SUPPLEMENT ANALYSIS FOR
THE WASTE ISOLATION PILOT PLANT SITE-WIDE OPERATIONS

DOE/EIS-0026-SA-12

Revision 0

Effective: April 8, 2021

U.S. Department of Energy
Carlsbad Field Office
Carlsbad, New Mexico

U.S. Department of Energy
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Effective: April 8, 2021

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Statement Concerning CEQ's NEPA Implementing Procedures

On July 16, 2020, the Council on Environmental Quality (**CEQ**) issued an *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act* (85 Federal Register [**FR**] 43304). In accordance with Title 40 Code of Federal Regulations (**CFR**) Section 1506.13, the updated regulations apply to National Environmental Policy Act (**NEPA**) processes after September 14, 2020. Because this Supplement Analysis (**SA**) process was initiated prior to that date, the United States (**U.S.**) Department of Energy (**DOE**) has the option to continue to follow the CEQ NEPA regulations in effect prior to September 14, 2020 (1978 regulations), and has opted to do so.

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ACRONYMS AND ABBREVIATIONS

AGSC	above ground storage capability
AROD	Amended Record of Decision
ATWIR	Annual Transuranic Waste Inventory Report
BLM	Bureau of Land Management
CBFO	Carlsbad Field Office
CCA	Compliance Certification Application
CD	Critical Decision
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH	contact-handled
Ci	curie
CRA	Compliance Recertification Application
CO	carbon monoxide
Culebra	Culebra Dolomite Member of the Rustler Formation
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FGE	fissile-gram equivalent
FR	Federal Register
ft	foot [feet]
ft^3	cubic foot [cubic feet]
Gatuña	Gatuña Formation
GHG	greenhouse gas
HWDU	Hazardous Waste Disposal Unit
INL	Idaho National Laboratory
LCF	latent cancer fatality
LANL	Los Alamos National Laboratory
LMP	Land Management Plan
LWA	Land Withdrawal Act (Public Law 102-579)
Magenta	Magenta Dolomite Member of the Rustler Formation
MEI	maximally exposed individual
MFFF	Mixed-Oxide Fuel Fabrication Facility
m^3	cubic meter
mrem	millirem
mrem/hr	millirem per hour
MT	metric ton

NEPA	National Environmental Policy Act of 1969
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NO_2	nitrogen dioxide
PA	performance assessment
PCB	polychlorinated biphenyl
Permit	Hazardous Waste Facility Permit
P.L.	Public Law
PVS	Permanent Ventilation System
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man
RH	remote-handled
ROD	Record of Decision
ROI	region of influence
ROMPCS	run-of-mine salt panel closure system
Rustler	Rustler Formation
SA	Supplement Analysis
Santa Rosa	Santa Rosa Formation
SEIS	Supplemental Environmental Impact Statement
SO_2	sulfur dioxide
SRS	Savannah River Site
SWEIS	Site-Wide Environmental Impact Statement
TRU	transuranic
U/G	underground
U.S.	United States
VTR	Versatile Test Reactor
WAC	Waste Acceptance Criteria
WCS	Waste Control Specialists, LLC
WLWA	WIPP Land Withdrawal Area
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

1.1 Background and Regulatory History of the Waste Isolation Pilot Plant

In 1979, the U.S. DOE was authorized to proceed with the construction of a research and development facility for demonstrating the safe, permanent disposal of transuranic (**TRU**) waste from national defense activities and programs of the U.S. Government (Public Law [**P.L.**] 96-164) (U.S. Congress, 1979). This resulted in the design, construction, and operation of a centralized repository for the disposal of TRU waste known as the Waste Isolation Pilot Plant (**WIPP**) (DOE, 1980; DOE, 1990a; DOE, 1997a).

TRANSURANIC WASTE

Transuranic waste consists of material that is contaminated with man-made radioactive elements, which have atomic numbers greater than that of uranium. This waste consists of solid sludge, clothing, tools, rags, residues, soils, and debris. It contains more than 100 nanocuries of alpha-emitting isotopes, per gram of waste, with half-lives greater than 20 years. Exceptions include the following: (a) high-level radioactive waste; (b) waste that the Secretary of Energy has determined, with concurrence of the U.S. Environmental Protection Agency (**EPA**), does not need the degree of isolation required by the disposal regulations; or (c) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR 61.

Transuranic waste, acceptable for disposal at the WIPP facility, results from defense activities and programs of the U.S. Government. Several types of operations (current, past, and future) have generated, or will generate TRU waste: (1) nuclear weapons development and manufacturing; (2) plutonium recovery, stabilization, and management; (3) research and development; (4) environmental restoration, and decontamination and decommissioning; (5) waste management at various DOE and other government facilities including laboratories; and (6) testing at private institutions and universities under contract to the DOE.

This waste is further classified as either contact-handled (**CH**) or remote-handled (**RH**). Direct handling of a waste container with a specified dose rate of no more than 200 millirem per hour (**mrem/hr**) on the outside surface of the container is defined as CH TRU waste. A surface dose rate greater than 200 mrem/hr on the outside of the container is defined as RH TRU waste. Remote manipulators are used to handle RH TRU waste containers. Transuranic mixed waste may contain hazardous components as well, such as lead or organic solvents regulated in accordance with the *Resource Conservation and Recovery Act* (**RCRA**). It also can be commingled with polychlorinated biphenyls (**PCBs**), which are regulated under the *Toxic Substances Control Act.*

On October 30, 1992, the WIPP Land Withdrawal Act (**LWA**) transferred jurisdiction of land from the U.S. Department of the Interior (**DOI**) to the DOE for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities associated with the purposes of the WIPP facility as set forth in section 213 of the *Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980* (U.S. Congress, 1979; U.S. Congress, 1992a). The LWA legislation [P.L. 102-579] led to the operation of the WIPP facility to demonstrate the safe disposal of TRU waste (U.S. Congress, 1992a; U.S. Congress, 1996). The WIPP facility is 26 miles east of Carlsbad, New Mexico, located at the WIPP Site (refer to Figure 1-1).

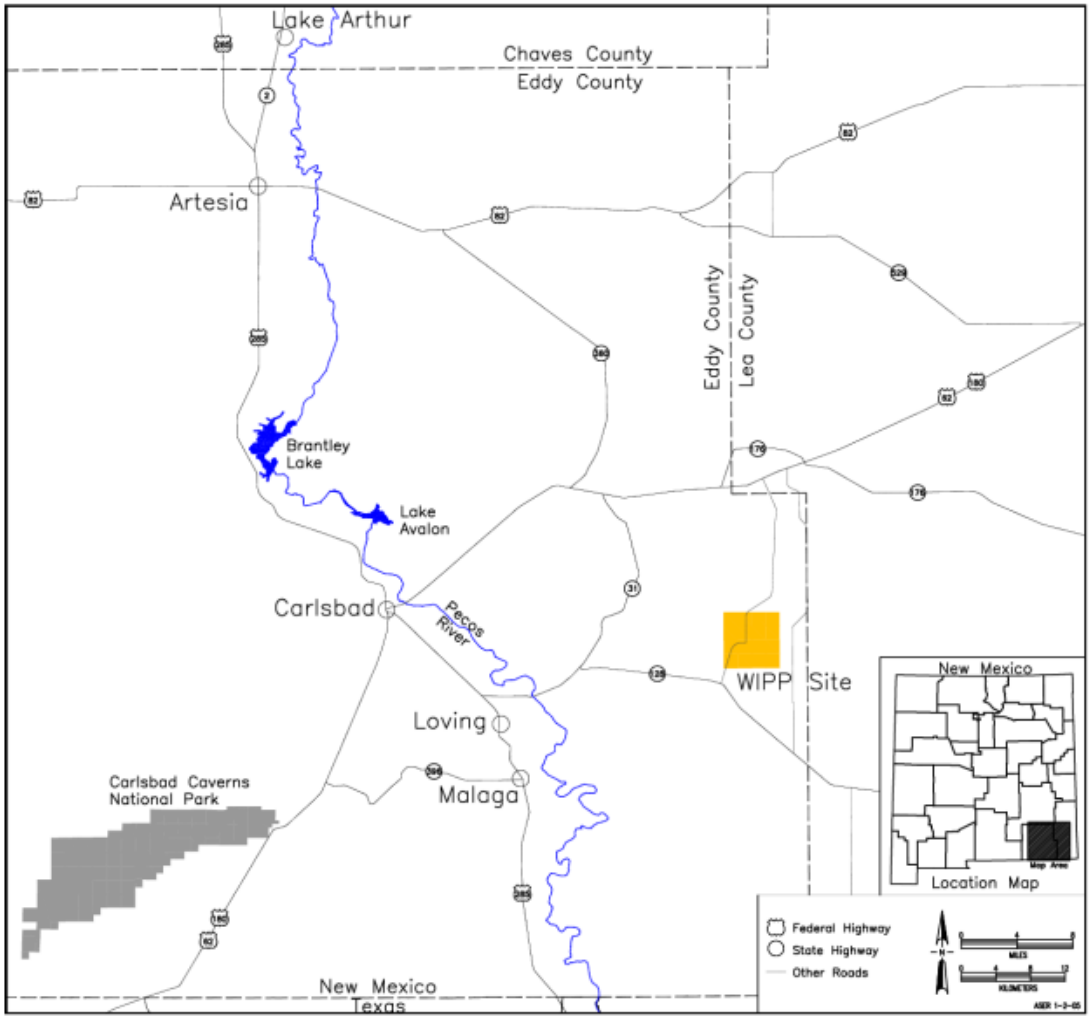


FIGURE 1-1. LOCATION OF THE WIPP SITE

The WIPP facility is a deep geologic repository mined within a substantial bedded salt formation (DOE, 1980; DOE, 1990a; DOE, 1997a). It is located in the middle of a 41-square-kilometer (16-square-mile) area under the jurisdiction of the DOE pursuant to the LWA known as the WIPP Land Withdrawal Area (**WLWA**) (U.S. Congress, 1992a; U.S. Congress, 1996). Figure 1-2 illustrates the underground (**U/G**) disposal area of the WIPP facility, where TRU waste is emplaced. The disposal area is nominally 2,150 feet (**ft**) beneath the ground surface.

