismic Analysis of Facilities and Evaluation of Risk Project is a multi-year analysis of the seismic design loads on existing facilities in the Plutonium Facilities Complex. This comprehensive seismic hazard analysis of PF-4 provides a better understanding of the tensional stress the building could sustain during an earthquake, and how it might react during an earthquake event. Additionally, paleoseismic trenching investigations conducted in 2018 provide new seismic source characterization information on earthquake timing and recurrence to be incorporated into the upcoming update to the LANL PSHA.

Although many subsidiary fault strands of the Pajarito fault system are present across the Pajarito Plateau, numerous site-specific investigations at TA-55 found no evidence for any active surface-displacing faults at the Plutonium Facility Complex (LANL 1999; LANL 2008). Investigations at and near TA-55 using intensive geologic field techniques have concluded that the identified geologic structures pose no independent seismic surface rupture hazard (DOE 2011, ch. 3, p. 27). The potential for seismically induced land subsidence at TA-55 is expected to be low and negligible for soil liquefaction (DOE 2011, ch. 3, p. 28).

The 2018 LANL SWEIS SA evaluated potential changes in conditions and an analysis for seismic activity and risks since the 2008 LANL SWEIS was issued. The 2018 LANL SWEIS SA did not identify USGS data from 2014 although, as Figure 3-1 indicates, the NNSA data provides a more conservative bounding case for analysis. A principle change was issuance of the 2009 Defense Nuclear Facilities Safety Board Recommendation following the 2007 seismic hazard study. Subsequently, the 2007 seismic hazard study was updated in 2009 to incorporate a new set of ground motion attenuation relationships and to examine potential conservatism in the 2007 study (LANL 2009). The 2009 recommendation from the Defense Nuclear Facilities Safety Board identified the need to execute both immediate and long-term actions to reduce risks posed by a seismic event at PF-4 (DNFSB 2009, DOE 2018a, p. 55). In 2017, the Defense Nuclear Facilities Safety Board recognized that numerous upgrades have been completed and other improvements will continue to be implemented at the Plutonium Facility to continue meeting seismic hazard requirements (DNFSB 2017).

Based on information gathered for the LANL Seismic Analysis of Facilities and Evaluation of Risk Project there are no new seismic conditions at TA-55 that varies from the accident analysis presented in the 2008 LANL SWEIS (LANL 2019c).

Potential Impacts as a Result of the Proposed Pit Production

Data in the USGS 2014 study do not identify any new hazard posed by a seismic event at PF-4. The proposed action would not increase the MAR as the MAR in TA-55 would be administratively controlled to reduce potential consequences to human health and environment in an accident scenario (LANL 2018a); therefore, the facility accident scenario as described in the 2008 LANL SWEIS for earthquakes continues to be the bounding accident scenario for the proposed action. Population in the ROI increased about six percent since 2008, which does not constitute a significant change and would not significantly increase potential population doses from accidents (NM-IBIS 2018).

Differences in Potential Impacts

NNSA finds that potential impacts of seismic activity and risk levels related to pit production are consistent with the impacts analyzed in the 2008 LANL SWEIS (DOE 2008a) and the evaluation in the 2018 LANL SWEIS SA (DOE 2018a).

3.3.2. Human Health – Public and Workers

Affected Environment, Existing NEPA Analysis, and New Information

The 2008 LANL SWEIS analyzed potential impacts to workers and the public from operations at LANL that include radiological and chemical impacts for all operations including pit production (DOE 2008a). The 2018 LANL SWEIS SA incorporated new requirements under DOE Order 458.1 for protecting the public and the environment from risk from radiation associated with DOE facilities. These protections include the all-pathway public dose limit of 100 millirem per year, requirements for clearance of real and personal property, public exposure limits under as low as reasonably achievable principles, requirements for environmental monitoring, and all-pathway dose limits for the protection of biota (DOE 2018b, p. 95).

Public Health

Public exposure associated with the activities within the Pajarito Corridor is primarily limited to the inhalation of particles from chemical and radiological emissions and ingestion of contaminated foodstuffs and water. Ingestion pathway dose to LANL operators is extremely small and is most likely due to natural occurring radioactivity in the environment (DOE 2018b). A hazardous chemical emission of concern from the Plutonium Facility Complex is beryllium. Beryllium emissions are controlled at LANL by a high-efficiency particulate air filtration with a removal efficiency of 99.95 percent and are unlikely to affect members of the public.

The majority of offsite dose from all LANL operations to the public comes by point source emissions from LANL's tritium facilities and the Los Alamos Neutron Science Center (LANL 2019d). The Pajarito Corridor has several other radiological emission point sources at three Technical Areas: TA-48-1, Radiochemistry Complex; TA-55, RLUOB and PF-4; and TA-50, Radioactive Liquid Waste Treatment Facility and the Waste Management Facility. Radiological emissions are controlled using multiple stages of high-efficiency particulate air filters with a 99.95 percent removal efficiency.

In 2018, the maximum offsite dose to the MEI was 0.35 millirem (LANL 2019h). The Environmental Protection Agency radioactive air emissions limit for DOE facilities is 10 millirem per year. In 2017, the Plutonium Facility Complex accounted for 2.28×10^{-4} millirem or 0.05 percent of the total maximum offsite dose to the MEI (LANL 2018b). In 2017, the offsite dose to the population within 50-miles from LANL has been estimated to be 0.2 person-rem per year (LANL 2018b). The 2008 LANL SWEIS Expanded Operations Alternative (including production of 80 pits per year) projected a dose to the MEI of 8.2 millirem per year and an offsite dose of 36.2 person-rem (DOE 2008a, ch. 5 p. 96, Table 5-22). The 2017 population in ROI was about 418,432 (NM-IBIS 2018).

Worker Health

NNSA operates in a manner that protects the health and safety of employees and the public, preserve the quality of the environment, and prevents property damage. LANL uses workplace evaluation and establishes controls, training, and medical surveillance to maintain worker safety and health. Most workplace injuries at LANL are sprains and strains associated with everyday activities (LANL 2019h). In 2018, LANL's Total Recordable Cases were 89 (LANL 2019h). Recordable cases are those that were submitted to the Occupational Safety and Health Administration and required treatment beyond first aid or a diagnosis of significant injury or illness. In 2018, LANL's days away, restricted or transferred cases were 21, or 0.21 case for every 200,000 hours worked (LANL 2019h). LANL's three-year average Total Recordable Cases and Days Away, Restricted or Transferred cases were 1.17 and 0.23 respectively. These rates were evaluated against comparison industries' three-year rates of 1.87 and 0.88 (LANL 2019h). Recordable injuries that require the worker to miss work or changes in job responsibilities were recorded in the cases resulting days away or restricted or transferred duties database.

Workers at the Plutonium Facility Complex, Transuranic Waste Facility, and at other LANL locations within the Pajarito Corridor, may be exposed to a variety of hazardous chemicals and radioactive materials. Exposure pathways to workers include direct dermal contact, inhalation of particles, and ingestion. Typically, operations are controlled so workers that may be exposed to these materials are below the safety threshold of concern throughout the duration of work performance. LANL evaluates all operations and prevents worker exposures to hazardous chemicals through engineering and administrative controls, and the use of appropriate personal protective equipment.

Occupational radiation exposure to workers is controlled and monitored to ensure that an individual's dose is as low as reasonably achievable.

In 2017, of the 10,876 monitored[15] workers at LANL, 1,850 workers had received a measurable effective dose (DOE 2018b). The total effective dose to workers within the Plutonium Facility Complex was 109 person-rem, which represents the majority of collective total effective dose throughout LANL (LANL 2019d). In 2018, the highest individual dose for a worker at the Plutonium Facility Complex was 1,483 millirem which is below regulatory and administrative limits (LANL 2019d). The DOE limit on annual worker radiation exposure is 5,000 millirem as mandated in 10 CFR Part 835. DOE established an agency-wide administrative control limit of 2,000 millirem per year in its *Radiological Control Manual* (DOE 1994).

Potential Impacts as a Result of the Proposed Action

Public Health

Collective total effective dose within the Plutonium Facility Complex would increase with the implementation of the proposed action. Based on projections, by implementing pit production, the collective population within 50 miles of LANL would receive a dose of 2.8×10^{-5} person-rem per year for 80 pits per year and 1.05×10^{-5} person-rem per year for 30 pits per year, *see* Table 3-2. The calculated dose to the MEI is 6.7×10^{-6} millirem per year for 80 pits and 2.5×10^{-6} millirem per year for 30 pits, *see* Table 3-2 (LANL 2019j). The population in the ROI increased approximately six percent since 2008, which does not constitute a significant change and would not significantly increase potential doses from the proposed action (NM-IBIS 2018).

Worker Health

The individual dose to workers performing radiological work is calculated to be approximately 206 person-rem per year for 80 pits per year and 155 person-rem per year for 30 pits per year, see Table 3-2 (LANL 2019g). Staff would be administratively controlled to a maximum dose of 2,000 millirem per year. Construction worker dose has been estimated at seven person-rem per year for work inside PF-4 and 0.0216 person-rem for work outside of PF-4 (LANL 2019l).

[15] All monitored workers LANL enrolled in the LANL dosimetry program.

Table 3-2. Projected Public and Worker Dose

Projected Dose	Population Dose within 50 miles (Person-rem per year)	MEI (Millirem per year)	Collective Dose to workers (Person rem per year)
2008 LANL SWEIS projected dose for the Plutonium Facility under the Expanded Operations Alternative	0.2	0.012	220
2008 LANLSWEIS projected dose for all LANL operations under the Expanded Operations Alternative	36.2	8.2	407[a]
Estimated Projected Dose for 30 pits under the proposed action at PF-4	1.05×10^{-5}	2.5×10^{-6}	155
Estimated Projected Dose for 80 pits under the proposed action at PF-4	2.8×10^{-5}	6.7×10^{-6}	206

[a] As projected with the MDA Capping option (DOE 2008a, Table 5-27, pg 5-104)

It is anticipated that repackaging of the MFFF fuel rods will take several months to complete and worker doses would be bounded by dose estimates for pit production (DOE 2008a, ch. 5 p. 104, Table 5-27). LANL has not conducted this activity before so specific dose estimates are not available. The composition of the fuel rods suggests doses to workers would be no greater than pit production doses. It is anticipated that the concentration of material in the fuel rods is lower than that encountered with pit production. In addition, shielding will result in lower worker doses (LANL 2019a).

The implementation of pit production would likely increase the number of annual occupational injuries and illnesses due to the expanded workforce and the construction of support buildings. It is assumed the total recordable cases and cases resulting days away or restricted or transferred duties would increase to approximately 104 Total Recordable Cases per year and 21 Days Away, Restricted or Transferred Cases per year with the implementation of the proposed action. The increase is proportional to an increase in the workforce population.