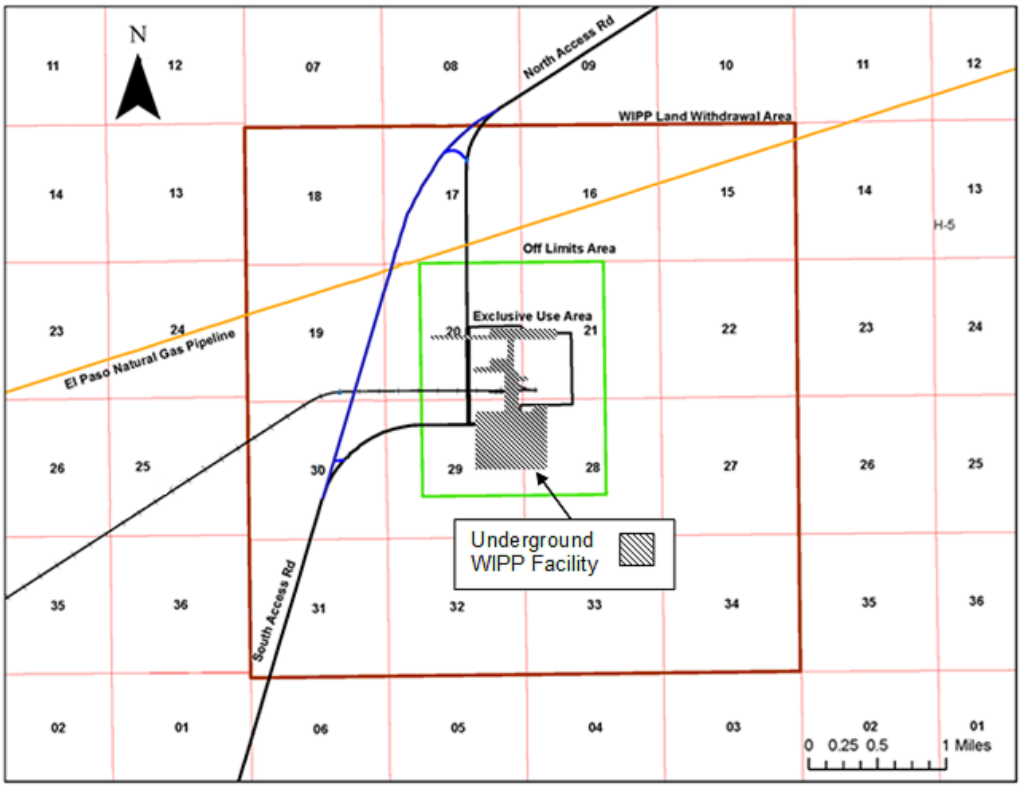


FIGURE 1-2. THE WIPP LAND WITHDRAWAL AREA (i.e., THE WIPP SITE)

In 1997, the DOE issued the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE, 1997a), which analyzed the potential environmental impacts associated with disposing of TRU waste at the WIPP facility, including PCB-commingled TRU waste identified within the DOE inventory. On January 23, 1998, the DOE announced the implementation of the Preferred Alternative with a Record of Decision (**ROD**) [63 FR 3624] (DOE, 1998). In 2004, the ROD was revised to include an anticipated quantity of PCBs commingled with TRU waste [69 FR 39456] (DOE, 2004c). The DOE conducted disposal operations at the WIPP facility continuously from March 1999 until February 2014, when a salt haul truck fire and radiological release interrupted operations (DOE, 2016a).

In response to the February 2014 salt haul truck fire and radiological release, the DOE implemented new facility processes and conducted appropriate operational readiness reviews to resume underground waste disposal operations (DOE, 2016a). The DOE resumed TRU waste emplacement at the WIPP facility on January 4, 2017, after the completion of comprehensive recovery efforts. Details of the recovery are discussed in the 2016 *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE, 2016a). The recovery was supported by improved safety management programs including changes to nuclear safety, fire protection, radiological controls, and emergency management, along with their associated documentation, procedures, and training (DOE, 2016a). These changes were analyzed in the 2016 site-wide operations SA (DOE, 2016a). On April 7, 2017, the DOE resumed receipt of offsite TRU waste. The DOE continues to characterize, transport, and dispose of TRU waste from authorized generator/storage sites to satisfy its mission (U.S. Congress, 1979).

After issuance of the 2016 *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations* (DOE, 2016a), the DOE has undertaken two infrastructure upgrade projects at the WIPP facility (i.e., the Permanent Ventilation System [**PVS**] and the North Access Road Bypass). These projects support TRU waste disposal operations at the facility. Each site-specific infrastructure project was evaluated under previous DOE NEPA procedures and they have final decisions (DOE, 2017b; DOE, 2018a). The North Access Road Bypass does not represent substantial changes to the 1997 SEIS-II. There are no new circumstances nor information relevant to environmental concerns or potential environmental impacts that would warrant additional NEPA analysis (DOE, 2018a). The PVS does not represent substantial changes to the 1997 SEIS-II. There are no new circumstances nor information relevant to environmental concerns or potential environmental impacts that would warrant additional NEPA analysis (DOE, 2017b). The PVS project is not individually analyzed in this SA; however, it is included here to assess cumulative impacts as it is an on-going activity at the WIPP facility (refer to Sections 4.2.1 and 4.4.1).

1.2 Purpose of this Supplement Analysis

The purpose of this SA is to perform the five-year site-wide WIPP facility evaluation pursuant to 10 CFR §1021.330(d). The DOE NEPA procedures codified at 10 CFR 1021.330(d) state that the DOE shall evaluate site-wide Environmental Impact Statements (**EISs**) at least every five years by means of a SA. The DOE prepared this SA to evaluate the existing EIS listed below in light of changes that could have bearing on the potential environmental impacts previously analyzed. Included with this SA is a proposed change pertaining to the excavation of two U/G replacement panels for the disposal of TRU waste. The DOE needs to excavate two replacement panels to take the place of lost disposal capacity.

The CEQ NEPA regulations direct agencies to prepare a supplement to either a draft or final EIS if the "agency makes substantial changes in the [Preferred Alternative] that are relevant to environmental concerns" or there are "significant new circumstances or information relevant to environmental concerns and bearing on the [Preferred Alternative] or its impacts" (40 CFR §1502.9[c][1][i]–[ii]). The DOE NEPA implementing procedures state that when it "is unclear whether or not an environmental impact statement (EIS) supplement is required, the DOE shall prepare a Supplement Analysis" (10 CFR §1021.314[c]). This SA provides sufficient information for the DOE to determine whether (1) to supplement an existing EIS, (2) to prepare a new EIS, or (3) to conclude that no further NEPA documentation is required (10 CFR §1021.314[c][2][i]–[iii]).

Existing EIS(s) evaluated in this SA:

- *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE/EIS-0026-S-2) (1997 SEIS-II), https://wipp.energy.gov/library/seisii/Volume%20I.pdf.

1.3 Proposed Action and the No Action Alternative

1.3.1 Proposed Action

The DOE is proposing to continue the transportation of TRU waste to the WIPP facility by truck and to continue the operation of the WIPP facility for the disposal of TRU waste generated by atomic defense-related activities as authorized by P.L.s 96-164, 102-579, and 104-201 (U.S. Congress, 1979; U.S. Congress, 1992a; U.S. Congress, 1996).

While there have been programmatic and infrastructure changes at the WIPP facility since the issuance of the 1997 SEIS-II, the DOE has determined that these do not represent substantive changes relevant to environmental concerns; it was determined that no further NEPA was required in the three previous site-wide SAs (DOE, 2005; DOE, 2009a; DOE, 2016a). The transportation of TRU waste and the disposal operations of the WIPP facility have not substantially changed since the preparation of the 1997 SEIS-II; however, the affected environment may change. Two types of changes need to be understood and are pertinent to support the continuation of WIPP operations: (1) the region of influence (**ROI**) associated with the 1997 SEIS-II environmental analyses, and (2) the WIPP underground repository layout (excavation and use of two replacement panels[1] for capacity not fully utilized in the ten equivalent panel design).

Equivalent Panel 9 has been closed and equivalent Panel 10 will likely not be used for TRU waste disposal operations to protect WIPP workers (DOE, 2016b; DOE, 2019c; EPA, 2019). The continuation of TRU waste emplacement would include two replacement panels beyond Panel 8, which would be designated as Panels 11 and 12. The DOE proposes to excavate and use two replacement panels to take the place of lost disposal capacity. The proposed change maintains the ten panel equivalents for waste emplacement analyzed in the 1997 SEIS-II, including construction, disposal, and closure. The DOE does not propose any change to the LWA TRU waste volume capacity limit or the function of the WIPP waste handling facility. Mining of the access drifts to the replacement panels would likely commence in the summer of 2021. Authorization from the New Mexico Environment Department (**NMED**) must be obtained prior to the mining of Panel 11 and Panel 12, which is anticipated in the summer of 2023. This schedule would allow for the first replacement panel equivalent to be ready for waste emplacement after Panel 8 operations end.

1.3.2 No Action Alternative

Under the No Action Alternative, the DOE would not pursue the two replacement panels Proposed Action and would not proceed with continued TRU waste disposal operations beyond Panel 8 and equivalent Panel 10 (refer to Figure 1-5). The No Action Alternative would require no additional action from the DOE regarding continued disposal at the WIPP facility. Disposal would be limited to the space available in the hazardous waste disposal units (**HWDUs**), Panels 1 through 8, and potentially certain portions of equivalent Panel 10. Utilization of equivalent Panel 10 for the disposal of TRU waste is not yet authorized by the NMED.

[1] A panel is an underground hazardous waste disposal unit (HWDU) consisting of seven rooms and two access drifts designated for disposal of TRU waste containers. The HWDUs are located at the WIPP facility nominally 2,150 feet below the ground surface within the Salado formation.

Under this alternative, the potential impacts of the Proposed Action would not take place, and ongoing activities that are described in the 1997 SEIS-II affected environment would continue. Under the No Action Alternative, TRU waste that was designated for disposal in the two replacement panels would remain at various DOE generator/storage sites. The DOE is currently legally bound by agreements and orders concerning TRU waste management and disposal (U.S. Congress, 1992b). The No Action Alternative would jeopardize the ability to meet these legally binding agreements and orders. The DOE would need to develop an alternate disposition path for TRU waste beyond Panel 8 and equivalent Panel 10.

1.4 Purpose and Need

1.4.1 The WIPP 1997 SEIS-II Purpose and Need

The 1997 SEIS-II provided information on environmental impacts regarding the DOE's disposal operations at the WIPP facility. The 1997 SEIS-II assessed the potential impacts of the phased development of the WIPP Site as a geologic repository for the safe disposal of TRU waste in ten panel equivalents (DOE, 1997a). The purpose and need for the WIPP facility has not substantively changed since documented in the 1997 SEIS-II or authorized by the LWA (DOE, 1997a; U.S. Congress, 1992a; U.S. Congress, 1996). The DOE needs to safely dispose of the TRU waste that has resulted from atomic energy defense-related activities in a manner that protects the workers, the public health, and the environment.

1.4.2 Purpose and Need for the Proposed Action

The purpose and need for the continued operation of the WIPP facility is to provide support to the DOE complex for TRU waste cleanup as initially directed by P.L. 96-164 (U.S. Congress, 1979). The purpose of this SA is to perform a five-year site-wide evaluation in compliance with 10 CFR §1021.330(d) and also to evaluate the potential impacts of the excavation and use of two replacement panels at the WIPP facility for the continuation of TRU waste disposal. The two replacement panels address underutilized disposal capacity (DOE, 2020b; NMED, 2020), and protect WIPP workers by avoiding the abandoned portions of the repository (DOE, 2016b; DOE, 2019c; EPA, 2019).

1.4.3 Description of Specific Lost Disposal Capacity

1.4.3.1 Lost Disposal Capacity in Panel 1

Mining of Panel 1 began in May 1986. The panel was completed in 1988, expecting that the WIPP facility would be authorized to receive and emplace TRU waste in 1988. However, the first TRU waste disposal container was not emplaced in Panel 1 until March 1999. This was far in excess of the 30-month emplacement period anticipated in the design of the disposal panels, which resulted in extensive maintenance of the ground within the panel.[1] In order to protect WIPP workers, a decision was made to abandon Panel 1 Rooms 4, 5, and 6 due to deteriorating ground conditions[2] (refer to Figure 1-3) and access was prohibited.

The permitted CH TRU mixed waste RCRA disposal capacity of Panel 1 was 636,000 ft^3 (18,000 m^3); however, the final CH TRU mixed waste volume emplaced was only 370,685 ft^3 (10,496 m^3), resulting in an estimated loss of 265,314 ft^3 (7,503 m^3) of RCRA disposal capacity (DOE, 2020b; NMED, 2020). The TRU mixed waste RCRA volume means the gross internal volume of the outermost disposal container of TRU mixed waste pursuant to waste volumes in the Hazardous Waste Facility Permit (**Permit**) (NMED, 2020). This outermost container volume is used to estimate the number of panels needed due to lost disposal capacity. This lost capacity is about the equivalent of 0.4 panels (three unused rooms [91 meters x 10 meters x 4 meters]) as shown in Figure 1-3.