Differences in Potential Impacts

Public Health

The 2008 LANL SWEIS analyzed the expansion of pit production operations at the Plutonium Facility Complex. It projected the maximum offsite dose to a MEI would be approximately 0.012 millirem per year (DOE 2008a, ch. 5 p. 90).The proposed pit production estimated offsite dose to the MEI is 6.7×10^{-6} millirem per year for 80 pits per year and 2.5×10^{-6} millirem per

year for 30 pits per year (Table 3-2). This projection is less than the 0.012 millirem per year as projected in the 2008 LANL SWEIS. As pit production expands at the Plutonium Facility Complex, the projected population dose is calculated to be 2.8 x 10^{-5} person-rem per year for 80 pits per year and 1.05 x 10^{-5} person-rem per year for the 30 pits per year (LANL 2019j) (Table 3-2). This projection is less than the 0.2 person-rem per year as presented in the 2008 LANL SWEIS (DOE 2008a, ch. 5 p. 98).

Worker Health

In the 2008 LANL SWEIS, the projected collective worker dose by expanding pit production was 220 person-rem per year (DOE 2008a, ch. 5 p.104). However, the projected collective worker dose associated with the proposed action is estimated to be 206 person-rem per year for 80 pits per year and 155 person-rem per year for 30 pits per year (LANL 2019g) (Table 3-2).

The 2008 LANL SWEIS projected an increase in the number of annual occupational injuries and illnesses from pit production (DOE 2008a, ch. 5 p. 106). Higher occupational injuries and illnesses are due to an increase in workforce size and project related construction work. The 2008 LANL SWEIS estimated both the Total Recordable Cases and Days Away or Restricted or Transferred duties would be 12 to 13 percent higher than existing operations (DOE 2008a, ch. 5 p. 106). The projected Total Recordable Cases and Days Away or Restricted or Transferred duties associated with the implementation of pit production are expected to be no greater than the expected increase in full-time equivalents (FTEs) which would be three percent higher than existing operations. However, this percentage is expected to be lower because of multiple shifts. All human health and public safety potential impacts under pit production caused by occupational injuries and illnesses are consistent with those analyzed in the 2008 LANL SWEIS.

Impacts analyzed for human health and public safety for the expansion of the pit production mission in the 2008 LANL SWEIS are consistent with the potential impacts related to the proposed pit production.

3.3.3. Socioeconomics

Affected Environment, Existing NEPA Analysis, and New Information

The 2008 LANL SWEIS estimated a staffing increase of 1,890 associated with the Expanded Operations Alternative. The 2008 LANL SWEIS analyzed potential impacts related to socioeconomics for employment, housing, local government finance, and services within the three counties closest to LANL. In the 2008 LANL SWEIS the counties of Los Alamos, Rio Arriba, and Santa Fe make up the socioeconomic region of influence (DOE 2008a). The 2018 LANL SWEIS SA analyzed potential impacts to socioeconomics in an expanded region of influence that included Sandoval, Los Alamos, Rio Arriba, and Santa Fe counties (DOE 2018a, p. 101). The analysis in this SA evaluates an expanded region of influence (*e.g.,* Sandoval, Mora, San Miguel, Taos, Los Alamos, Rio Arriba, and Santa Fe counties) because, as stated in the *2019 Economic Impact of Los Alamos National Laboratory*, potential socioeconomic impacts would be more apparent due to the majority of LANL FTEs residing in those counties (UNM 2019).

Employment

Regional Economic Characteristics

The ROI for LANL includes seven-counties in northern New Mexico. The majority (83 percent) of 12,334 LANL FTEs and their families live in Los Alamos, Rio Arriba, Mora, Sandoval, San Miguel, Taos, and Santa Fe counties (LANL 2019b, N3B 2019, UNM 2019). The socioeconomic impacts associated with pit production would have the most potential to directly or indirectly influence the economic conditions of those counties.

The total population of the ROI is 418,432 people with a total workforce population of 137,157 people (NMDWS 2018b, DOC 2018). As of 2018, LANL FTEs represent 8.9 percent of the total workforce within the ROI and 1.0 percent of the total workforce in New Mexico (NMDWS 2018b). For comparison, as of 2018, there were 10,308 New Mexico state employees and 7.5 percent of that workforce was within the ROI (NMDWS 2018b). The annual unemployment rate in the ROI is 4.8 percent, compared to New Mexico's annual unemployment rate of 4.9 percent (DOC 2018).

Regional Income

As of 2018, LANL has a total direct labor income of $1.34 billion (NMDWS 2018a). Expenditures by LANL and its FTEs generate $1.65 billion in sales for businesses within the ROI (UNM 2019). Indirectly, LANL supports 19,122 jobs and those jobs equal $1.57 billion in labor income to the State of New Mexico (UNM 2019).

LANL benefits New Mexico by creating jobs, generating income, and purchasing goods and services from local businesses. Based on a three-year study, LANL expended an average of $752.6 million on procurement of goods, services, and construction within the ROI, New Mexico, and out of state (UNM 2019). Just over one-half of those purchases were from New Mexico-based businesses (UNM 2019).

Housing

Table 3-3 lists the total number of housing units and vacancy rates in the ROI. In 2018, there were a total of 199,678 housing units in the ROI, with 75 percent of those occupied and 25 percent vacant. The median value of owner-occupied homes in Los Alamos County ($285,300) was the greatest of the seven counties (DOC 2018). The vacant units and vacancy rate represents housing units that were not currently owner occupied. Vacancy rate can be an indicator of available housing in a particular area. Typically, lower vacancy rates indicate housing shortage (<50 percent), while higher rates indicate housing surplus (>50 percent). Although available housing can change year-to-year, in 2018 there was a general housing shortage as indicated by the low vacancy rate across the ROI.

Table 3-3. Housing in the region of influence

Housing (2018)	
Total units	199,678
Owner-occupied housing units	148,988
Vacant units	50,690
Average owner-occupied housing rate	75 percent
Average vacancy rate	25 percent
Average median value	$196,257

Source: (DOC 2018)

Local Government Finances

LANL, through direct, indirect, and induced activities, contributes to state and local governments revenues that fund education, public safety, health and human services, judiciary, and other public services (UNM 2019). LANL FTEs and vendors use services provided by state and local government. Table 3-4 summarizes LANL contributions to the New Mexico general fund and local governments within the ROI.

Table 3-4. Fiscal Revenues to state and ROI governments

Revenue (2017)	New Mexico	Region of Influence
Personal Income	$62,092,631	-
Gross Receipts	$67,320,454	$47,366,069
LANL Residential Property	-	$20,307,999
LANL Non-Residential property	-	$3,084,985
Total Revenue	**$129,413,085**	**$70,759,053**

Source: (NMDWS 2018b)

Services

New Mexico is divided into 89 school districts, eight of which are predominantly located within the ROI. As of the 2018/2019 school year, the total public enrollment in the eight districts within the ROI was 23,473 students (NMPED 2018).

The Los Alamos County Fire Department provides fire suppression, medical, rescue, and fire prevention services to both LANL and the Los Alamos County. There are six manned fire stations with 150 budgeted personnel positions (LAC 2019a).

As of 2018, the Los Alamos County Police Department had 33 officers. The ratio of commissioned police officers in Los Alamos County was 1.76 per 1,000 of population (LAC 2019b).

Summary of Potential Impacts as a Result of the Proposed Action

Socioeconomic impacts are defined by changes to the demographic and economic characteristics of a region. The numbers of jobs created by the implementation of the proposed action could affect regional employment, income, and expenditures. Job creation is characterized by two types (1) construction-related jobs, which are short-term and less likely to affect public services; and (2) operations-related jobs, which are long-term and could create additional public service requirements in the ROI.

Potential impacts to direct socioeconomic resources were determined by analyzing projected changes in employment (in terms of FTEs at LANL). Changes in employment are based on the projected employment needs related to the proposed action. Employment for the rest of LANL is assumed to remain the same.

The 2008 LANL SWEIS evaluated impacts to indirect socioeconomics resources using multipliers developed by the U.S. Department of Commerce, Bureau of Economic Analysis's Regional Input-Output Modeling System to predict the total LANL socioeconomic impacts to the ROI (DOE 2008a). Based on the results of a recent report, *The Economic Impact of Los Alamos National Laboratory*, the initial modeling results were determined to be valid (UNM 2019). Additional modeling for this analysis is not required because changes to indirect socioeconomic resources have not occurred.

It is anticipated that the implementation of pit production would require the addition of approximately 400 new FTEs at LANL. The proposed change would result in direct changes to employment, salaries, and expenditures in the ROI, and demands for social services. The indirect changes within the ROI include the creation of additional jobs that would create local opportunities.

Projected changes used to determine whether there would be an impact to socioeconomic resources in the ROI include housing units, construction requirements at LANL, local government finances, and the need for public services.

Employment

The addition of 400 FTEs would be a three percent increase to the current FTEs at LANL a total of 12,734 FTEs (UNM 2019). For the purpose of this analysis, it is assumed that the majority of additional FTEs would reside within the ROI. With the additional FTEs, it is anticipated that another 575 indirect jobs would be added to the estimated 19,122 indirect jobs that LANL supports. Peak annual construction employment during this time would be approximately 200 individuals, and potential socioeconomic impacts associated with construction would be bounded by operational impacts.

Construction efforts related to pit production would increase; however, construction projects would likely be staffed by workers already present in the ROI. It is anticipated as support buildings are constructed there would be regional increases in construction jobs, but this increase would be short-term.

Housing

An increase within the ROI in direct and indirect employment would likely increase the need for housing. The vacancy rate of 25 percent throughout the ROI has been relatively low when compared to similar locations with national laboratories. For example, Sandia National Laboratories in Bernalillo County, NM had a vacancy rate of 37.2 percent and Oak Ridge National Laboratory (ORNL) in Anderson County, TN had a vacancy rate of 32.6 percent (DOC 2018). Nationally, the vacancy rate has been 36.2 percent (DOC 2018). A low vacancy rate indicates that available housing in a ROI is limited. Any available housing in the ROI would likely be filled quickly, and a larger percentage of LANL-related housing needs would be accommodated by workers relocating outside the ROI (see Section 3.3.6 for indirect impacts on Transportation).

Additional housing needs would not be expected to exceed regional growth projections because the region is expected to grow by approximately 6.7 percent between 2016 and 2026 or 0.67 percent annually (NMDWS 2018b).

Local Government Finance

LANL in 2017 through direct and indirect employment and procurements, contributed $70,759,053 in tax revenue to local governments within the ROI and $129,413,085 to the New Mexico general fund. The implementation of pit production would be expected to increase tax revenue within the ROI and New Mexico. In terms of employment, the expected increase of direct FTEs would increase an estimated 0.03 percent to the annual gross receipt taxes. Any increases in tax revenues would offset the cost of additional services to support the associated increased population.

Services

Municipal services (*i.e.,* police and fire) in conjunction with LANL-related employment (both direct and indirect) would likely increase in proportion to increases in LANL-related employment (both direct and indirect) associated with the implementation of pit production.

As expected FTEs would relocate within the ROI, annual school enrollments would likely increase. An increase in school enrollment would require additional funding assistance from the State of New Mexico. With limited housing in the ROI, expected increases to school enrollment would likely be greater in neighboring school districts.

Differences in Potential Impacts

The 2008 LANL SWEIS estimated 15,400 FTEs would be employed at LANL (an increase of 1,890 FTEs) under the Expanded Operations Alternative and up to 27,130 indirect positions would be employed within the ROI (DOE 2008a, ch. 5 p. 121). Proposed pit production would add approximately 400 direct and 575 indirect jobs to the ROI.