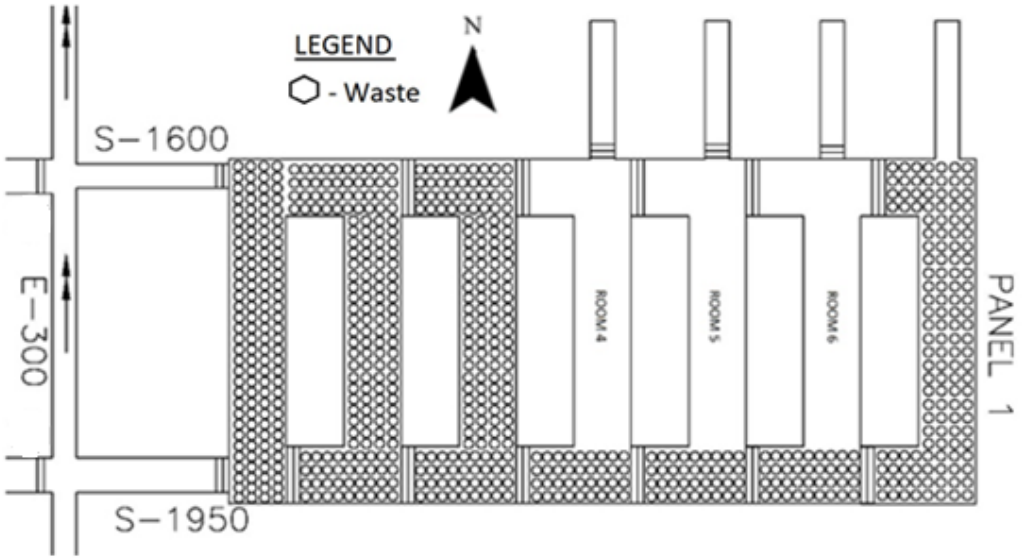


FIGURE 1-3. PANEL 1 WASTE EMPLACEMENT AND ABANDONED ROOMS[3]

[1] Maintenance consists of rock bolting, wire meshing, trimming, and scaling (i.e., the act of removing loose slabs of debris from the back and ribs of an underground opening) (DOE, 2019g).

[2] Ground control maintenance is performed as necessary to maintain access. If ground control activities cannot be performed in a timely manner and the geomechanical data suggest potential instability, access is restricted or prohibited until ground remediation can occur (DOE, 2019g).

[3] Rooms are approximately 300 feet long, 33 feet wide, and 13 feet high at the time of TRU waste emplacement. Each panel consists of seven rooms and two access drifts designated for disposal of TRU waste containers.

1.4.3.2 Lost Disposal Capacity in Panel 7

Waste emplacement operations began in Panel 7 in September 2013. Subsequent to the February 14, 2014, salt haul truck fire and radiological release, waste emplacement in Panel 7 was suspended (DOE, 2016a). A primary consequence after the event was a temporary delay in ground control maintenance in Panel 7.[1] The delay in ground control resulted in the prohibition on the use of Panel 7 Room 6 and Room 4, creating a loss of TRU waste disposal capacity (refer to Figure 1-4). In addition, as a direct consequence of radiological contamination and the DOE's decision to protect WIPP workers, the utilization of Panel 7 Room 7 was prohibited. The maximum permitted TRU mixed waste RCRA disposal capacity of Panel 7 including both CH waste and RH waste is 685,100 ft^3 (19,400 m^3); however, the abandonment of portions of Panel 7 Rooms 4, 6, and 7 resulted in an estimated loss of 189,221 ft^3 (5,358 m^3) of TRU mixed waste volume capacity. This lost capacity is about the equivalent of 0.4 panels (three unused rooms [91 meters x 10 meters x 4 meters]) (DOE, 2020b) as shown in Figure 1-4.

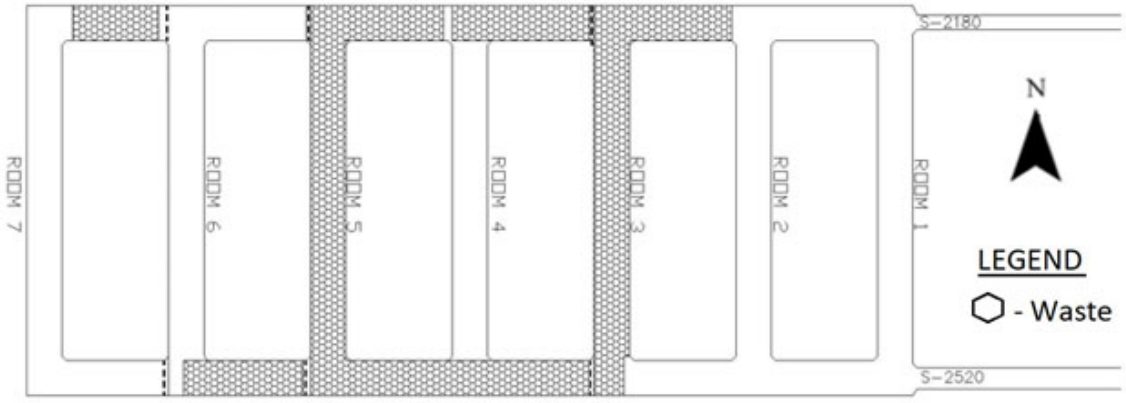


FIGURE 1-4. PANEL 7 WASTE EMPLACEMENT AND ABANDONED ROOMS

1.4.3.3 Lost Disposal Capacity in Equivalent Panel 9

Equivalent Panel 9 consists of the main entries (i.e., access drifts[2]) and cross-cuts[3] from S-2750 to S-3650 (refer to Figure 1-5). These areas are used for the operation of the WIPP repository (i.e., ventilation, access, mining, and transportation) with the intent that they would be excavated to the dimensions for TRU waste disposal at a later time. Equivalent Panel 9 was evaluated in the 1997 SEIS-II and was determined to be necessary to accommodate TRU waste permissible under the LWA (DOE, 1997a). The main entries and cross-cuts would have been modified to accommodate the assumed volume of TRU waste prior to disposal. After modification, the physical space available for TRU waste disposal would have been approximately equivalent to one panel (i.e., the physical space of seven rooms [91 meters x 10 meters x 4 meters]).

[1] Ground control maintenance is performed as necessary to maintain access. Maintenance consists of rock bolting, wire meshing, trimming, and scaling. If ground control activities cannot be performed in a timely manner and the geomechanical data suggest potential instability, access is restricted or prohibited until ground remediation can occur (DOE, 2019g).

[2] Main entries or access drifts are any near-horizontal underground passageway that provides access to mining operations.

[3] A cross-cut is a horizontal underground passageway that connects one or more main passageways at a right angle.

The post-2014 radiological event reduction in U/G ventilation flow limited the amount of ground control work that could be safely performed simultaneously with operations. This impacted multiple U/G activities, including mining, maintenance, and TRU waste disposal. In 2018, the DOE decided not to use equivalent Panel 9 for TRU waste disposal in order to continue to protect WIPP workers from both radiological and deteriorating ground control conditions[1] (DOE, 2016b; DOE, 2019c; EPA, 2019) and access was prohibited. As a result of this decision, equivalent Panel 9 has been closed, is no longer accessible, and is not available for TRU waste disposal. The DOE is maintaining the option to seek a permit modification to use selected portions of equivalent Panel 10 (e.g., access drifts between S-2520 and S-1600) for TRU waste disposal; however, physical space will likely be limited. Utilization of equivalent Panel 10, pursuant to the Permit, for the disposal of TRU waste is not yet authorized by the NMED.

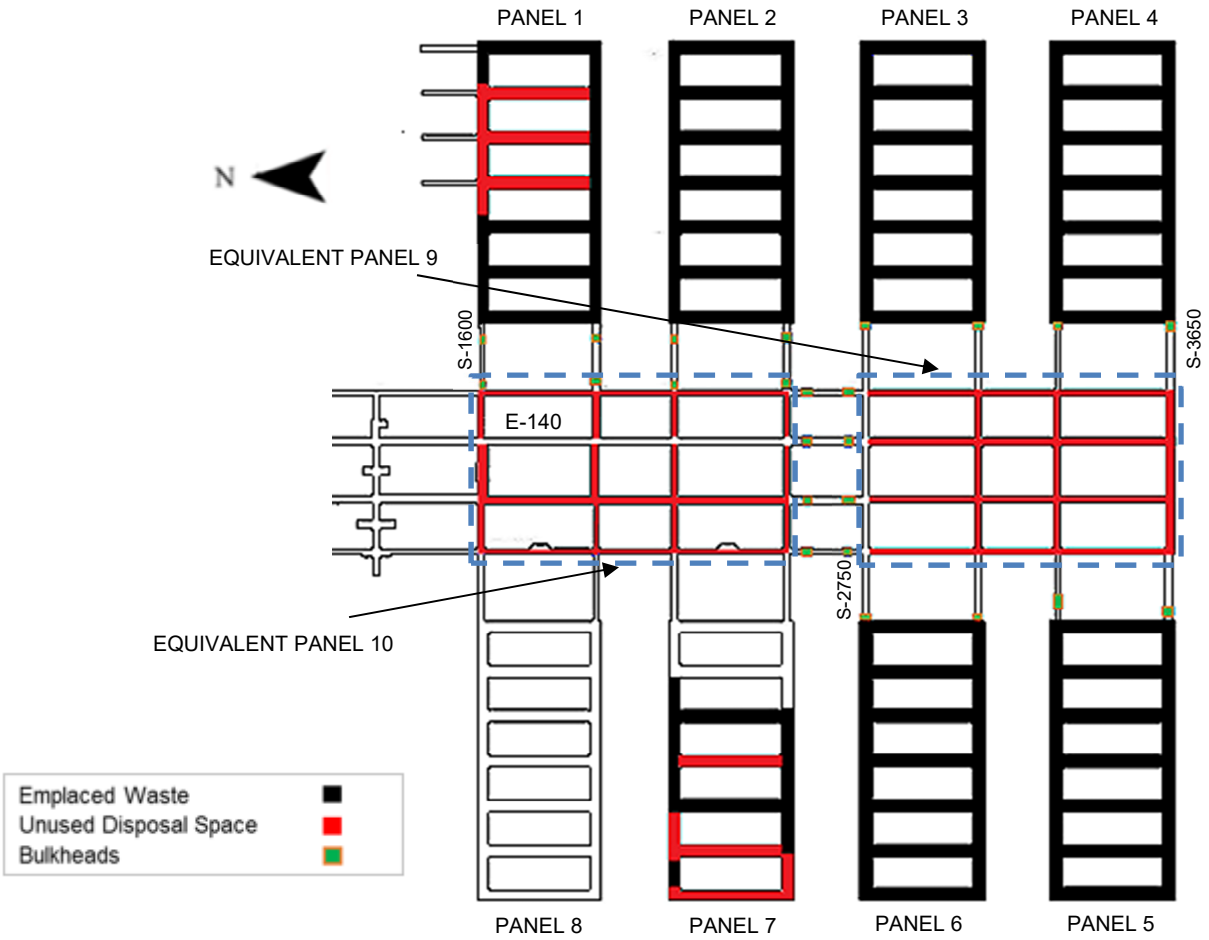


FIGURE 1-5. UNUSED REPOSITORY DISPOSAL SPACE

[1] Ground control maintenance is performed as necessary to maintain access. Maintenance consists of rock bolting, wire meshing, trimming, and scaling. If ground control activities cannot be performed in a timely manner and the geomechanical data suggest potential instability, access is restricted or prohibited until ground remediation can occur (DOE, 2019g).

1.4.3.4 Summary of Lost Disposal Capacity in the WIPP Repository

Due to differences in the use of physical disposal containers along with the assumed mix of containers in each HWDU, the estimates of TRU mixed waste RCRA capacity varies. However, the physical space of each HWDU is the same because each room is mined to specific dimensions. Because three rooms each were lost in Panels 1 and 7 due to the DOE's decision to protect WIPP workers, 0.8 equivalent panels were lost. Table 1-1 indicates lost TRU mixed waste volume capacity from Panels 1 and 7, along with estimated lost RCRA disposal capacity in equivalent Panel 9. Data are based on the information and calculations presented above.