Similar to projected employment, the 2008 LANL SWEIS analysis expected that (1) additional housing needs would not exceed regional growth projections of approximately 2.3 percent annually, (2) annual gross receipt taxes would increase between 1.3 and 3.9 percent, and (3) annual school enrollment would increase as the workforce relocated to the ROI (DOE 2008a, ch. 5 p. 122).

Potential impacts with regards to socioeconomics related to pit production are anticipated to be consistent with, and bounded by, the impacts analyzed in the 2008 LANL SWEIS (DOE 2008a) and the evaluation in the 2018 LANL SWEIS SA (DOE 2018a).

3.3.4. Environmental Justice

Affected Environment, Existing NEPA Analysis, and New Information

As defined by Executive Order 12898 – "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations" - environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA 2016; Executive Order 12898). Environmental justice is analyzed to identify and address the fair treatment of all people so that no group of people should bear a disproportionate burden of environmental harms and risks resulting from negative environmental consequences of industrial, governmental, and commercial operations (EPA 2019).

In this section, NNSA will assess whether minority and low-income populations could be disproportionately affected by the proposed action. Minority populations are defined as those members of the population that are not single-race white and not Hispanic (EPA 2019). Populations of individuals who are members of the following groups are considered part of a minority population: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (EPA 2019).

Low-income populations, as defined by the poverty status, are represented as the number of persons with annual income below the national poverty threshold. The Census Bureau defines the 2018 poverty threshold as an annual income of $12,784 for one person with no dependents and an annual income of $25,701 for a family of four (DOC 2018). Annual incomes below these thresholds are considered low-income populations.

The minority populations and low-income populations that would potentially be influenced by the pit production mission are described in terms of the ROI. Similar to the 2008 LANL SWEIS, the ROI for environmental justice consists of Bernalillo, Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos counties (DOE 2008a, ch. 4 p. 169). The majority of properties within a 50 mile radius of LANL consist of Federal property without full-time residents. The analysis in this SA evaluates the ROI that captures minority and low-incomes populations that would most likely be impacted by the proposed action. By including the entire populations of surrounding counties, a conservative estimate of potential impacts is more likely. The population in the ROI increased approximately six percent since 2008 (NM-IBIS 2018). The analysis in this SA evaluates the ROI that includes all counties within a 50-mile radius of PF-4 (DOE 2008a, ch 4. p. 169).

The 2018 demographic profile of the ROI is included in Table 3-5 (DOC 2018). Persons self-designated as minority individuals in the ROI comprise 68 percent of the total population (DOC 2018). This minority population is composed largely of Hispanic or Latino/a and American Indian residents. The majority of the Hispanic or Latino/a are located in the Española Valley and in the Santa Fe metropolitan area. The Pueblos of San Ildefonso, Cochiti, Jemez, Sandia, Santa Clara, Ohkay Owingeh, San Felipe, Santo Domingo, Nambe, Picuris, Pojoaque, Taos, Tesuque, Zia, and part of the Jicarilla Apache Indian Reservation are included in the ROI. Within the ROI approximately 68,184 (16 percent) of the population are considered low-income (DOC 2018).

The 2008 LANL SWEIS analyzed the potential impacts for pit production, and expected no disproportionately high and adverse impacts (DOE 2008a, ch. 5 p. 232). The 2018 LANL SWEIS SA re-evaluated the potential impacts to minority and low-income populations in the ROI and addressed potential changes from actions that were implemented since the 2008 LANL SWEIS as well as new projects (DOE 2018a, p. 125-126).

Table 3-5. Demographic Profile of Region of Influence

Population Group	Region of Influence - Population (percent)
Hispanic	232,023 (56)
Black or African American	5,019 (1)
American Indian or Alaska Native	31,370 (8)
Asian	5,079 (1)
Native Hawaiian and Other Pacific Islander	597 (0.1)
Two or More Races	8,843 (2)
Total Minority	**282,931 (68)**
Total White	**135,501 (32)**
Total	**418,432 (100)**

Potential Impacts as a Result of the Proposed Action

Environmental justice impact analysis focuses on the potential for disproportionately high and adverse impacts to minority and low-income population in the ROI from implementing pit production. Factors considered in determining whether pit production would have disproportionate impacts to minority and low-income populations, include the extent or degree the action would change any social, economic, physical, environmental; or health conditions that disproportionately affect the minority population or low-income populations.

Potential impacts to the minority and low-income populations associated with the pit production are comparable to the population as a whole. Potential impacts to the population as a whole are consistent with the impacts discussed in the human health and public safety analysis provided in Section 3.3.2, socioeconomics analysis provided in Section 3.3.3, and transportation analysis provided in Section 3.3.6. It is not anticipated that pit production would change any social, economic, physical, environmental, or health conditions of the population, and specifically minority populations or low-income populations.

As discussed in Section 3.3.2, the estimated radiological dose from proposed pit production operations is anticipated to be less than impacts presented in the 2008 LANL SWEIS (0.20 person-rem per year) (DOE 2008a, ch. 5 p. 91). Based on projections, by implementing pit production, the collective population within 50 miles of LANL would receive a dose of 2.8×10^{-5} person-rem per year for 80 pits per year and 1.05×10^{-5} person-rem per year for the 30 pit per year (LANL 2019j). This is a minor increase and is not considered to be a disproportionately high or adverse effect to minority or low-income populations.

Human health impacts from radiological exposure through special pathways are a potential concern for impacts to minority populations and low-income populations. Potential special pathways include subsistence consumption of native vegetation (piñon nuts and Indian tea [cota]), locally grown produce and farm products, groundwater, surface waters, fish (game and nongame), game animals, other foodstuffs, and incidental consumption of soils and sediments (*i.e.,* on produce, in surface water, and ingestion, or inhaled dust) (DOE 2008a, Appx. C p. 5). Radiological exposure through these special pathways are mostly associated with the release of contaminates from site remediation efforts. Potential impacts to minority populations and low-income populations through these special pathways would only occur with the disturbance of soil associated with remediation efforts. Though the proposed action would involve soil disturbance, the proposed action is not expected to impact special pathways as it is not a remediation effort (DOE 2008a, ch. 1 p. 46).

Differences in Potential Impacts

Based on the analyses for human health–public and workers, socioeconomics, transportation, and the proposed action, it is not likely to adversely affect human health through special pathways; the pit production mission would not result in disproportionately high and adverse impacts on low-income or minority groups and would be within the analysis provided in the 2008 LANL SWEIS (DOE 2008a, ch. 5, p. 173).

3.3.5. Waste Management

Affected Environment, Existing NEPA Analysis, and New Information

Construction and demolition debris that are not hazardous may be disposed of in an approved municipal landfill or an approved construction and demolition debris landfill (NMAC 20.9.1). In 2018, 386 cubic meters of construction and demolition debris were processed at LANL (LANL 2019h).

Radioactive and chemical wastes are generated by production, maintenance, and remediation activities. Radioactive wastes are divided into the following categories (1) LLW, (2) MLLW, and (3) TRU including mixed TRU. Chemical wastes categories include (1) hazardous (*i.e.,* designated under Resource Conservation and Recovery Act (RCRA) regulations), (2) toxic, (3) hazardous construction and demolition debris, and (4) special waste as defined by RCRA[16]. Waste quantities vary with different operations, construction activities, and implementation of waste minimization activities. Table 3-6 describes the amount of radioactive and chemical waste that was generated in 2018 at LANL.

Annual waste estimates for routine operations were provided in the 2008 LANL SWEIS including projected waste generation at the Plutonium Facility Complex, *see* Table 3-6. The 2008 LANL SWEIS No Action Alternative is used to compare to waste generated in 2018 for all LANL operations including the Plutonium Facility Complex. TRU waste, LLW, and mixed LLW were no greater than the projections in the 2008 LANL SWEIS. Operations contributing to chemical waste exceedance of the 2008 LANL SWEIS estimate were press filter cake from the LANL Sanitary Effluent Reclamation Facility in TA-03 (LANL 2019h). The Plutonium Facility Complex exceeded the 2008 LANL SWEIS projections of mixed LLW due to waste drums from TA-55 that were converted from TRU waste to MLLW waste (LANL 2019h, pgs. 30 and A-35).

[16] Special wastes includes cement kiln dust waste, crude oil and natural gas waste, fossil fuel combustion waste, and mining and mineral waste.

Table 3-6. 2018 Radioactive and Chemical Waste Generated a LANL

Waste Type	2008 LANL SWEIS No Action Alternative Projection for LANL/Plutonium Facility Complex (Cubic Yards per year)	2018 LANL annual total (Cubic yards per year)	2018 Plutonium Facility Complex annual total (Cubic yards per year)
LLW	12,000 / 990	4,622.3	405.3
MLLW	130 / 20	79.7	26.2[a]
TRU/Mixed TRU	570 / 440	201	118.8
Chemical	2,749 / 19[b]	3,747.9[b, c]	17.3[b]

[a.] In 2018, MLLW at the Plutonium Facility Complex exceeded 2008 LANL SWEIS projections due to waste drums from TA-55 that were reclassified from TRU waste to MLLW waste, which contributed to 87 percent (17.8 cubic yards) of the total MLLW generated at the Plutonium Facility (LANL 2019h).
[b.] Pounds x 10^3 per year
[c.] The total LANL volume of chemical waste was above the annual volume projected in the 2008 SWEIS. Chemical waste exceeded 2008 LANL SWEIS projections due to the disposal of press filter cakes from the Sanitary Effluent Reclamation Facility and due to non-routine maintenance, upgrade, and cleanup activities. LANL has generated less than half of the cumulative chemical waste analyzed in the 2008 LANL SWEIS so an exceedance in a given year is not considered significant (LANL 2020). LANL continues efforts to reduce its chemical waste volume and experienced a significant reduction during 2018 (9,062 cubic yards) (LANL 2019h).

Summary of Potential Impacts as a Result of the Proposed Action

Potential impacts associated with the implementation of pit production include the management of construction and demolition debris and radioactive and chemical waste. Construction and demolition debris may be disposed of at an approved solid waste landfill, an approved construction and demolition debris landfill, or recycled where appropriate.

Radioactive and chemical wastes are expected to be generated from the pit production operations, modifications, and upgrades to existing operational equipment. Projected radioactive and chemical waste quantities related to pit production are presented in Table 3-7. LANL waste infrastructure at the Plutonium Facility Complex would require some modification to be able to meet the increases in waste generated. One modification would be expanding space at existing waste storage areas. Overall, LANL waste infrastructure is expected to accommodate waste generated under proposed pit production. The number of waste shipments under proposed pit production is not expected to increase beyond what was analyzed in the 2008 LANL SWEIS (see Section 3.3.6).

Table 3-7. Proposed Action Waste Estimates

Waste Type	2008 LANL SWEIS Expanded Operations Alternative Projection for LANL / Plutonium Facility Complex (Cubic yards per year)	80 pits per year projected waste (Cubic yards per year)	30 pit per year projected waste (Cubic yards per year)
LLW	13,000 / 1,400	2,355[a]	885
MLLW	140 / 20	3.7	1.4
TRU/Mixed TRU	860 / 690	400	140
Chemical	2,750 / 19[b]	414[b, c]	155 [b, c]

[a.] The projected LLW for 80 pits exceeds the estimate in the 2008 LANL SWEIS for the Plutonium Facility Complex under the Expanded Operations Alternative. The pit production estimate of 2,355 is based on data from 2007 through 2011 during pit production runs (LANL 2019g). LANL will still be under the site estimate of 13,000 cubic yards per year.