Table 1-1. LOST TRU WASTE VOLUME CAPACITY IN EQUIVALENT PANELS

Panels	Estimated TRU Mixed Waste RCRA Capacity Lost (m^3)	Equivalent Panels Lost
1	7,503	0.4
7	5,358	0.4
equivalent Panel 9	18,000	1.0
TOTAL	30,861	1.8

The lost disposal capacity in Panels 1 and 7, along with equivalent Panel 9, is approximately 1.8 equivalent panels used at the WIPP facility. Since unmined panels are not part of the approved design, the 1.8 replacement panels needed for the continuation of TRU waste emplacement would be adjusted to two panels.

1.5 Scope of this Supplement Analysis

The NEPA requires federal agencies to consider the potential environmental consequences of their proposed actions and reasonable alternatives before making decisions. The DOE NEPA procedures at 10 CFR §1021.330(d) state that DOE shall evaluate site-wide EISs at least every five years by means of a SA. In accordance with 10 CFR §1021.314, the DOE may also prepare a SA when it is unclear whether an EIS supplement is required. Since issuance of the 1997 SEIS-II, the DOE has prepared three WIPP-related site-wide SAs (DOE, 2005; DOE, 2009a; DOE, 2016a). The most recent evaluation occurred in 2016, *Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations*, DOE/EIS-0026-SA-10 (DOE, 2016a).

The DOE has prepared this SA in accordance with the CEQ NEPA regulations at 40 CFR 1502.9(c) and DOE NEPA implementing procedures codified at 10 CFR 1021.314. This SA serves as the DOE-required evaluation of the existing 1997 SEIS-II for the WIPP facility and assesses reasonably foreseeable programs, operations, and activities at the WIPP Site, including excavation and use of two replacement disposal panels for continuation of TRU waste emplacement. This SA evaluates whether there are any substantial changes to the Preferred Alternative in the 1997 SEIS-II that are relevant to environmental concerns, and any significant new circumstances or information relevant to environmental concerns that could have bearing on the Preferred Alternative, or its impacts since the preparation of the 1997 SEIS-II or the 2016 site-wide SA. Based on this evaluation, the DOE will determine whether to (1) supplement the 1997 SEIS-II, (2) prepare a new EIS, or (3) conclude that no further NEPA documentation is required.

The DOE does not propose to change the LWA TRU waste volume capacity limit or the function of the WIPP waste handling facility. The Proposed Action would include the same type of mining equipment, the same waste handling building, including functionally equivalent equipment, and the same disposal room TRU waste volume capacity. The two proposed replacement panels would use the same nominal panel and disposal room dimensions as described for Panels 1 through 8 in the original repository design (DOE, 1997a). The two proposed replacement panels would also use the same CH TRU waste and RH TRU waste emplacement processes (i.e., receipt, handling, and permanent disposal) as currently practiced and analyzed in the 1997 SEIS-II. The proposed location of the two replacement panels would be to the west of the current underground access drifts (refer to Figure 2-1).

1.6 Relevant NEPA Documents

The following NEPA documents are relevant to the Proposed Action described in Section 1.3. This information provides context for understanding the current status of NEPA analyses associated with activities at the WIPP facility and forms the foundation for preparing the comparative analyses in this SA.

- ***Waste Isolation Pilot Plant Final Environmental Impact Statement,* DOE/EIS-0026** (1980 FEIS) (DOE, 1980). In October 1980, the DOE issued the 1980 Final Environmental Impact Statement (**FEIS**), which analyzed the potential environmental impacts of initial construction and operation of the WIPP facility. The ROD (46 FR 9162, January 28, 1981) documented the DOE's decision to proceed with the phased construction and operation of the WIPP facility near Carlsbad, New Mexico. Because the DOE prepared two subsequent supplemental EISs (SEIS-I and SEIS-II), the 1980 FEIS is included for completeness. The only impacts analyzed in this SA that trace back to the 1980 FEIS include noise impacts and floodplains.

- ***Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant,* DOE/EIS-0026-FS** (1990 SEIS-I) (DOE, 1990a). In January 1990, the DOE issued the SEIS-I to evaluate the environmental impacts associated with new information and changes since issuance of the 1981 ROD. The 1990 SEIS-I included an analysis of changes in the TRU waste inventory, consideration of the hazardous chemical constituents in the TRU waste, modification and refinement of the system for the transportation of TRU waste to the WIPP facility, modification of the experimental program (i.e., test phase), and changes in the understanding of the hydrogeologic characteristics of the WIPP Site. The ROD for the 1990 SEIS-I (DOE, 1990b), which was issued in June 1990, continued the phased development of the WIPP facility by instituting a test phase to further examine the WIPP Site's suitability as a TRU waste repository (55 FR 25689, June 22, 1990). The test phase was designed to bridge the gap between the experimental program and the implementation of the operational phase (i.e., disposal phase); however, the DOE decided to pursue the disposal phase directly.

- ***Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement, Eddy County, near Carlsbad, New Mexico,* DOE/EIS-0026-S-2** (1997 SEIS-II) (DOE, 1997a). In 1997, the DOE issued the SEIS-II, which analyzed the potential environmental impacts associated with disposing of TRU waste at the WIPP facility, including PCB-commingled TRU waste identified in the DOE inventory at the time. On January 23, 1998, the DOE announced its decision to implement the proposed action with a ROD [63 FR 3624] (DOE, 1998). The 1997 SEIS-II, as the most recent SEIS related to TRU waste disposal at the WIPP facility, is the foundational NEPA document against which the changes described in this SA are compared.

- ***Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement*** (DOE, 2015a). In keeping with the U.S. nonproliferation policies and agreements with the Russian Federation to reduce the availability of material that is readily usable in nuclear weapons, the DOE engaged in a program to disposition U.S. surplus plutonium. This SEIS evaluated the potential disposal of 13.1 metric tons (**MTs**) of surplus plutonium for which a disposal path had not been assigned at that time. In 2016, the National Nuclear Security Administration (**NNSA**), a semi-autonomous agency within the DOE, announced its decision (ROD [81 FR 19588, April 4, 2016]) to implement the proposed action for the disposition of six MTs of non-pit surplus plutonium. As authorized through an amended Record of Decision (**AROD**) [85 FR 53350] in August 2020 (DOE, 2020d), the NNSA announced that an additional 7.1 MTs of non-pit surplus plutonium has been designated to be disposed of at the WIPP facility. This non-pit surplus plutonium would be prepared and packaged to meet the WIPP Waste Acceptance Criteria (**WAC**) for CH TRU waste and other regulatory requirements, including a TRU waste determination through Acceptable Knowledge and nondestructive analysis.

- ***Categorical Exclusion: Installation of Supplemental Ventilation System to Support Underground Activities at the Waste Isolation Pilot Plant*** (DOE, 2017a). This categorical exclusion determination addressed a temporary upgrade to the existing WIPP U/G ventilation exhaust system. Supplemental ventilation was needed to facilitate some U/G activities such as mining of Panel 8, and maintenance, drilling, bolting, and salt handling in other areas of the underground.

- ***Final Environmental Impact Statement for Plutonium Pit Production at the Savannah River Site in South Carolina (SRS Pit Production EIS),* DOE/EIS-0541** (DOE, 2020c). The NNSA prepared this Savannah River Site (**SRS**) Pit Production EIS to evaluate the potential environmental impacts of repurposing the Mixed-Oxide Fuel Fabrication Facility (**MFFF**) to produce war reserve pits. In 2020, the NNSA announced its decision (ROD [85 FR 70601, November 5, 2020]) to implement the proposed action to repurpose the MFFF to produce war reserve pits for the nuclear weapons stockpile (DOE, 2020h). The NNSA must implement a strategy to provide the enduring capability and capacity to produce war reserve plutonium pits beginning during calendar year 2026. The impact to the WIPP facility is the potential disposal of TRU waste by-products from the pit production process after 2026. The by-product waste would be prepared and packaged to meet the WIPP WAC for CH TRU waste and other regulatory requirements, including a TRU waste determination through Acceptable Knowledge and nondestructive analysis.

1.7 Relevant Supplement Analyses and Their Application to the WIPP Facility

- ***Supplement Analysis for the Disposal of Certain Rocky Flats Plutonium-Bearing Materials at the Waste Isolation Pilot Plant, DOE/EIS-0026-SA-3*** (DOE, 2002a). The potential impacts from different proposed alternatives for the storage and disposition of surplus plutonium and waste containing surplus plutonium have been analyzed by the DOE. These analyses present the potential impacts for several disposal alternatives including conversion to mixed-oxide fuel, immobilization, and direct disposal at the WIPP facility (DOE, 2015a). In 2015, the DOE issued an EIS to address changes to prior proposals on the disposition of surplus plutonium (DOE, 2015a). In addition, the DOE has issued a ROD and an AROD that determined the disposition paths for surplus plutonium and plutonium-bearing materials within the DOE complex (DOE, 2016c; DOE, 2020d).

- ***Supplement Analysis for Disposal of Polychlorinated Biphenyl-Commingled Transuranic Waste at the Waste Isolation Pilot Plant, DOE/EIS-0026-SA-02*** (DOE 2004b). The DOE's decision to implement the proposed action in the ROD for the 1997 SEIS-II did not include the disposal of PCB-commingled TRU waste because no facilities were then available to provide thermal treatment of that waste prior to disposal. However, in June 2004, DOE issued DOE/EIS-0026-SA-02, which evaluated the potential impacts of disposing up to 2,500 cubic meters of PCB-commingled TRU waste at the WIPP facility. The DOE determined that the 1997 SEIS-II was adequate, and therefore, did not have to supplement the EIS or prepare a new EIS. Subsequent to the determination based on that SA, on June 30, 2004, the DOE issued a revision to the 1997 SEIS-II ROD, announcing its decision to dispose of up to 2,500 cubic meters of TRU waste containing PCBs at the WIPP facility [69 FR 39456].

- ***Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations,* DOE/EIS-0026-SA-05** (DOE, 2005)***, Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations,* DOE/EIS-0026-SA-07** (DOE, 2009a)**,** and ***Supplement Analysis for the Waste Isolation Pilot Plant Site-Wide Operations,* DOE/EIS-0026-SA-10** (DOE, 2016a). The DOE prepared site-wide SAs in 2005, 2009, and 2016 related to the continuation of TRU waste disposal at the WIPP facility. These SAs were performed in accordance with 10 CFR §1021.330(d) and they analyzed changes that had occurred since issuance of the 1997 SEIS-II. In these site-wide SAs, the DOE determined that there were no substantial changes in the proposed action that were relevant to environmental concerns; or significant new circumstances or information relevant to environmental concerns bearing on the proposed action or its impacts (DOE, 2005; DOE, 2009a; DOE, 2016a). The DOE concluded in each instance that no further NEPA documentation, such as a supplemental EIS or a new EIS, was needed.

- ***Supplement Analysis for a Proposal to Temporarily Store Defense Transuranic Waste Prior to Disposal at the Waste Isolation Pilot Plant,* DOE/EIS-0026-SA-09** (DOE 2014c). This SA examined a proposal to temporarily store a limited amount of TRU waste at the Waste Control Specialists, LLC (**WCS**) facility in Andrews, Texas. The DOE determined that temporary storage of TRU waste at WCS did not substantively change the proposed action analyzed in the 1997 SEIS-II, that is, the packaging and transportation of TRU waste for disposal in the WIPP repository. Thus, the DOE did not

make substantive changes that are relevant to environmental concerns, nor would the temporary storage of TRU waste at WCS contribute substantively to the potential impacts identified in the 1997 SEIS-II proposed action. The DOE concluded that a supplement to the 1997 SEIS-II was not necessary.