[b.] Pounds x 10^3 per year

[c.] The chemical waste estimate for pit production (80 pits and 30 pits) is greater than the 2008 LANL SWEIS estimate for the Plutonium Facility Complex under the Expanded Operations Alternative. The pit production estimate is based on data from 2007 through 2011 during pit production runs (LANL 2019g). LANL has generated less than half of the cumulative chemical waste analyzed in the 2008 LANL SWEIS (LANL 2020).

The estimate of TRU waste for proposed pit production is anticipated to remain below the 2008 LANL SWEIS estimate. It is anticipated that neither TRU waste from other activities at PF-4 nor total TRU waste from LANL would be greater than the 2008 LANL SWEIS estimates.

The LLW estimate for all LANL operations in the 2008 LANL SWEIS was 13,000 cubic yards per year under the Expanded Operations Alternative. LLW from the proposed pit production and other site activities (approximately 7,000 cubic yards per year) would not be greater than the site-wide LLW estimate of 13,000 cubic yards per year. Projected LLW volume for any surge capacity could exceed the 2008 LANL SWEIS estimate for the Plutonium Facility Complex by approximately 955 cubic yards. The proposed pit production waste projection is based on waste generated during pit production in 2007 through 2011.

The 2008 LANL SWEIS projected a total of 5.3 million gallons per year of liquid radioactive waste would be treated at the Radioactive Liquid Waste Treatment Facility (RLWTF) (DOE 2008a, ch.5, p. 136, Table 5-37). Based on the projected liquid waste that would be treated under proposed pit production (1.7 million gallons per year) and the current annual treatment of liquid waste (1 million gallons), it is expected that the proposed action would not exceed the 2008 LANL SWEIS analyzed projections (LANL 2019h).

Differences in Potential Impacts

Under the 2008 LANL SWEIS Expanded Operations Alternative, pit production would result in larger quantities of radioactive and chemical wastes, but NNSA does not expect this to cause significant impacts since the project overages are less than the anticipated cumulative waste totals that were projected in the 2008 LANL SWEIS (DOE 2008a, ch. 5 p. 148). The 2018 LANL SWEIS SA states that chemical and radioactive waste will fluctuate annually, but that the average generation for most waste types is projected to remain within the 2008 LANL SWEIS projections. LLW would potentially exceed the 2008 LANL SWEIS for the Plutonium Facility Complex but not for the site when producing 30 and 80 pits per year. Chemical waste generation would exceed estimates in the 2008 LANL SWEIS for production of 80 and 30 pits. LANL has generated less than half of the cumulative chemical waste analyzed in the 2008 LANL SWEIS (LANL 2020). Other waste estimates for the 30 and 80 pit production would not exceed the 2008 LANL SWEIS.

3.3.6. Transportation

Summary of Affected Environment, Existing NEPA Analysis, and New Information

The primary methods used for transportation analysis under the Expanded Operations Alternative include commuting FTEs and onsite and offsite waste and material shipments.

Motor vehicles are the primary means of transportation to and from LANL. Regional transportation routes connecting LANL with Albuquerque, Santa Fe, and Española include I-25 to US 84/285 or NM 30 to NM 502.

Commuting FTEs

The majority of commuters access Los Alamos County and LANL from NM 502. As of 2017, the annual average daily commuter traffic from NM 502 to Los Alamos and NM 502 to NM 4 through White Rock is between 8,000–15,000 vehicles per day (DOT 2018).

The majority of commuter traffic consists of personal vehicles. The Park & Ride service from Santa Fe and Española provides another transportation option for commuters. As of 2017, daily ridership using the Park & Ride service was 515 passengers, which represents approximately 68 percent of the total capacity (DOT 2017).

In 2017, there were approximately 4,400 motor vehicle accidents in Los Alamos, Rio Arriba, and Santa Fe counties resulting in 23 fatalities (DOT 2019a).

Onsite/Offsite Shipments

Hazardous, radioactive, industrial, commercial, and recyclable materials including wastes are transported to, from, and within LANL site boundaries during routine operations. Offsite shipments from and to LANL are carried by commercial carriers (*e.g.,* truck, air-freight, and government transport) and by DOE safe secure transport trailers. Numerous regulations and requirements govern the transportation of hazardous and radioactive materials, including those of the U.S. Department of Transportation, U.S. Nuclear Regulatory Commission, DOE, U.S. Federal Aviation Administration, and International Air Traffic Association.

The primary route for the transportation of hazardous and radioactive materials, as designated by the State of New Mexico and governed by 49 CFR 177.825, is approximately a 40 mile corridor between LANL and Interstate 25 near Santa Fe. This route passes through the Pueblos of San Ildefonso, Pojoaque, Nambe, and Tesuque, as well as through Los Alamos and Santa Fe counties. The primary transportation route goes through the northern and western sides of the City of Santa Fe on NM 599 to I-25.

Onsite[17] hazardous and radioactive material shipments are transported in conformance with U.S. Department of Transportation regulations. In limited cases where materials are required to be shipped onsite without meeting conformance requirements, onsite roads are temporarily closed. Potential impacts (*i.e.,* worker dose from handling and transporting radioactive materials) from these activities are part of normal operations and are analyzed in the 2008 LANL SWEIS (DOE 2008a, Appendix K).

Offsite transports of radioactive materials occur using both trucks and airfreight. The radioactive materials transported under proposed pit production may include plutonium, uranium (both depleted and enriched), LLW, and TRU waste. Shipments are required to meet applicable U.S. Department of Transportation (49 CFR parts 171 -185) and U.S. Nuclear Regulatory Commission (10 CR 71.5) requirements as stated in the Hazardous Materials Transportation Act. Most unclassified shipments are transported offsite by commercial carriers. The destination of these materials include disposal locations such as NNSS, WIPP, commercial sites in Utah, or material processing/recycling sites such as SRS, Pantex, LLNL, or Y-12. The 2008 LANL SWEIS evaluated transportation for potential impacts from all actions at LANL including those from proposed pit production (*see* Table 3-8).

Table 3-8. Transportation Risks from 2008 SWEIS Expanded Operations Alternative

Activities	Number of Shipments	Round Trip Miles Traveled (million)	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	Risk [b]	Dose (person-rem)	Risk [b]	Radiological Risk [b]	Non-radiological Risk [b]
Expanded Operations Alternative	122,439	186.3	910.1	0.55	286.8	0.17	0.0016	2.96
Proposed Pit Production	1,553	2.3	18.0	0.01	8.95	0.0054	1.1×10^{-5}	0.024

Source – (DOE 2008a, Table 5-51).

LLW and MLLW are transported to various locations, including the NNSS in Nevada; Energy*Solutions* disposal facility in Clive, Utah; and Waste Control Specialists disposal facility in Andrews County, Texas. TRU and mixed TRU wastes are characterized, certified, and placed in drums or other containers, which are then loaded into shipment containers for transport to WIPP. In 2018, LANL completed 275 shipments of hazardous materials and 258 shipments of

[17] A shipment is considered an onsite shipment if both the origin and destination are at LANL. Onsite transport constitutes the majority of activities that are part of routine operations in support of operations.

radioactive materials for a total of 533 waste shipments to offsite locations (LANL 2019h). Forty-six of the radioactive waste shipments went to NNSS.

DOE operates safe and secure trailers that are used for offsite shipments of SNM. Safe and secure trailers are similar in appearance to commercial tractor-trailers. However, the trailers are equipped with unique security and safeguard features that prevent unauthorized cargo removal and minimize the likelihood of an accidental radioactive material release caused by a vehicle accident.

For the purpose of this analysis, it is assumed that the population along the transportation routes analyzed in the 2008 LANL SWEIS has increased in a manner consistent with the overall U.S. population change. Since 2008, the U.S. population has increased by approximately eight percent; from 304 million people to approximately 328 million people (Census 2019).

Summary of Potential Impacts as a Result of the Proposed Action

Commuting FTEs

The increase of approximately 400 FTEs and the additional offsite shipments would impact local transportation. With the lower vacancy rate in the surrounding counties, FTEs are likely to commute from further locations. It is anticipated that traffic on NM 502 and NM 4 to Los Alamos County could increase from a maximum 15,000 vehicles per day to 15,500 vehicles per day. New Mexico's Park & Ride service could possibly increase from 515 to 530 per year. Impacts associated with construction traffic would be temporary in that these impacts would only last for the anticipated five years of construction activities.

Onsite/Offsite Shipments

With the implementation of proposed pit production, onsite transportation of hazardous, radioactive, industrial, commercial, and recyclables materials including wastes would still constitute the majority of activities that are part of routine operations at LANL. Onsite shipments would likely increase within the Pajarito Corridor. Offsite shipments of hazardous, radioactive, industrial, commercial, and recyclable materials including waste would increase with the implementation of proposed pit production, but be below projected shipment estimates as presented in the 2008 LANL SWEIS. Table 3-9 describes the estimated number of trips for waste and materials as projected in the 2008 LANL SWEIS and proposed pit production.

Table 3-9. Number of Shipments from 2008 SWEIS for Expanded Operations Alternative and Proposed Pit Production

Activities	Number of Shipments										
	Radioactive Materials									Miscellaneous	
	Low Specific Activity	Decontamination Decommissioning and Demolition	LLW	High Activity	LLW - Remote Handled	MLLW	TRU	SNM[a]	Plutonium Dioxide	Hazardous	Other
Expanded Operations	49,940	9,538	9,919	36,521	856	9,019	5,044	1,558	50	4,749	41,506
Proposed Pit Production	0	0	701	0	0	6	246	600	0	0	0

[a] Includes enriched uranium
Source – (DOE 2008a, Table K-5).

The 2008 LANL SWEIS risk transportation evaluation was performed using the RADTRAN[18] Version 5 computer program in conjunction with the Transportation Rating Analysis Geographic Information System computer program (DOE 2008a, ch. 5 p. 153). The transportation analysis provided in the 2008 LANL SWEIS identified the uncertainty associated with a potential increase in the populations along the transportation routes. Potential impacts to the population associated with a potential increase were not specifically identified in the transportation analysis; however, with the conservatism in the estimated impacts, it is anticipated that population increase would not affect the comparison of risks identified in this SA. The national U.S. population has increased by about eight percent (Census 2019) and the population in the eight counties making up LANL's ROI increased by approximately six percent (NM-IBIS 2018).

It is anticipated that the expected annual total number of offsite shipments would be 200 for 30 pits per year and 530 for any periods of surge operations (LANL 2019g). This is less than the 1,553 shipments (sum of the Proposed Pit Production row in Table 3-9) evaluated in the 2008 LANL SWEIS.

Potential impacts associated shipping include radiation dose to the transportation crew (*i.e.*, driver and security personnel) and general populations along transportation routes and potential transportation accidents.