- ***Supplement Analysis for the New Permanent Ventilation System,* DOE/EIS-0026-SA-11** (DOE, 2017b). The DOE evaluated the impacts of the construction and operation of a new filter building and a new ventilation shaft. Although the project name was *exhaust shaft*, the SA evaluated Shaft #5 as an air intake shaft. The DOE determined there were no substantive changes in the proposed action that were relevant to environmental concerns; or significant new circumstances or information relevant to environmental concerns bearing on the proposed action or its impacts. The DOE concluded that no further NEPA documentation was needed.

- ***Final Supplement Analysis of the 2008 Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory for Plutonium Operations,* DOE/EIS-0380-SA-06** (DOE, 2020f). The NNSA prepared this SA to re-evaluate adopting elements of the Expanded Operations Alternative from the 2008 Los Alamos National Laboratory (**LANL**) Site-Wide Environmental Impact Statement (**SWEIS**). The NNSA's AROD (85 FR 54544, September 2, 2020) enabled the production of a minimum of 30 pits/year during 2026 at Los Alamos National Laboratory (**LANL**) with additional surge capacity, if needed, to meet the programmatic requirements of producing pits at a rate of no fewer than 80 pits/year during 2030 for the nuclear weapons stockpile (DOE, 2020g). The NNSA evaluated the potential environmental impacts of producing up to 80 pits/year at LANL.

1.8 Summary Table to Illustrate WIPP Activities with Existing NEPA Coverage

Table 1-2. WIPP ACTIVITIES WITH EXISTING NEPA COVERAGE

Project-Specific Activities at the WIPP Facility	Existing NEPA Coverage
Permanent Ventilation System / Safety Confinement Ventilation System / New Filter Building	DOE. (2017b). *Supplement Analysis for the New Permanent Ventilation System,* DOE/EIS-0026-SA-11. Carlsbad Field Office, Carlsbad, NM.
Shaft # 5 and two access drifts, specifically S-250/S-400 and S-550 (refer to Figure 2-1)	DOE. (2017b). *Supplement Analysis for the New Permanent Ventilation System,* DOE/EIS-0026-SA-11. Carlsbad Field Office, Carlsbad, NM.
North Access Road Bypass	DOE. (2018a). *Environmental Assessment for the Waste Isolation Pilot Plant North Access Road Bypass.* DOE/EA-2077. Carlsbad Field Office, Carlsbad, NM.

Project-Specific Activities at the WIPP Facility	Existing NEPA Coverage
Disposal of TRU Waste from WCS	DOE. (2014c). *Supplement Analysis for a Proposal to Temporarily Store Defense Transuranic Waste Prior to Disposal at the Waste Isolation Pilot Plant*. DOE/EIS-0026-SA-09. Carlsbad Field Office, Carlsbad, NM.
Disposal of Surplus Plutonium at WIPP	DOE. (2002a). *Supplement Analysis for the Disposal of Certain Rocky Flats Plutonium-Bearing Materials at the Waste Isolation Pilot Plant,* DOE/EIS-0026-SA-3. Assistant Secretary for Environmental Management. Washington, DC.

1.9 Organization of the Supplement Analysis

This SA compares the Proposed Action to existing NEPA analyses for the WIPP facility in order to support a determination on whether there are any substantive changes to the Preferred Alternative in the existing NEPA documents (namely, the 1997 SEIS-II, as informed further by the 2005 site-wide SA [DOE, 2005], the 2009 site-wide SA [DOE, 2009a] and the 2016 site-wide SA [DOE, 2016a]). This document also evaluates new circumstances or information relevant to environmental concerns that could have significant bearing on the 1997 SEIS-II Preferred Alternative or its impacts.

The SA is organized as follows:

- Section 1.0 contains the introduction;
- Section 2.0 describes the changes considered in this Supplement Analysis;
- Section 3.0 contains the comparative environmental impact analyses and discusses the process/methodology utilized;
- Section 4.0 presents potential cumulative impacts;
- Section 5.0 includes the conclusions and determination; and
- Section 6.0 identifies references used.

2.0 CHANGES CONSIDERED IN THIS SUPPLEMENT ANALYSIS

This section describes the changes that have occurred since the 2016 site-wide SA, or are reasonably foreseeable, related to the transportation of TRU waste to the WIPP facility by truck and the operation of the WIPP facility for the disposal of TRU waste generated by atomic defense-related activities as authorized by P.L.s 96-164, 102-579, and 104-201. Two types of changes need to be understood and are pertinent to support the continuation of WIPP operations: (1) the ROI associated with the 1997 SEIS-II environmental analyses, and (2) the WIPP underground repository layout (excavation and use of two replacement panels for capacity not fully utilized in the ten equivalent panel design). As discussed in Section 1.5, the scope of this SA focuses on evaluating these changes against the analyses in the 1997 SEIS-II in order to support a determination as to whether the changes are substantial and relevant to environmental concerns, or represent significant new circumstances or information relevant to environmental concerns and bearing on the 1997 SEIS-II Preferred Alternative or its impacts.

2.1 Excavation and Use of Two Replacement Panels for Disposal of TRU Waste

Approximately two of the ten panel equivalents are unavailable for TRU waste disposal due to decisions on utilization of disposal areas out of concern and efforts to protect WIPP workers (refer to Section 1.4.3). The two replacement panels, designated as Panels 11 and 12, would each consist of seven disposal rooms and would have the same nominal dimensions (i.e. width, height and length) as the existing Panels 1-8. The number of panels used for TRU waste emplacement would remain at ten equivalent panels as evaluated in the 1997 SEIS-II Preferred Alternative (DOE, 1997a).

The area for TRU waste disposal in Panels 11 and 12 would be similar to the existing panel design (DOE, 1997a) with two exceptions: (1) the abutment pillar (located between the main access drifts and the first TRU waste disposal room) would increase from 200 ft to 400 ft and (2) the distance between panels would increase from 200 ft to 300 ft. The new pillar dimensions would improve ground stability within the newly excavated area. These differences, incorporated into the replacement panel design, are based on lessons learned from 35 years of WIPP specific mining experience and underground maintenance during the TRU waste disposal phase. The LWA TRU waste disposal volume limit, curie limit, and disposal processes would not change.

2.1.1 Mining, Waste Handling and Disposal Operations

The 1997 SEIS-II described the conceptual ten equivalent panels and indicated that equivalent Panels 9 and 10 (refer to Figure 1-5) would have to be modified (i.e., excavated) to accommodate TRU waste disposal. Equivalent Panels 9 and 10 have not been designed, excavated, or permitted by the NMED to the dimensions for TRU waste disposal. Instead of modifying (i.e. constructing) equivalent Panels 9 and 10, replacement Panels 11 and 12 are proposed for construction. Because the mining processes are similar, the construction of Panels 11 and 12 would have similar impacts to the modifications that would have been required for TRU waste disposal in equivalent Panels 9 and 10.

Excavation and use of the two replacement panels would not extend beyond the current estimated WIPP final facility closure date of 2033 and would not include the use of more than ten total equivalent disposal panels for the WIPP repository. Mining, waste handling, and waste disposal operations for the replacement panels would not substantively deviate from current

facility practices; however, efficiencies might be implemented (e.g., the use of electrical equipment over diesel equipment). If new equipment is utilized, it would be evaluated for functional equivalency prior to use, and any associated new waste handling practices would have to meet applicable provisions of the WIPP Permit (NMED, 2020), applicable DOE Orders and Standards, and be consistent with the Mine Safety and Health Administration regulations. If any changes are made, the DOE will determine the need for additional NEPA analysis, as appropriate.

To manage the mined salt for the Proposed Action, a new lined salt pile and evaporation pond may be needed. Currently, there is an existing salt pile that is permitted, and it can accommodate run-of-mine salt for the initial main access drifts (to the west of the facility) and at least one replacement disposal panel (i.e., Panel 11). The 1997 SEIS-II analyzed the environmental impacts of a 30-acre working salt pile during disposal operations. The new proposed salt pile could include land use up to ten acres. When including this additional use to the existing aggregated salt pile area at the WIPP facility, the total working salt pile would be approximately 40 acres.

The U/G ventilation process would not change. Underground ventilation would continue to meet the required air flow rates by using surface fans, bulkheads, air regulators, and overcasts. The panel closure system would be the same as the existing panel closure design approved by the WIPP Permit (NMED, 2020) and the EPA Rulemaking (EPA, 2014).

2.1.2 Replacement Panels Layout

Figure 2-1 illustrates the proposed location of the two replacement panels with their five accompanying access drifts. The proposed main drifts, west of the existing WIPP U/G facility, would have a similar excavated height and width of the existing main access drifts. Two of the five access drifts (S-250/S-400 and S-550), along with Shaft #5, were previously evaluated as part of the WIPP facility site-specific infrastructure projects. These actions were analyzed under previous NEPA procedures and they have a final decision (DOE, 2017b). Shaft #5 and the two access drifts do not represent substantial changes to the 1997 SEIS-II. There are no new circumstances nor information relevant to environmental concerns or potential environmental impacts that would warrant additional NEPA analysis (DOE, 2017b). The Shaft #5 project is not individually analyzed in this SA; however, it is included here to assess cumulative impacts as it is an on-going activity at the WIPP facility (refer to Sections 4.2.1 and 4.4.1).

While the layout for the two replacement panels (Panels 11 and 12; refer to Figure 2-1) would be in a different location than equivalent Panels 9 and 10, the environmental concerns are not substantively different because the repository continues to be composed of ten panel equivalents as evaluated in the 1997 SEIS-II Preferred Alternative (DOE, 1997a). Refer to Section 2.2.3.1 for analysis and conclusions. Approximately two of the ten equivalent panels are unavailable for TRU waste disposal due to the DOE's decision to continue to protect WIPP workers (DOE, 2016b; DOE, 2019c; EPA, 2019).