[18] The 2008 LANL SWEIS used RADTRAN Version 5 to estimate potential health impacts to workers and the public resulting from transportation of radioactive materials (*e.g.*, pits, plutonium metal and powder, highly enriched uranium, TRU waste, and LLW) among DOE and commercial sites. In 2015, the Defense Nuclear Facilities Safety Board identified quality assurance issues associated with RADTRAN. For this reason, in more recent applications of RADTRAN for other EISs, DOE has validated RADTRAN results using alternative methods.

Differences in Potential Impacts

Daily traffic to LANL is expected to increase by three percent with the implementation of pit production. Increases to traffic would be noticed at each LANL entrance. The majority of traffic would be expected at the Pajarito Road and NM 4 entrance, as the Pajarito Corridor would likely experience the biggest increase in employee traffic. The expected increase in daily traffic at LANL from implementation of the proposed action would be bounded by the 2008 LANL SWEIS that estimated a traffic increase of 85 percent from the Pajarito Road and NM 4 (DOE 2008a, ch. 5 p. 165, Table 5-54).

Offsite shipments of radioactive waste would be transported to WIPP, NNSS, and other locations as discussed in previous sections. Materials supporting pit production activities would be transported between NNSA sites across the complex. The number of annual offsite shipments of waste and special nuclear material projected with the implementation of pit production is estimated to be 200 for 30 pits per year and up to 530 for a potential surge capacity of up to 80 pits per year (LANL 2019g). The projected total of shipments analyzed in the 2008 LANL SWEIS Expanded Operations Alternatives for an increase in pit production activities was 1,553 (DOE 2008a, ch. 5 p. 157, Table 5-51). Because the inputs to transportation risk analysis from pit production (*i.e.,* shipments and accident/fatality rates) are no greater than those used for the transportation risk evaluation in the 2008 LANL SWEIS, potential impacts would be bounded by the 2008 LANL SWEIS. National population increase of about eight percent and ROI population increase of six percent are not anticipated to significantly affect the comparison of risks identified in the 2008 LANL SWEIS (DOE 2008a, Appx. K p. 31-32). The potential transportation impacts identified in the SA for accident and incident-free health impacts would not be greater than those analyzed in the 2008 LANL SWEIS. The subsequent risks associated with the projected shipments with the implementation of the proposed action were consistent with those modeled in the 2008 LANL SWEIS (DOE 2008a, ch. 5 p. 157, Table 5-51; Appx. K p. 24, Table K-5 and p. 26, Table K-6).

4.0 CUMULATIVE IMPACTS

The Council of Environmental Quality regulations (40 CFR § 1508.7) define cumulative impacts as "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place of a period of time."

4.1. Technical Approach

Section 3.0 of this SA documents the potential impacts of proposed pit production at LANL. The section demonstrates that potential impacts are not notably different than those analyzed and are within the bounds of the impacts presented in the 2008 LANL SWEIS. Consequently, the contribution to cumulative impacts from pit production is expected to be within the bounds presented in the 2008 LANL SWEIS. The technical approach to evaluate cumulative impacts includes (1) a description of relevant NEPA analyses that may influence pit production; (2) a discussion of the past, present, and foreseeable actions that may affect, or be affected by, pit production; and (3) the identification of potential cumulative impacts to resource areas associated with pit production. Through this evaluation, NNSA can determine if the potential cumulative impacts associated with pit production are significantly different from those analyzed in the 2008 LANL SWEIS and other relevant NEPA documents.

4.2. Relevant Analysis

The 2019 Complex Transformation SPEIS SA (DOE 2019a) has identified changes to the actions considered for potential cumulative impacts in the 2008 Complex Transformation SPEIS. As a result, past, present, new, or reasonably foreseeable future actions at SRS, LANL, or WIPP that could have a bearing on potential cumulative impacts associated with pit production are addressed in the 2019 Complex Transformation SPEIS SA.

The Complex Transformation SPEIS evaluated, among other things, constructing a new pit production facility ("Greenfield Alternative") to produce 125 to 200 pits per year at one of five site alternatives including LANL (DOE 2008b, ch. 3 p. 20). In addition to the Greenfield Alternative at LANL, the Complex Transformation SPEIS includes an analysis of two distinct upgrades to existing LANL facilities: one to support production of 125 pits per year and one to support production of 50-80 pits per year (Los Alamos Upgrade Alternative) (DOE 2008a, ch. 5 p. 3). All three of these NEPA analyses are considered in this SA for cumulative impacts.

4.3. Past, Present, and Reasonably Foreseeable Actions

Past, present and reasonably foreseeable actions that may affect, or be affected by, pit production considered for cumulative impacts consist of (1) Surplus Plutonium Disposition, (2) AC/MC at TA-55, (3) an Environmental Testing Facility at LANL, (4) commuter route road modifications, and (5) proposed housing developments. Each of these actions is discussed in the following sections.

4.3.1. Surplus Plutonium Disposition

Since the end of the Cold War, the United States has safely stored surplus plutonium at Pantex, with lesser quantities at SRS and other locations within the Complex. Surplus plutonium is separate from plutonium reserved for nuclear weapons programs.

In the mid-1990s DOE began studying technologies for preparing surplus plutonium for disposal and identifying locations for a surplus plutonium disposal facility. In 2000, DOE issued a decision to construct and operate the MFFF at SRS for the primary purpose of dispositioning surplus plutonium (65 FR 1608). Construction of the MFFF began in 2006. In 2018, DOE issued a decision to terminate the surplus plutonium plan at the MFFF at SRS and the construction of MFFF was terminated. NNSA intends to utilize the dilute and dispose method for the remaining surplus plutonium intended for disposition at the MFFF.

In 2016, the DOE published the Surplus Plutonium Disposition (SPD) SEIS analysis, which documented the disposal of six metric tons of surplus plutonium using the dilute and dispose process. In the SPD SEIS, DOE also evaluated alternatives for disposition of an additional 7.1 metric tons of surplus plutonium, but DOE has not made a decision on its disposition. The 13.1 metric tons of surplus plutonium are separate from both the 34 metric tons of surplus plutonium addressed in the SPD SEIS and from plutonium that remains available for use in nuclear weapons programs.

As part of the plutonium stabilization capability for the Plutonium Facility Complex, LANL has an existing pit disassembly capability (DOE 2008a, ch. 3 p. 57). The 2015 Surplus Plutonium Disposition Supplemental Environmental Impact Statement (2015 SPD SEIS) considered several alternatives that included LANL's PF-4 for the SPD program (DOE 2015c).

The cumulative impacts for both proposed pit production and the current and potential future SPD program at TA-55 are not anticipated to be greater than those impacts presented in the 2015 SPD SEIS cumulative impacts analysis because the program is not yet at the capacity previously analyzed (DOE 2015c). Any changes to the SPD program that would have impacts beyond what have previously been analyzed would be analyzed in a new NEPA analysis.

4.3.2. Analytical Chemistry and Materials Characterization (AC/MC) at TA-55

An ongoing action that may affect, or be affected by, pit production is the relocation of the AC/MC operations from the CMR Building. A 2015 SA to the CMRR EIS evaluated potential impacts for moving AC/MC operations from the aging CMR building to PF-4 and RLUOB, and it was determined that impacts were consistent with analyses in the 2003 CMRR EIS and the 2008 LANL SWEIS (DOE 2015a, p. 49). The relocation of AC/MC operations is ongoing.

In 2018, NNSA issued the *Final Environmental Assessment of Proposed Changes for Analytical Chemistry and Materials Characterization at the Radiological Laboratory/Utility/Office Building* (2018 RLUOB EA) (DOE 2018d) and associated finding of no significant impacts. The 2018 RLUOB EA analyzed a proposal to re-categorize RLUOB from a radiological facility to a

HC-3 nuclear facility (DOE 2014b, Attachment 2, Table 1)[19]. The re-categorization would allow for a greater number and range of AC/MC operations to be performed in RLUOB and would reduce the need for additional AC/MC operations in PF-4 (DOE 2018d, p. 2). The 2018 RLUOB EA analyzed potential cumulative impacts of re-categorizing RLUOB in addition to pit production. Potential impacts were anticipated to be less than those considered in the 2008 LANL SWEIS (DOE 2018d, p. 81).

4.3.3. Environmental Testing Facility at LANL

A potentially foreseeable action would be the consolidation of existing environmental testing capabilities at LANL for plutonium and non-nuclear weapons components designed at LANL. Environmental testing consists of evaluating the effects of environmental stresses (*e.g.,* heat or vibration) for each nuclear weapon system. Environmental testing of plutonium and non-nuclear weapons components are conducted at several LANL locations, including TA-55 (DOE 2008a, ch. 3 p. 24 and 57; DOE 1999a, ch. 2 p. 28-33 and 60-73).

NNSA is considering the construction of a non-destructive environmental testing facility for plutonium components at LANL. The proposed testing facility will require a hardened surface facility[20], support control rooms, a PIDAS, and a HC-2 facility. The proposed testing facility would be located at either TA-55 or TA-11. At either location, upgrades to existing infrastructure will be required.

Based on currently available information, potential impacts from operating this facility at either TA-55 or TA-11 are not anticipated to be greater than those analyzed in the 2008 LANL SWEIS.

4.3.4. Commuter Route Road Modifications

East Jemez Road Intersection Modifications

NNSA and Bandelier National Monument propose modifications and upgrades to the intersection of NM 4 and East Jemez Road (Figure 4-1). The intersection modification and upgrade design was part of the Supplemental Environmental Projects that was established in an agreement between DOE and the State of New Mexico (DOE 2018a, p. 19). The proposed design modifications and upgrades include a second eastbound turn lane to East Jemez Road, a second northbound lane through to NM 4, and a new turn bay to a proposed Tsankawi trailhead parking lot. The modifications and upgrades to NM 4 and East Jemez Road would improve safety and increase the capacity and efficiency of the intersection. Potential short-term impacts could include temporary delays during construction, which could potentially increase greenhouse emissions from vehicles.

[19] DOE has determined threshold quantities for individual radionuclides that define the lower boundaries for the hazard categories: a DOE HC-3 Nuclear Facility threshold quantity is 2,610 grams of plutonium equivalent. RLUOB has a limit of 400 grams in consideration of additional security requirements above 400 grams.
[20] A hardened facility is designed to provide protection of material and has considerable redundancies to withstand an attack.

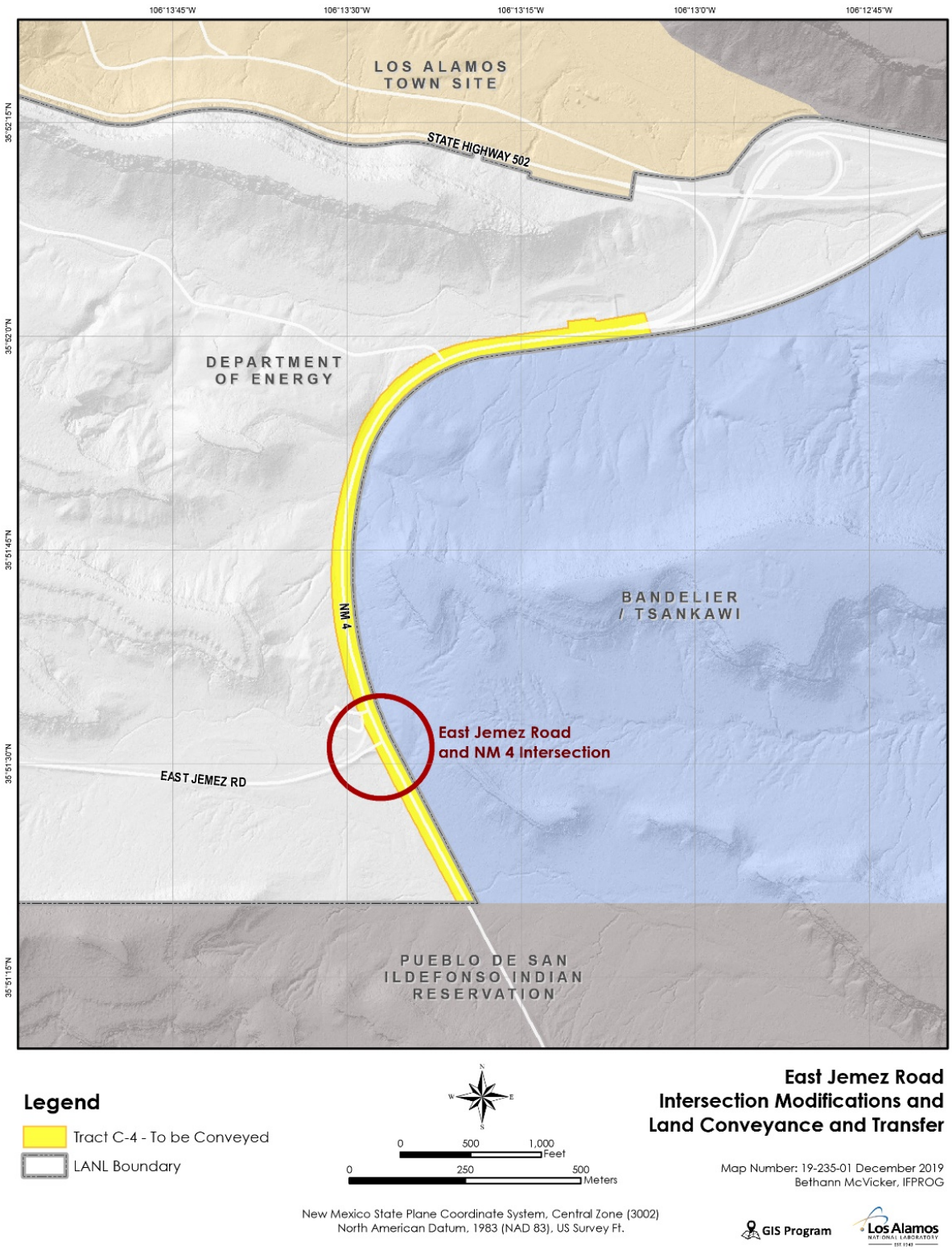

Figure 4-1. East Jemez Intersection Modifications and Land Conveyance and Transfer

NM 502 Los Alamos Roadway Reconstruction & Roundabout

This project would improve NM 502 through Los Alamos between Kneckt Street and Tewa Loop (0.8 mile). The project includes roadway reconstruction, earthwork, curbs and gutters, sidewalks, concrete retaining walls, storm drains, landscaping, permanent signing, lighting, traffic signalizations, and utilities. The project would replace the existing intersection at NM 502 and Central Avenue with a roundabout to improve traffic flow through Los Alamos. Potential short-term impacts could include temporary delays during construction, which could potentially increase greenhouse emissions from vehicles.

NM 30 Improvements Project from NM 502 to US 84/285

The New Mexico Department of Transportation, in cooperation with the Federal Highway Administration, is improving traffic and safety conditions on NM 30 between NM 502 and the US 84/285 intersection in Española (DOT 2019b). This is a major commuter route serving northern New Mexico and LANL (FHWA 2013). The project would provide physical, operational, and safety improvements. When completed, the projects would reduce congestion and delays. Potential short-term impacts could include temporary delays during construction, which could potentially increase greenhouse emissions from vehicles.

4.3.5. Los Alamos County and ROI Housing Developments

Los Alamos County plans to construct the two housing developments in two locations: the Land Conveyance and Transfer tract on DP Road which has capacity for 261 dwelling units and the former DOE Los Alamos Site Office which has the capacity to accommodate 150 housing units (LAC 2016, p. 59). A housing development is currently in the construction phase on a Land Conveyance and Transfer tract in White Rock it provides approximately 160 single-family homes (Laskey 2018). These three housing developments were analyzed in the 1999 *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* (1999 Land Conveyance and Transfer EIS) (DOE 1999b, ch. 2 p. 3) and incorporated by reference in the 2008 LANL SWEIS (DOE 2008a, ch. 1 p. 29 and ch. 5 p. 212).

In Santa Fe County approximately 2,800 housing units are planned or in construction (City of Santa Fe 2019). Other information about planned housing developments are not available for other counties located in the ROI.

Potential cumulative impacts attributed to housing development projects include increased greenhouse gas emissions, increased traffic, increased demand of utilities, and a temporary contribution to construction noise and dust. Furthermore, the additional housing units may increase housing vacancy rates as mentioned in Section 3.3.3.

4.4. Potential Cumulative Impacts

The cumulative impact analysis in this section is to determine (1) if potential cumulative impacts of pit production would be different from those analyzed in the 2008 LANL SWEIS and other relevant NEPA documents, and (2) if so, whether those differences would be considered

significant in the context of NEPA (40 CFR 1508.27). Identifying the potential cumulative impacts from pit production informs NNSA's decision to implement pit production beyond what was previously decided.

Potential cumulative impacts evaluated in this SA are those associated with the production of a minimum of 30 pits per year and those associated with the production of 80 pits per year. The evaluation of potential cumulative impacts is based on the cumulative impact analysis conducted in relevant analysis and past, present and reasonably foreseeable actions that may affect, or be affected by, pit production. A potential impact that is significantly different than to those impacts analyzed in the 2008 LANL SWEIS is a strong indicator that there is a significant cumulative impact associated with pit production.

4.4.1. Potential Cumulative Impacts to Resource Areas

As part of the cumulative impact analysis in this SA, NNSA evaluated each of the environmental resource areas identified in the 2008 LANL SWEIS. The environmental resource areas considered to have minor or negligible impacts and were not different from what was analyzed in previous NEPA analyses and are not affected by past, present, and foreseeable future actions are summarized in Table 4-1. These resource areas include land use, visual resources, geology and soil (excluding seismic), water resources, air quality, noise, ecological resources, cultural resources, infrastructure, facility accidents, intentionally destructive acts, socioeconomics, and environmental justice. In Table 4-1, NNSA presents environmental resource areas that have no significant cumulative impact and a qualitative justification for not providing further discussion.

Table 4-1. Environmental Resource Areas with no Significant Cumulative Impacts

Resource Area	Rationale
Land Use	The past, present, and foreseeable future projects considered in this SA do not identify new developments in the vicinity of the proposed project at this time.
Visual Resources	The past, present, and foreseeable future projects considered in this SA are not expected to cumulatively exceed the visual impacts anticipated in the 2008 SWEIS, which anticipated construction of new buildings and support infrastructure within the Pajarito Corridor.
Geology and Soils	The past, present, and foreseeable future projects considered in this SA would not involve new developments in the vicinity of the proposed project. All proposed activities would follow appropriate mitigation measures, permits, and BMPs to minimize soil erosion and the transport of soil materials in storm water runoff. There would be no changes to existing facilities that would affect their ability to withstand a seismic event.
Water Resource (Surface Water and Groundwater Quality)	Potential impacts to water resources from construction activities and building modifications of past, present, and foreseeable future projects considered in this SA would be minor. Storm water runoff could potentially impact downstream surface-water quality. Storm water and sediment controls, pollution prevention plans, and BMPs would be implemented to minimize sediment transport and impacts to surface water and groundwater resources.
Air Quality	The past, present, and foreseeable future projects considered in this SA are not expected to cumulatively exceed the impacts analyzed in the 2008 LANL SWEIS. Total emissions of criteria pollutants, hazardous air pollutants, and volatile organic compounds for 2008 through 2016 were well below the facility-wide Title V Operating Permit limits at LANL (DOE 2018a, p. 86).
Noise	The past, present, and foreseeable future projects considered in this SA are not expected to cumulatively exceed the impacts analyzed in the 2008 LANL SWEIS. Activities are either indoors or temporary, and would be within regional noise ordinance restrictions.
Ecological Resources	The past, present, and foreseeable future projects are not expected to cumulatively exceed the impacts analyzed in the 2008 LANL SWEIS. All projects are either indoors or would comply with the Threatened and Endangered Species Habitat Management Plan (LANL 2017b).

Table 4-1. Environmental Resource Areas with no Significant Cumulative Impacts

Resource Area	Rationale
Cultural Resources	LANL and NNSA would follow the LANL's Cultural Resources Management Plan (LANL 2017a) and the Programmatic Agreement (DOE 2017b) between DOE and stakeholders for complying with the National Historic Preservation Act and minimize potential impacts to cultural resources. Potential impacts to cultural resources that require mitigation would be consulted on with the New Mexico State Historic Preservation Officer.
Infrastructure	A minor increase in utility infrastructure requirements is anticipated, however, the past, present, and foreseeable future projects considered in this SA are not expected to cumulatively exceed the utility infrastructure impacts analyzed in the 2008 LANL SWEIS (DOE 2008a, ch. 5 p. 124).
Facility Accidents	MAR is the primary driver for facility accidents. The MAR at PF-4 does not increase for pit production. Administrative controls will be used to reduce MAR. The past, present, and foreseeable future projects considered for cumulative impacts in this SA do not change the assumptions about facility accidents.
Intentional Destructive Acts	The past, present, and foreseeable future projects considered for cumulative impacts in this SA do not change the assumptions about intentional destructive acts that are described in Table 3-1.
Socioeconomics	Potential cumulative impacts to socioeconomics are related to the number of people employed at LANL. The majority of increased hiring is attributable to existing mission activities (see Section 2.1 of this SA). The past, present, and foreseeable future projects are not expected to cumulatively exceed the socioeconomic impacts analyzed in the 2008 LANL SWEIS.
Environmental Justice	The past, present, and foreseeable future projects considered in this SA are not expected to disproportionally impact low-income or minority communities.

4.4.2. Cumulative Impacts by Resource Area

Environmental resource areas that require additional cumulative impact analysis are reviewed in more detail in the following subsections. These resource areas consist of human health, waste management, and transportation. Criteria for this additional discussion may include perceived risk or issues raised by public comments to the 2019 Complex Transformation SPEIS SA.

Potential cumulative impacts to environmental resources associated with pit production are discussed by describing the resource relation to relevant analysis and past, present, and foreseeable future projects that could affect that resource.

Human Health

Potential cumulative impacts from pit production may affect the population within 50 miles of LANL, the MEI, and workers. The foreseeable actions that affect human health are discussed in the Expanded Operations Alternative in the 2008 LANL SWEIS (DOE 2008a), the proposed SPD project at LANL (DOE 2015c), and relocated AC/MC operations from the CMR building to TA-55 (DOE 2015a, DOE 2018d).