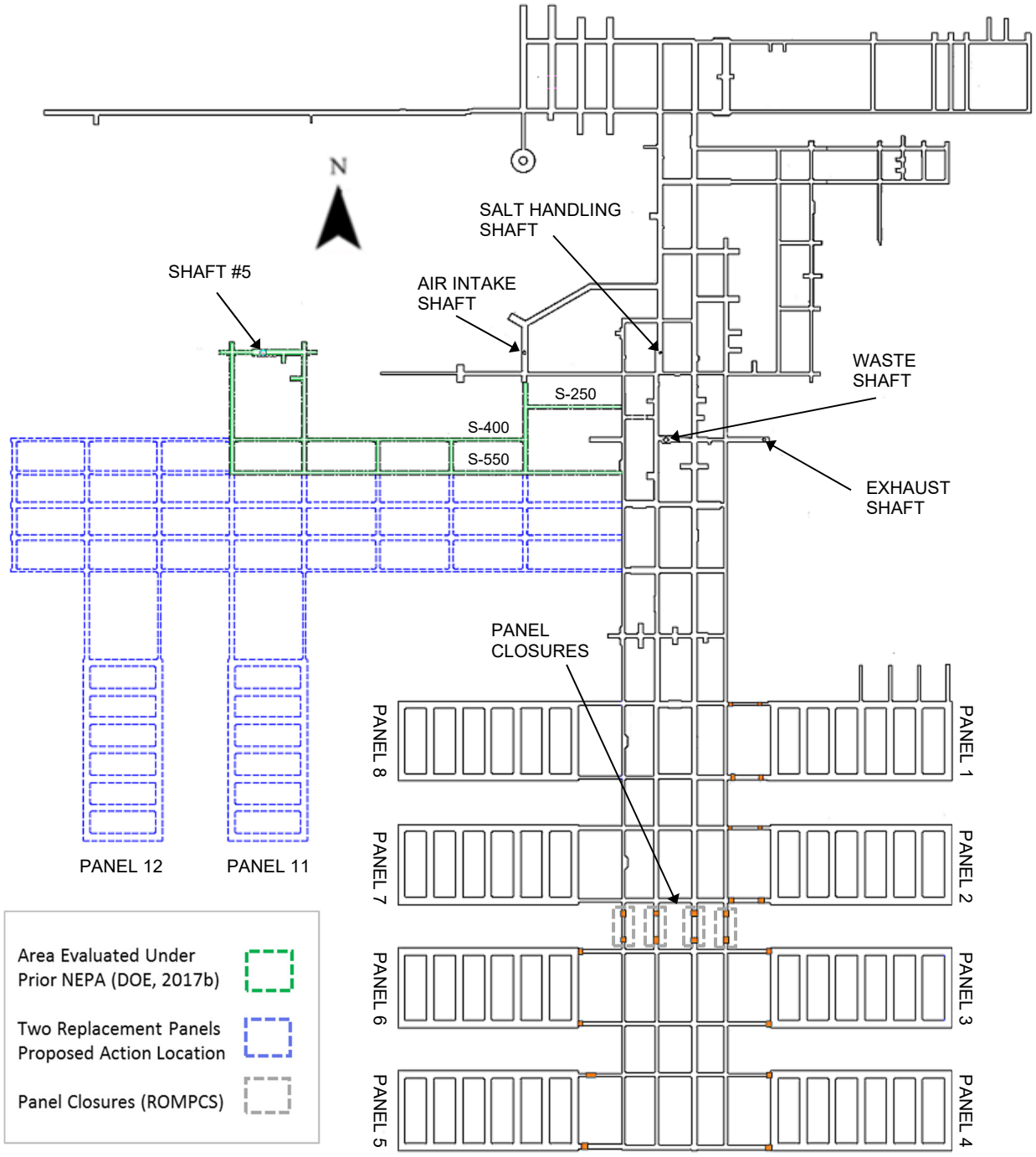


FIGURE 2-1, PROPOSED LOCATION FOR REPLACEMENT PANELS 11 AND 12

2.2 Performance Assessment

2.2.1 Background and Regulatory History

Performance assessment (**PA**) is the primary quantitative analysis tool used by the DOE to demonstrate compliance with the long-term disposal standards in 40 CFR 191 (Subparts B and C) and the compliance certification criteria in 40 CFR 194 (DOE, 1996b). The PA results determine the effects of significant features, events, and processes that may affect the disposal system, considers the uncertainties associated with those features, events, and processes, and estimates the cumulative releases of radionuclides over a 10,000-year period. This assessment evaluates each release scenario under the assumption of a full repository (i.e., the LWA TRU waste limit of 175,600 cubic meters [6.2 million cubic feet] of total TRU waste volume). The PA evaluates the likelihood that the WIPP repository will meet the release limits specified by 40 CFR 191.13 for 10,000 years after the disposal phase ceases. The PA must consider both natural and human-initiated features, events, and processes, which could have an effect on the WIPP disposal system (DOE, 1996b, DOE, 2004a; DOE, 2009b; DOE, 2014b; DOE, 2019b).

For the Compliance Certification Application (**CCA**) (DOE, 1996b) and each subsequent Compliance Recertification Application (**CRA**), the EPA has determined that the WIPP repository continues to comply with the criteria of 40 CFR 194.34(a). Information and data from previous compliance recertification applications form the basis of past and present DOE compliance positions (DOE, 2004a; DOE, 2009b; DOE, 2014b). Past EPA decision documents are referenced in the CRA-2019 (DOE, 2019b).

2.2.2 The WIPP 1997 SEIS-II Performance Assessment Analyses

In the 1997 SEIS-II Preferred Alternative, repository performance 10,000 years post-closure was first evaluated assuming an undisturbed condition, which means there is no inadvertent human intrusion. Analysis of the undisturbed repository conditions during the first 10,000 years showed that no radionuclides or heavy metals would be released to the Culebra Dolomite Member (**Culebra**) of the Rustler Formation (**Rustler**) (DOE, 1997a). No total radionuclide activity concentrations greater than 1 pCi per liter or heavy metal concentrations greater than 1 part per billion would be found beyond the 16 square mile subsurface lateral boundary (DOE, 1997a). In conclusion, there would be no radiological release to the accessible environment and therefore no human health impact.

The 1997 SEIS-II also evaluated two exposure scenarios under a disturbed condition. The first exposure scenario results from a surface release caused by drilling into the repository. The second exposure scenario results from drilling through the repository into a pressurized brine reservoir. For the first scenario, no population impacts were calculated because only small amounts of radioactive material would be brought to the surface, remain in a wet, relatively non-dispersible form, and would remain localized. Radiological impacts to a member of the drilling crew would be 4.4E-04 probability of a latent cancer fatality (**LCF**) (DOE, 1997a). This probability is equivalent to a radiation exposure of 870 millirem (**mrem**) over the time period of the drilling episode (DOE, 1997a). For comparison, a typical person residing in the U.S. receives an effective dose equivalent of about 350-620 mrem every year from various background radiation sources (DOE, 1995; DOE 1997b; NCRP, 2009).

For the second scenario, the potential human health impacts were evaluated at a stock well assumed to be located two miles downgradient from the borehole. It was assumed that this well would provide contaminated water to stock ponds used by cattle. Direct uses by humans were not considered because of the high salinity of groundwater in the area. Beef from cattle using this water was assumed to be consumed by an individual such as a cattle rancher at a rate of 93 pounds annually over a 70-year lifetime. Ingesting beef from cattle using the water from this well over the individual's lifetime would result in a 7E-28 probability of an LCF (DOE, 1997a). This probability would most likely result in zero radiation exposure.

LATENT CANCER FATALITY

A latent cancer fatality is a death from a cancer that results from, and occurs an appreciable time after, exposure to ionizing radiation. Death from radiation-induced cancers can occur any time. However, latent cancers induced from radiation generally occur many years after exposure. Using a conversion factor of 0.0006 LCF per rem of radiation exposure (ISCORS, 2002), the result is the increased lifetime probability of developing a latent fatal cancer.

For example, if a person received a dose of 0.033 rem (i.e., 33 mrem), that person's risk of an LCF from that dose over a lifetime would be 0.00002. This risk corresponds to a one in 50,000 chance of dying of a radiation-induced cancer from that exposure. Because estimates of LCFs are statistical, the results often indicate less than one LCF for cases that involve low doses or small populations. As a comparison, the probability of dying from an asteroid or comet impact, while living in the U.S. over one's lifetime is one in 20,000; the probability of dying from influenza over one's lifetime is one in 5,000; and the probability of dying from a motor vehicle accident over one's lifetime is one in 100 (Kovach, 1995; Morrison, 1992).

2.2.3 Performance Assessment Changes since the CRA-2014

The PA for CRA-2019 was updated based on new information since the EPA Certification Decision on the CRA-2014. These changes include accommodations for not installing panel closures in entrances to Panels 3, 4, 5, and 6, the abandonment of equivalent Panel 9, the inclusion of an additional shaft and its associated access drifts, along with updates to various technical parameters (DOE, 2019b). Because PA results were used in the 1997 SEIS-II to estimate potential impacts of the Preferred Alternative, important changes to the PA will be considered in this SA to determine if PA changes are substantial or represent significant new circumstances or information relevant to environmental concerns and bearing on the previous NEPA evaluations.

2.2.3.1 Abandonment of Equivalent Panel 9 and South End Individual Panel Closures

Activity within the WIPP repository was suspended in February 2014 and later restarted on a limited basis. This hiatus in underground maintenance work resulted in ground control challenges. The DOE proposed an operational policy change at the WIPP facility as a result of these ground control challenges (DOE, 2016b; DOE, 2019c; EPA, 2019). The policy change prohibited personnel access to (with the ultimate goal of withdrawal from) the area in the WIPP underground designated as equivalent Panel 9. With that change, the planned installation of the run-of-mine salt panel closure system (**ROMPCS**) in Panels 3, 4, 5, and 6 was no longer possible (access to these panels requires access to equivalent Panel 9). Also, waste disposal

in the area designated as equivalent Panel 9 was no longer possible. In response to these operational changes, the DOE performed analyses to determine the impacts to the repository configuration on the long-term performance of the WIPP repository.

The analyses considered both an empty equivalent Panel 9 and a new hypothetical full panel-equivalent north of Panel 8, outside of the current repository configuration (DOE, 2019b). The analyses showed that this hypothetical configuration resulted in lower releases when compared to releases from a model that assumed waste within the existing equivalent Panel 9 (DOE, 2019b) suggesting the retention of a full Panel 9 would be conservative in regards to releases for the CRA-2019 PA. The condition of an empty equivalent Panel 9 or the hypothetical panel replacement was more than covered by the conservative assumptions of the existing model. Also, the parameterization representing no panel closures already existed in the Performance Assessment Parameter Database prior to the CRA-2019 PA and were therefore carried forward into the CRA-2019 PA compliance calculations (DOE, 2019b).

Thus, continuing to model the same TRU waste volume estimate as if it was located in equivalent Panel 9 results in larger releases compared to releases if the waste was relocated to an arbitrary location outside the current repository (DOE, 2019b). The results of this analysis suggests that the proposed location of the two replacement panels would not significantly change the WIPP compliance calculations or the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative because the repository continues to be modeled as ten panel equivalents (DOE, 1997a; DOE, 2019b).

2.2.3.2 Inclusion of an Additional Shaft and Associated Drifts

There are four shafts currently located in the repository north end, namely a Salt Handling Shaft, an Exhaust Shaft, a Waste Shaft, and an Air Intake Shaft. In the WIPP PA compliance calculation, these shafts are combined into a single shaft that captures the combined impacts (DOE, 2014b; DOE, 2019b). The rationale for this modeling treatment is set forth by Sandia National Laboratories (SNL, 1992 [Volume 5, Section 2.3]). The additional, planned shaft (i.e., Shaft #5) was combined with the four existing shafts in the analysis for the CRA-2019 PA. Additionally, mined volume in the repository north end was modified in the repository representation to include the additional drifts needed to access Shaft #5 (DOE, 2019b).

2.2.3.3 Conclusions from the CRA-2019

The results from the CRA-2019 PA compliance calculation demonstrate that the changes since CRA-2014 have little impact on the long-term performance of the WIPP repository (DOE, 2019b). The updated results incorporate the previously listed changes (refer to Section 2.2.3) and illustrate that for the undisturbed repository scenario there are no radionuclide releases to the accessible environment (DOE, 2019b). For the disturbed scenarios, the CRA-2019 PA results (i.e., total mean releases) demonstrate a marginal increase from the CRA-2014; however, these results are well within the acceptable regulatory limits as defined in 40 CFR 191.13 (DOE, 2019b). The CRA-2019 PA results also illustrate that there are only minor changes to environmental and human health impacts when compared to the results of the 1997 SEIS-II Preferred Alternative (DOE, 1997a; DOE, 2019b).

2.3 TRU Waste Inventory Estimates

Each year, TRU waste inventory estimates are collected from generator/storage sites. The Annual Transuranic Waste Inventory Report (**ATWIR**) provides the Carlsbad Field Office (**CBFO**) with updated TRU waste inventory estimates to facilitate achieving national TRU waste disposal objectives, to conduct PA compliance calculations (if needed), and to fulfill commitments in support of strategic planning (DOE, 2020e). The TRU waste inventory estimates change frequently due to retrieval, treatment, characterization, and shipping activities; therefore, the inventory estimates are updated on an annual basis (DOE, 2020e).