The Public and the MEI

Table 4-2 presents radiological impacts to human health to the MEI and the population within 50 miles of the LANL boundary as analyzed in the 2008 LANL SWEIS, the 2018 RLUOB EA, and the 2015 SPD SEIS. These are compared to the impacts of the proposed action in Table 3-2 of this SA.

Table 4-2. Estimated Cumulative Radiological Health Effects to the Public and MEI

Action	Population within 50 Miles (80 kilometers)		MEI	
	Dose (person-rem per year)	LCF Risk per year[a]	Dose (millirem per year)	LCF Risk per year[a]
2008 LANL SWEIS – Expanded Operations Alternative[b]	36[c]	0 (0.02)	8.2[c,d]	0 (4.9×10^{-6})
RLUOB EA[e]	0.98	0 (6.0×10^{-4})	0.082	0 (5.0×10^{-8})
2015 SPD SEIS[f]	0.21	0 (1.0×10^{-4})	0.081	0 (5.0×10^{-8})
LANL Total[f]	**38**	**0 (0.02)**	**8.6**	**0 (5.0×10^{-6})**

Table 4-2. Estimated Cumulative Radiological Health Effects to the Public and MEI

Action	Population within 50 Miles (80 kilometers)		MEI	
	Dose (person-rem per year)	LCF Risk per year[a]	Dose (millirem per year)	LCF Risk per year[a]
Estimated Dose for 30 pits under the proposed action[g]	1.05×10^{-5}	0 (6.3×10^{-9})	2.5×10^{-6}	0 (1.5×10^{-12})
Estimated Dose for 80 pits under the proposed action[g]	2.8×10^{-5}	0 (2.0×10^{-8})	6.7×10^{-6}	0 (4.0×10^{-12})

[a.] LCFs are calculated using a conversion of 0.0006 LCFs per rem or person-rem (DOE 2003b). The annual LCFs for the analyzed population represents the number of LCFs calculated by multiplying the listed doses by the risk conversion factor; no population LCFs are expected from any individual activity or from all combined activities. The annual MEI LCF risk represents the calculated risk of an LCF to an individual.
[b.] (DOE 2008a, ch. 5 p. 91, Table 5-18 and ch. 5 p. 221, Table 5-81)
[c.] (DOE 2008a, ch. 5 p. 91, Table 5-18)
[d.] (LANL 2019k)
[e.] (DOE 2018d, p. 34, Table 9)
[f] (DOE 2015c, ch. 4 p. 125, Table 4-40)
[g.] *See* Table 3-2

Involved Workers

Table 4-3 presents radiological impacts to human health for involved workers at LANL as analyzed in the 2008 LANL SWEIS, the 2018 RLUOB EA, and the 2015 SPD SEIS. Potential impacts to involved workers from the proposed action are presented to compare to previously analyzed impacts.

The potential impacts to involved workers from pit production represent a small fraction of the impacts analyzed in existing NEPA documents including the 2008 LANL SWEIS (DOE 2008a), the 2018 RLUOB EA (DOE 2018d), and the 2015 SPD SEIS (DOE 2015c) and are consistent with the impacts considered in these existing NEPA documents.

Table 4-3. Estimated Cumulative Radiological Health Effects to Workers

Action	Involved Workers	
	Dose (person-rem per year)	LCF Risk per year[a]
2008 LANL SWEIS – Expanded Operations Alternative[b]	543	0 (0.33)
RLUOB EA[c]	8.2	0 (5.0×10^{-3})
2015 SPD SEIS[d]	190	0 (0.1)
LANL Total[d]	**741.2**	**0 (0.4)**
Estimated Dose for 30 pits under the proposed action[e]	155	0 (0.09)
Estimated Dose for 80 pits under the proposed action[e]	206	0 (0.12)

[a.] LCFs are calculated using a conversion of 0.0006 LCFs per rem or person-rem (DOE 2003b). The annual LCFs for the analyzed population represent the number of LCFs calculated by multiplying the listed doses by the risk conversion factor; no population LCFs are expected from any individual activity or from all combined activities. The annual MEI LCF risk represents the calculated risk of an LCF to an individual.
[b.] (DOE 2008a, ch. 5 p. 221, Table 5-81)
[c.] (DOE 2018d, p. 35, Table 10)
[d.] (DOE 2015c, ch. 4 p. 126, Table 4-41)
[e.] *See* Table 3-2

Waste Management

Projections of TRU waste, LLW, MLLW, and chemical waste generation from present and foreseeable actions are presented in Table 4-4 through Table 4-8. These present and foreseeable actions are those identified in the 2008 LANL SWEIS (DOE 2008a), Surplus Plutonium Disposition project at LANL (DOE 2015c), and in the AC/MC operations (DOE 2015a, 2018d).

TRU Waste

Table 4-4 presents total TRU waste projections for ongoing activities at LANL and reasonably foreseeable actions that include the pit production. The 2008 LANL SWEIS Expanded Operations Alternative for TRU waste generation includes the projections from the Plutonium Facility Complex, the Sigma Complex, the CMR facility, RLWTF, Solid Radioactive and Chemical Waste facilities, and decontamination and remediation waste.

Table 4-4. TRU Waste Projections

NEPA Analysis	Facility	TRU Waste Projections (Cubic yards per year)
2008 LANL SWEIS Expanded Operations Alternative (Includes proposed pit production)	Plutonium Facility Complex[a]	690
	CMR[a]	90
	RLWTF[a]	18
	Solid Radioactive and Chemical Waste Facilities[a]	35
	Decontamination Waste[b]	171
	Remediation Waste[b]	2,200
	Total LANL (Operations, decontamination, and Remediation Waste)[b]	**3,300**
2018 RLUOB EA	PF-4 and RLUOB AC/MC Modifications and Operations[c]	109
2015 SPD SEIS Operations at LANL	PF-4[d]	222
LANL Total		**3,631**
Proposed production of 50 to 80 pits per year at SRS[e]	Savannah River Plutonium Processing Facility (SRPPF)	820 – 1,200
Production of 30 to 80 pits per year at LANL[f]	PF-4	140 – 400

[a.] (DOE 2008a, ch. 5 p. 149, Table 5-47)
[b.] (DOE 2008a, ch. 5 p. 151, Table 5-49). Values presented in Table 5-49 in the 2008 LANL SWEIS are for 10 year projections (DOE 2008a). These values are divided by 10 to represent an approximate annual generation rate in this SA.
[c.] (DOE 2018d, p. 54, Table 18). Projections are reported in the 2018 RLUOB EA as 2,920 cubic feet. To convert to cubic yards, multiply by 0.037.
[d.] (DOE 2015c, ch. 4 p. 133, Table 4-47). Projections are reported in the 2015 SPD SEIS as 6,000 cubic meters. To convert to cubic yards, multiply by 1.307.
[e.] (SRNS 2020)
[f.] *See* Table 3-7

In addition, the projected rates of TRU waste from the 2018 RLUOB EA and 2015 SPD SEIS are consistent with the rates projected in the 2008 LANL SWEIS Expanded Operations Alternative and 2015 SPD SEIS. Potential TRU waste generated by pit production would be a small fraction of the projected waste that was analyzed in previous NEPA analyses and include those rates from the 2008 LANL SWEIS (DOE 2008a), the 2015 SPD SIES (DOE 2015c), and the 2018 RLUOB EA (DOE 2018d).

The environmental impacts from construction and operation of WIPP have been addressed in several NEPA analyses, particularly in the WIPP SEIS-II (DOE 1997). The WIPP SEIS-II evaluated the impacts from disposal at WIPP of a TRU waste quantity equivalent to that

established by the WIPP Land Withdrawal Act, as well as a larger quantity of waste from other sources (*e.g.*, TRU waste that was not generated from defense activities). The WIPP SEIS-II analysis concludes that WIPP could be operated safely and that WIPP would not be expected to result in any long-term (over 10,000 years) impacts on human health (DOE 1997). The WIPP SEIS-II supported DOE's decision to develop WIPP for TRU waste disposal (63 FR 3624, January 23, 1998).

In January 2018, DOE submitted a request to modify the New Mexico Environment Department WIPP Hazardous Waste Facility Permit to differentiate between the way RCRA waste volumes was defined versus the way the WIPP Land Withdrawal Act TRU waste volume (175,564 cubic meters) was calculated and tracked (DOE 2018c; NMED 2018). In December 2018, the New Mexico Environment Department approved the DOE's request to modify the existing WIPP Hazardous Waste Facility Permit (NMED 2018) and in January of 2019 DOE fully implemented the change in the method of tracking, reporting, and recording the volumes of generated waste.

This method for TRU disposed waste volumes as of August 3, 2019, is 68,425 cubic meters.[21] Based on the statutory limitations and agreements between DOE and the State of New Mexico and considering past disposals of TRU waste from across the DOE Complex, NNSA estimated a TRU waste remaining disposal capacity of approximately 107,175 cubic meters.

The potential cumulative impacts associated with TRU waste disposal at WIPP from disposal of TRU waste generated from the pit production and other applicable DOE activities are listed in Table 4-5. The WIPP Land Withdrawal Act volume capacity limit for TRU waste disposal are also listed in Table 4-5 (DOE 2018e). Assuming a production rate of 30 pits per year, approximately 6,998 cubic yards of TRU waste is projected to be generated over the life (*i.e.,* 50 years) of pit production at LANL.

With regard to the potential cumulative impacts on the available TRU waste capacity at WIPP, Table 4-5 presents a summary of the estimated TRU waste generation rates of the proposed action over a 50-year period along with past, present, and reasonably foreseeable TRU waste generation and WIPP capacity estimates.

[21] Current TRU waste volumes at WIPP are posted at https://wipp.energy.gov/shipment-information.asp.

Table 4-5. Cumulative TRU Waste Generation

Activity	TRU Waste (Cubic Yards)
Past TRU Waste Disposed of at WIPP as of August 3, 2019[a]	**89,496**
Present and Projected TRU Waste Needing Disposal	
TRU waste projected from INL (DOE Environmental Management TRU waste)[b]	26,099
TRU waste projected from SRS Pit Production (50 pits per year): 50-year projection[c]	41,004
TRU waste projected from LANL Plutonium Pit Production (30 pits per year): 50-year projection[d]	6,998
TRU waste estimates for other DOE/NNSA sites (through 2030)[b,e]	54,829
Total of Present and Reasonably Foreseeable Future Actions	**128,930**
Total Past, Present, and Reasonably Foreseeable Future Actions	**218,426**
Land Withdrawal Act TRU waste volume of record[f]	**229,629**

[a.] Volume represents WIPP Land Withdrawal Act total volume of record. Information obtained from https://wipp.energy.gov/shipment-information.asp on August 3, 2019.
[b.] (DOE 2018e)
[c.] (SRNS 2020)
[d.] (DOE 2019a)
[e.] TRU waste volume was reduced to remove INL waste and MFFF waste estimates.
[f.] (DOE 2018c, p. 9)

Low-Level Waste

Table 4-6 presents total anticipated LLW waste projections for ongoing activities at LANL and reasonably foreseeable actions, including the proposed action for producing 80 pits per year.