2.3.1 WIPP 1997 SEIS-II TRU Waste Inventory Estimate Analysis

The LWA included provisions that might affect the environmental impacts of some WIPP disposal alternatives. One section of the LWA allows no more than 175,600 cubic meters (6.2 million cubic feet) of total TRU waste volume and 5.1 million curies (**Ci**) of RH TRU waste to be disposed of at the WIPP facility (U.S. Congress, 1992a). In the 1997 SEIS-II Preferred Alternative, the DOE analyzed the impacts of disposing of a basic TRU waste inventory estimate.[1] The basic inventory estimate was comprised of two components, TRU waste that resulted from defense activities that were placed in retrievable storage pursuant to the Atomic Energy Commission policy of 1970, and TRU waste reasonably expected to be generated by these ongoing activities through 2033 (DOE, 1997a). The basic inventory estimates, including scale up to the statutory limit authorized under the LWA, was analyzed in the 1997 SEIS-II Preferred Alternative. Under the Preferred Alternative, a total of ten panel-equivalents were determined to be needed for the disposal of TRU waste up to the current WIPP LWA waste volume limit of 175,600 cubic meters (6.2 million cubic feet).

2.3.2 TRU Waste Inventory Estimate Updates

2.3.2.1 TRU Waste Volume

To meet the requirements of 40 CFR 194.24(a), the DOE describes and categorizes the TRU waste inventory emplaced in the WIPP repository and estimates the TRU waste inventory that exists or is expected to be generated at TRU waste generator/storage sites from across the nation. The CRA-2014 was based on the ATWIR-2012 inventory with a cutoff date of December 31, 2011 (DOE, 2012). The TRU waste inventory estimate used in the CRA-2019 (March 2019 submittal) was based on the ATWIR-2017 inventory data with a cutoff date of December 31, 2016 (DOE, 2017c).

Using the CRA-2019 data cutoff date, the inventory volume estimate for CH TRU waste increased and RH TRU waste decreased since CRA-2014. The increase in CH TRU waste was mainly attributed to SRS, LANL, and the Hanford (Richland) Site, with a total combined increase of about 19,000 cubic meters (DOE, 2017c; DOE, 2019b). Approximately 20-25% of the 19,000 cubic meter increase (i.e., 4,200 cubic meters) was associated with the addition of TRU waste stream SR-KAC-PuOx, which contains plutonium oxide from SRS K-Area (DOE, 2017c). This additional plutonium oxide (6 MTs) is categorized as WIPP-bound TRU waste as authorized by the 2016 ROD (DOE, 2016c). The 1997 SEIS-II discusses cumulative impacts from the disposition of up to 7,000 cubic meters of surplus plutonium as foreseeable future activities (DOE, 1997a); therefore, less than 7,000 cubic meters (i.e., 4,200 cubic meters from waste

[1] The basic inventory is that waste currently permitted in WIPP based on current laws and agreements (DOE, 1997a).

stream SR-KAC-PuOx) would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

The decrease in RH TRU waste volume estimate was mainly attributed to the Richland Site, with a decrease of about 600 cubic meters (DOE, 2017c; DOE, 2019b). The decrease was primarily due to new estimates in un-containerized TRU waste for waste stream RL618-08 based upon ongoing retrieval and projected decontamination and decommissioning efforts (DOE, 2017c).

The total LWA TRU waste volume (sum of stored, projected, and emplaced) from the CRA-2019 (as of December 31, 2016) was estimated at 169,400 cubic meters (166,000 cubic meters of CH TRU waste and 3,400 cubic meters of RH TRU waste). The basic inventory analyzed in the 1997 SEIS-II was 175,600 cubic meters. This suggests that the Proposed Action to continue the operation of the WIPP facility for the disposal of TRU waste in two replacement panels, including 6 MTs of surplus plutonium TRU waste, would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative (DOE, 1997a; DOE, 2019b).

The most recent ATWIR, (DOE, 2020e), continues to provide inventory estimate updates that are bounded by the LWA total TRU waste volume capacity limit of 175,600 cubic meters (6.2 million cubic feet). The TRU waste inventory estimate category from the ATWIR that is used in a WIPP PA compliance calculation is WIPP-Bound (which includes both Stored and Projected subcategories of TRU waste inventory estimates). The volume of TRU waste emplaced in the WIPP underground, plus the WIPP-Bound TRU waste volume estimates, plus a scaled-up TRU waste volume to meet the WIPP LWA total TRU waste volume capacity limit are the three categories of TRU waste used in a WIPP compliance calculation. The Potential waste category in the 2020 ATWIR is not included in the most recent WIPP PA compliance calculation.

Because WIPP-bound inventory estimates for TRU waste will be characterized to meet the WIPP WAC, including defined Pu-239 fissile gram equivalent limits based on individual containers, the WIPP Permit Waste Analysis Plan, transportation requirements, and the EPA certification criteria, environmental impacts from surplus plutonium disposition or the generation of TRU waste by-products from pit production in conjunction with the Proposed Action would be similar to those analyzed for in the 1997 SEIS-II Preferred Alternative.

2.3.2.2 Number of Curies

Using the CRA-2019 data cutoff date, the total activity for RH TRU waste reported by the generator/storage sites has decreased since the CRA-2014 by approximately 20,000 Ci to 1.18 million Ci (DOE, 2017c). This is a minor change considering the total RH TRU activity reported for CRA-2014 was 1.2 million Ci. This TRU waste inventory estimate update would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative because the RH TRU waste total activity estimate is less than the LWA limit of 5.1 million Ci (U.S. Congress, 1992a; DOE, 1997a; DOE, 2019b).

2.4 Panel Closure

The WIPP facility panel closures, for the purposes of a PA compliance calculation, comprise a crucial feature of the repository. These closures have been represented in WIPP PA since the 1996 CCA (DOE, 1996b). Following the EPA specification of the Option D panel closure design in 1998 [63 FR 27354, May 18, 1998], the DOE reassessed the engineering of the panel closure and established a revised design which is simpler, easier to construct, and equally effective at performing its operational-period isolating function (EPA, 2014). The revised design is the ROMPCS and is comprised of 100 feet of run-of-mine salt with barriers at each end (DOE, 2019b; NMED, 2020). For the CRA-2014 PA, the ROMPCS was assumed to exist at the entrance and exit drifts of panels; for the CRA-2019 PA, the planned implementation of the ROMPCS in Panels 3, 4, 5, and 6 was assumed to not be installed (DOE, 2019b).

The new panel closure design is different from the panel closure system that was described in the 1997 SEIS-II; however, it is not substantively different. The ROMPCS continues to meet the closure requirements specified in the WIPP Permit (NMED, 2020), and it continues to be included in the PA computer codes as a feature of the repository for a PA compliance calculation. Results from the CRA-2019 PA, which include representation of areas with the new panel closure design and areas with uninstalled panel closures, demonstrate that the WIPP continues to comply with the EPA radioactive waste disposal standards (DOE, 2019b). The panel closure update would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative because the new panel closure will be installed in the same underground location and continue to meet the operational requirements for closure in WIPP Permit.

2.5 Tracking and Reporting of LWA TRU Waste Disposal Volume

In 2018, the NMED adjudicated a Permit modification that distinguished and differentiated the method of counting the TRU waste disposal volume for the purposes of reporting and tracking against the Permit versus the LWA statutory limit (NMED, 2018). The LWA waste volume is reported by a different method and tracked separately from the Permit.

This change clarified that the maximum capacity of the WIPP repository, as it pertains to RCRA, is based on the TRU waste capacities of the individual HWDUs. It is not based on the LWA total TRU waste volume capacity limit of 175,600 cubic meters (6.2 million cubic feet). Volume reporting, according to RCRA, determines how much waste is emplaced at the WIPP facility, which is limited by the physical volume of each mined HWDU. The LWA TRU waste volume is the volume of TRU waste inside a disposal container. The amount of actual TRU waste in a HWDU will always be less than what was analyzed for in the 1997 SEIS-II, because conservative assumptions were used regarding waste container fill capacity and waste container packing fractions (DOE, 1997a).

While the result is the need for more underground space to dispose of the authorized LWA TRU waste inventory, the total LWA TRU waste volume remains the same as the basic TRU waste volume[1] analyzed in the 1997 SEIS-II Preferred Alternative. Because the LWA TRU waste volume remains unchanged, the method for tracking and reporting TRU waste would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

[1] The basic inventory is that waste currently permitted in WIPP based on current laws and agreements (DOE, 1997a)

2.6 Update to the WIPP U/G Ventilation System

Post 2014-radiological event, the DOE proposed to construct and operate a Permanent Ventilation System (**PVS**) to support the WIPP mission, which included full-scale, simultaneous waste disposal and mining operations. In 2015, the Assistant Secretary for Environmental Management approved Critical Decision (**CD**)-1, *Waste Isolation Pilot Plant Underground Ventilation System (UVS) Project Implementing Line Items 15-D-411, Safety Significant Confinement Ventilation System, and 15-D-412, Exhaust Shaft* (NWP, 2015). These site-specific infrastructure projects were evaluated under previous NEPA procedures and have a final decision (DOE, 2016a; DOE, 2017b). These actions are not further analyzed in this SA; however, they are included here for information as they continue to be ongoing projects at the WIPP facility with potential effects when included with foreseeable future actions (refer to Section 4.0). The PVS replaces the existing filtration system and it satisfies the need for a safety significant confinement ventilation system. The new ventilation shaft (i.e., Shaft #5) and the accompanying access drifts provide additional air to the U/G for full-scale waste emplacement along with concurrent mining and maintenance operations (DOE, 2017b).

The PVS is designed with the best available radionuclide control technology to minimize the potential release of radionuclides into the atmosphere. The dose to the population within 80 kilometers (50 miles) of the WIPP Site is less than 0.00001 person-rem, with no LCFs expected (DOE, 2017b). Over a hypothetical 30-year PVS lifetime, no LCFs would be expected either (DOE, 2017b). The normal operation of the PVS does not affect quantities of radioactive or hazardous materials managed at the WIPP facility.

Shaft #5 is designed to provide ventilation air for both the construction and disposal circuits of the WIPP repository (DOE, 2017b). The additional airflow capacity facilitates concurrent mining, waste disposal, and maintenance activities. It also can provide an unfiltered exhaust path for the construction (i.e., mining) circuit. In the WIPP PA, the four existing shafts are combined into a single shaft that captures the combined impacts (DOE, 2014b; DOE, 2019b). Shaft #5 was combined with the four existing shafts in the PA for the CRA-2019 PA (DOE, 2019b). The rationale for this modeling treatment is set forth by Sandia National Laboratories (SNL, 1992, [Volume 5, Section 2.3]).