Table 4-6. Low-level Waste Projections

NEPA Analysis	Facility	LLW Projections (Cubic yards per year)
2008 LANL SWEIS Expanded Operations Alternative (Includes proposed pit production)	Plutonium Facility Complex[a]	1,400
	Sigma Complex[a]	1,300
	CMR[a]	2,600
	RLWTF[a]	390
	Solid Radioactive and Chemical Waste Facilities[a]	300
	Decontamination Waste[b]	23,350

Table 4-6. Low-level Waste Projections

NEPA Analysis	Facility	LLW Projections (Cubic yards per year)
	Remediation Waste[b]	105,820
	Total LANL (Operations, decontamination, and Remediation Waste)[b]	**141,570**
2018 RLUOB EA (Modifications and Operations)	PF-4 and RLUOB[c] AC/MC Operations	2,675
2015 SPD SEIS Operations at LANL	PF-4[d]	261
LANL Total		**144,624**
Production of 30 to 80 pits per year at LANL[e]	PF-4	885 – 2,355

[a] (DOE 2008a, ch. 5 p. 149, Table 5-47)
[b] (DOE 2008a, ch. 5 p. 151, Table 5-49). Values presented in Table 5-49 in the 2008 LANL SWEIS are for 10 year projections (DOE 2008a). These values are divided by 10 to represent an approximate annual generation rate in this SA.
[c] (DOE 2018d, p. 54, Table 18). Projections in the 2018 RLUOB EA were reported as 72,230 cubic feet. To convert to cubic yards, multiply by 0.037.
[d] (DOE 2015c, ch. 4 p. 132, Table 4-46). Projections in the 2015 SPD SEIS were reported as 200 cubic meters. To convert to cubic yards, multiply by 1.307.
[e] *See* Table 3-7

Projected rates of low-level waste, cumulatively with all foreseeable projects, are consistent with the rates projected in the 2008 LANL SWEIS Expanded Operations Alternative, the 2015 SPD SEIS, and the 2018 RLUOB EA. Potential low-level waste generated by pit production would be a small fraction of the waste impacts analyzed in previous NEPA analyses including the 2008 LANL SWEIS (DOE 2008a), the 2015 SPD SEIS (DOE 2015c), and the 2018 RLUOB EA (DOE 2018d).

Mixed Low-Level Waste

Table 4-7 presents total anticipated MLLW projections for ongoing activities at LANL and reasonably foreseeable actions, including the proposed action for producing 80 pits per year.

Table 4-7. Mixed Low-level Waste Projections.

NEPA Analysis	Facility	MLLW Projections (Cubic yards per year)
2008 LANL SWEIS Expanded Operations Alternative (Includes proposed pit production)	Plutonium Facility Complex[a]	20
	Sigma Complex[a]	5
	CMR[a]	30
	RLWTF[a]	3
	Solid Radioactive and Chemical Waste Facilities[a]	10
	Decontamination Waste[b]	190
	Remediation Waste[b]	18,000
	Total LANL (Operations, decontamination, and Remediation Waste)[b]	**18,300**
2018 RLUOB EA (Modifications and Operations)	PF-4 and RLUOB AC/MC Operations[c]	49
2015 SPD SEIS Operations at LANL	PF-4[d]	3
LANL Total		**18,351**
Production of 30 to 80 pits per year at LANL[e]	PF-4	1.4 – 3.7

[a.] (DOE 2008a, ch. 5 p. 149, Table 5-47)
[b.] (DOE 2008a, ch. 5 p. 151, Table 5-49). Values presented in Table 5-49 in the 2008 LANL SWEIS are for 10 year projections (DOE 2008a). These values are divided by 10 to represent an approximate annual generation rate in this SA.
[c.] (DOE 2018d, p. 54, Table 18). Projection in the 2018 RLUOB EA was reported as 1,330 cubic feet. To convert to cubic yards, multiply by 0.037.
[d.] (DOE 2015c, ch. 4 p. 132, Table 4-46). Projections in the 2015 SPD SEIS were reported as 2 cubic meters. To convert to cubic yards, multiply by 1.307.
[e.] *See* Table 3-7

Projected rates of MLLW, cumulatively with all foreseeable projects, are consistent with the rates projected in the 2008 LANL SWEIS Expanded Operations Alternative, the 2015 SPD SEIS, and 2018 RLUOB EA. Potential MLLW waste generated by the pit production would be a small fraction of the waste impacts analyzed in previous NEPA analyses including the 2008 LANL SWEIS (DOE 2008a), the 2015 SPD (DOE 2015c), and the 2018 RLUOB EA (DOE 2018d.

Chemical Waste

Table 4-8 presents total anticipated chemical waste projections for ongoing activities at LANL and reasonably foreseeable actions, including the proposed action for producing 80 pits per year.

Projected rates of chemical waste, cumulatively with all foreseeable projects, are consistent with the rates projected in the 2008 LANL SWEIS Expanded Operations Alternative, the 2015 SPD SEIS, and 2018 RLUOB EA. Potential chemical waste generated by the pit production would be a small fraction of the waste impacts analyzed in previous NEPA analyses including the 2008 LANL SWEIS (DOE 2008a), the 2015 SPD SEIS (DOE 2015c), and the 2018 RLUOB EA (DOE 2018d).

Table 4-8. Chemical Waste Projections.

NEPA Analysis	Facility	Chemical Waste Projections pounds per year
2008 LANL SWEIS Expanded Operations Alternative (Includes proposed pit production)	Plutonium Facility Complex[a]	19,000
	Sigma Complex[a]	22,000
	CMR[a]	25,000
	RLWTF[a]	1,100
	Decontamination Waste[b]	442,500
	Remediation Waste[b]	9,700,000
	Total LANL (Operations, Decontamination, and Remediation Waste)[b]	**12,900,000**
2018 RLUOB EA (Includes Modifications and Operations)	PF-4 and RLUOB[c] AC/MC Operations	24,700
2015 SPD SEIS Operations at LANL	PF-4	N/A
LANL Total		**12,924,700**
Production of 30 to 80 pits per year at LANL[d]	PF-4	150,000 – 399,000

[a.] (DOE 2008a, ch. 5 p. 149, Table 5-47)
[b.] (DOE 2008a, ch. 5 p. 151, Table 5-49). Values presented in Table 5-49 in the 2008 LANL SWEIS are for 10 year projections (DOE 2008a). These values are divided by 10 to represent an approximate annual generation rate in this SA.
[c.] (DOE 2018d, p. 54, Table 18)
[d.] *See* Table 3-7

Summary

Potential cumulative impacts associated with TRU waste, LLW, MLLW, and chemical waste for ongoing activities at LANL and reasonably foreseeable related activities, including changes in plutonium operations, surplus plutonium disposition, and ongoing operations at LANL, are anticipated to be consistent with the cumulative impacts analyses in the 2008 LANL SWEIS (DOE 2008a), the RLUOB EA (DOE 2018d), and the 2015 SPD SEIS (DOE 2015c). NNSA would re-evaluate the cumulative impacts that might result from future decisions on plutonium disposition activities if those activity levels were to increase at LANL, but at this time such impacts are expected to be within the impacts considered under prior NEPA analyses.

Transportation

Cumulative impacts for transportation of nuclear material and waste were evaluated in previous NEPA analyses and center on radiological impacts to the public and worker health. The collective doses and cumulative health effects resulting from a projected 130 years (from 1943 to 2073) of nuclear material and waste transport across the United States have been estimated in the Surplus Plutonium Disposition Final SEIS (DOE 2015c, ch. 4 p. 136, Table 4-48 and ch. 4 p. 139, Table 4-49) and are shown in Table 4-9 in this SA.

The majority of the collective doses for workers and the general population would be associated with general transportation of radioactive materials. Examples of these activities include shipments of radiopharmaceuticals to nuclear medicine laboratories and shipments of LLW to commercial disposal facilities. The total collective worker doses from all types of shipments (*e.g.*, general transportation, historical shipments, reasonably foreseeable actions, and shipments under the 2015 SPD SEIS (DOE 2015c) were estimated to be 421,000 person-rem, which could result in 252 excess LCFs among the worker population, as shown in Table 4-9. The total collective doses to the general public were estimated to be 436,000 person-rem, which could result in 262 excess LCFs among the general population. As shown in Table 4-9, the estimated doses associated with radioactive waste and material transportation under the Expanded Operations Alternative in this SA (as described in Section 4.4), and projects considered for cumulative impacts, would be a small fraction of the cumulative impacts previously analyzed in existing NEPA analyses.

Table 4-9. Transportation Cumulative Impacts

Action	Crew Dose (person-rem)	Risk of LCF	Population Dose (person-rem)	Risk of LCF
2008 LANL SWEIS Expanded Operations Alternative (DOE 2008a, Table 5-85)	910	0 (0.15)	287	0 (0.17)
Final Surplus Plutonium Disposition SEIS (DOE 2015c)	650	0 (0.4)	580	0 (0.3)
All other action from 1943 to 2073 (DOE 2015c)	421,000	252	436,000	262
RLUOB Operations (DOE 2018d, Table 21)	125	0 (0.08)	41	0 (0.02)
WIPP SEIS-II (DOE 2016a, Table 4-48)	790	0 (0.47)	5,900	3.54
Total	**423,475**	**253.1**	**442,808**	**266**

4.5. Cumulative Impacts Summary

The potential cumulative impacts associated with pit production and in relation to past, present, and reasonably foreseeable actions at LANL discussed in this SA are consistent with the impacts presented in the 2008 LANL SWEIS, and the cumulative impacts of the proposed actions are not significantly different from previous NEPA analyses, including those impacts NNSA considered in the 2008 LANL SWEIS, 2008 Complex Transformation SPEIS, 2015 SPD SEIS, and the 2018 RLUOB EA cumulative impacts analyses.

5.0 PRELIMINARY CONCLUSIONS AND DETERMINATION

NNSA's proposed action is to implement elements of the Expanded Operations Alternative in the 2008 LANL SWEIS, as needed, to produce a minimum of 30 war reserve pits per year during 2026 for the national pit production mission and to implement surge efforts to exceed 30 pits per year to meet NPR and national policy. This SA evaluates the potential impacts of implementing elements of the Expanded Operations Alternative for pit production and considers new circumstances or information relevant to environmental concerns through a comprehensive review of existing NEPA analyses to determine if additional NEPA analysis is required per DOE's NEPA regulations in 10 CFR 1021.314. For all resource areas, the analyses verified that the potential environmental impacts would not be different, or would not be significantly different, than impacts in existing NEPA analyses identified in Section 1.4 and reevaluated in Section 3.0.

Based on the results of this SA, NNSA has preliminarily determined that the proposed action does not constitute a substantial change from actions previously analyzed, and there is no significant new circumstances or information relevant to environmental concerns. Therefore, as NEPA Compliance Officer for the DOE/NNSA Los Alamos Field Office and pursuant to NNSA's Administrative Procedure and DOE's NEPA implementing procedures (10 CFR 1021.314(c)), I have preliminarily determined that no further NEPA documentation is required, and NNSA may amend the existing 2008 LANL SWEIS ROD.

DOE/NNSA Concurrence:

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