2.7 Population

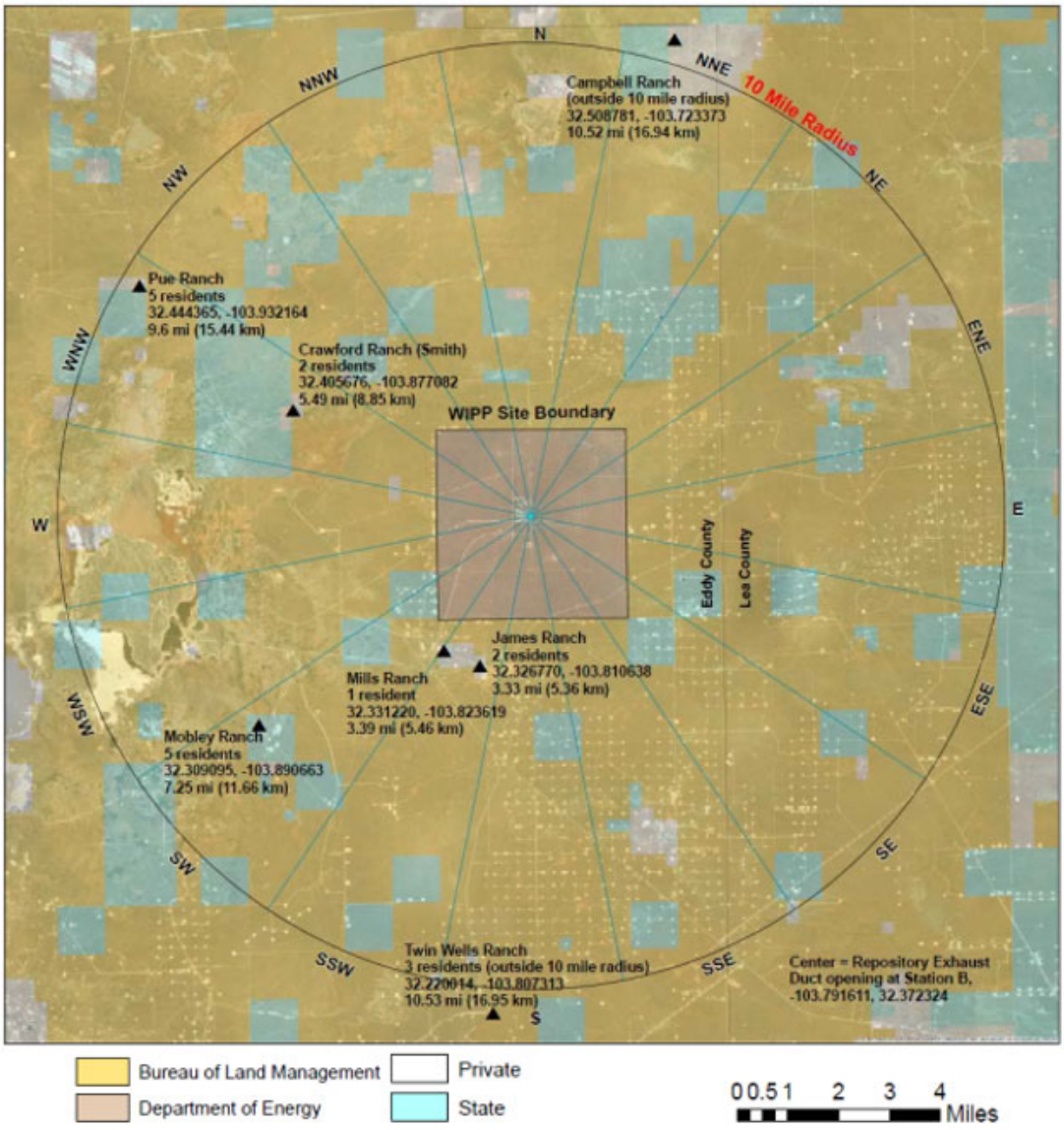
Potential consequences to human health from normal operations and accidents are evaluated within a specific group ROI. In the 1997 SEIS-II, these groups included workers at the WIPP Site, the 50-mile population surrounding the WIPP Site (for which the populations of Eddy and Lea counties are substituted), and the population along the transportation corridors from the generator/storage sites.

2.7.1 The WIPP Project Workforce

The WIPP Project workforce evaluated in the 1997 SEIS-II Preferred Alternative was 1,095 persons (DOE, 1997a). The workforce has remained reasonably constant throughout the 20 years of WIPP operations (DOE 2016a). In the *Waste Isolation Pilot Plant Five-Year Site Plan FY 2018 – FY 2022*, the current workforce was listed at 970 persons (DOE, 2018c). While no substantive changes in workforce staffing are anticipated, minor, temporary changes associated with construction activities may occur.

2.7.2 The 50-Mile Population Surrounding the WIPP Site

In 2019, there were five permanent residences (i.e., ranches) within 16 km (10 mi) of the WIPP Site (refer to Figure 2-2) (DOE, 2020a) compared to two ranches in the 1997 SEIS-II. The population associated with these residences primarily involves ranching activities. This area has not had noticeable population growth since the issuance of the 1997 SEIS-II (Figure 2-2).



Source: Delaware Basin Drilling Surveillance Program

FIGURE 2-2. ESTIMATED RANCH POPULATIONS WITHIN A 10-MILE RADIUS OF THE WIPP FACILITY

The majority of the population within 80.5 km (50 mi) of the WIPP Site is concentrated in and around Eddy County and Lea County (referred to as the combined population) among the communities of Carlsbad, Hobbs, Eunice, Loving, Jal, Lovington, and Artesia. The 1997 SEIS-II used a combined population of 104,370 from 1990 census data for the 50-mile population estimate surrounding the WIPP Site (DOE, 1997a). According to 2010 census data, the estimated population within this radius increased to 118,556 (DOE, 2016a). Since 2010, two periods of rapid growth have occurred due to oil field activity. The 2019 combined population is estimated at 129,530 (U.S. Census Bureau, 2019a), which represents a 24 percent increase over the ROI population since the issuance of the 1997 SEIS-II. The effects of this change on potential human health impacts are discussed in Section 3.2.5.

2.7.3 The Transportation Corridor

The population demographics of the transportation corridor were not evaluated in detail for this SA. Given that the population corridors span much of the continental United States, this SA assumes that changes in the corridor population are likely to be similar to the overall changes in the U.S. population. In 1990, the U.S. population was 248,709,873 (DOE, 2016a). The 2019 estimated U.S. population is 328,239,523 (U.S. Census Bureau, 2019b), which represents a 32 percent increase over the U.S. population since 1990. The effects of this change on potential human health impacts are discussed in Section 3.2.5.

2.8 Dose Conversion Factor

Since the publication of the 1997 SEIS-II, updated DOE guidance recommends the use of a dose-to-risk conversion factor of 6E-04 LCF per rem for both workers and members of the public versus 4E-04 and 5E-04, respectively (DOE, 2016a). The change in the conversion factor has been applied in previous WIPP site-wide SAs and is accounted for in the data presented in this SA.

2.9 Background Radiation

Background radiation includes radiation resulting from (1) naturally occurring radioactive materials as they exist in nature prior to removal, transport, or enhancement or processing by people; (2) cosmic and natural terrestrial radiation; (3) global fallout as it exists in the environment; (4) consumer products containing nominal amounts of radioactive material or emitting nominal levels of radiation; (5) medical procedures/sources; and (6) radon and its progeny in concentrations or levels existing in buildings or the environment that have not been elevated as a result of current or past human activities.

In 1994, ambient radiation (i.e. cosmic), atmospheric particulates, soil, surface water and sediment, groundwater, and biota (vegetation, fish, rabbit, and deer) samples in the vicinity of the WIPP Site were collected and analyzed radiologically (DOE, 1997a). An estimated annual dose of approximately 65 mrem was determined from these sources, indicating that no unusual levels of environmental radioactivity exist at the WIPP Site (DOE, 1997a). According to the most recent *Annual Site Environmental Report* (DOE, 2020a), there have been no substantive changes in background radiation at the WIPP Site since the 1997 SEIS-II. For comparison, a typical person residing in the U.S. receives an effective dose equivalent of about 350-620 mrem/yr from background radiation with 50 - 80 mrem coming from cosmic and terrestrial sources (DOE, 1995; DOE 1997b; NCRP, 2009).

Residual contamination from the 2014 radiological event resulted in an estimated maximally exposed off-site individual of less than 1 mrem, with a dose closer to 0.006 mrem (DOE, 2015b). The radiological release from the WIPP U/G repository did not measurably affect the public or the environment (DOE, 2015b). Because this dose is well below the estimated annual background dose, the radiological event did not affect background radiation. No substantive changes have occurred in the understanding of background radiation at the WIPP Site since the 1997 SEIS-II.

2.10 Changes in DOE's NEPA Approach

In 2019, the DOE issued updated guidance for SAs (DOE, 2019d). It provides recommendations that are broadly applicable to the SA process, including deciding whether to prepare an SA, the general content of an SA, and outcomes that can result from an SA. The DOE NEPA procedures (10 CFR §1021.314[c]) require that an SA be prepared when the need for a supplemental EIS is unclear based on the criteria established in the CEQ regulations. The DOE NEPA procedures also provide for the use of an SA to re-evaluate the adequacy of a site-wide EIS at least every five years (DOE, 2019d). Based on the analysis, the DOE shall determine whether the existing EIS remains adequate or whether to prepare a new site-wide EIS or supplement the existing EIS, as appropriate.

On July 16, 2020, the CEQ issued an *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act* (85 FR 43304). In accordance with 40 CFR §1506.13, the updated regulations apply to NEPA processes after September 14, 2020. Because this SA process was initiated prior to that date, the DOE has the option to continue to follow the CEQ NEPA regulations in effect prior to September 14, 2020 (1978 regulations), and has opted to do so.

3.0 ENVIRONMENTAL IMPACTS

3.1 Resource Areas Not Analyzed in Detail in this SA

The DOE determined that the following resource areas would not be substantively affected by the Proposed Action or new information and, therefore, are not carried forward: air quality, noise, climate, greenhouse gas (**GHG**) emissions, geology and hydrology, biological resources, cultural resources, and socioeconomics (including environmental justice).

3.1.1 Air Quality, Noise, Climate

3.1.1.1 Air Quality

Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. In the 1997 SEIS-II, the EPA classified Eddy County, NM, where the WIPP facility is located, as an attainment area for six criteria pollutants: ozone, carbon monoxide (**CO**), total suspended particulates, sulfur dioxide (**SO_2**), lead, and nitrogen oxide (DOE, 1997a). Air quality monitoring data collected since 1990 are summarized in annual WIPP Site environmental reports (DOE, 2020a). The WIPP facility has completed inventories of potential pollutants and emissions in accordance with EPA and New Mexico Air Quality Control Regulations. Based on these inventories, the WIPP facility has no permitting or reporting requirements except for those applying to two primary backup diesel generators. The diesel generators are assumed to emit four criteria pollutants: nitrogen dioxide (**NO_2**), SO_2, CO, and particulate matter PM_{10} (DOE, 1997a).

Principal emission sources of particulates from operation of the WIPP facility under the Proposed Action are (1) exhaust from U/G mining, (2) surface salt handling, (3) wind erosion of the salt pile, and (4) fuel combustion from back-up diesel generators, mining and support equipment. Fuel combustion would be the principal source of NO_2, SO_2, and CO. The Proposed Action would result in temporary salt dust emissions from mining and hauling activities spread over the lifetime of the facility, including diesel particulate matter from salt haul trucks. While mining would be performed in a different location other than equivalent Panels 9 and 10, the activities would be similar; thus, the impacts are negligible.

Excavation and use of the two replacement panels would not extend beyond the current estimated WIPP final facility closure date of 2033. Because excavation operations, TRU waste handling operations at the surface, CH TRU waste emplacement operations, RH TRU waste emplacement operations, panel closures, facility closure, and decommissioning would be similar as those analyzed in the 1997 SEIS-II Preferred Alternative, the excavation and use of two replacement panels for TRU waste disposal would not change the air quality impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

3.1.1.2 Noise

Since 2016, no known new noise receptors have been identified in the WIPP ROI (DOE, 2016a). Chapter 9, Section 9.3.1 of the FEIS (DOE, 1980) contains a thorough noise evaluation from construction activities similar to those of the Proposed Action. The nearest noise receptor remains the Mills Ranch, three miles to the south of the WIPP facility. Any WIPP noise sources with the potential to exceed these standards have been mitigated (for example, noise dampers have been installed in the U/G air exhaust fans) and are in compliance with 29 CFR §1910.95.

3.1.1.3 Climate

As discussed in the 1997 SEIS-II, the regional climate is semiarid (i.e., low precipitation and humidity with a high rate of evaporation). The climate information remains unchanged. Precipitation is unevenly distributed throughout the year, occurring mostly during summer thunderstorms. Winds are moderate and typically from the southeast. In late winter and spring, strong west winds and dust storms are present. From June through September thunderstorms are frequent, and are often accompanied by hail. Rains are brief but occasionally intense, which can result in flash flooding in arroyos and along floodplains.

There is no new information relevant to environmental concerns previously evaluated in the 1997 SEIS-II Preferred Alternative. Climate-related impacts such as increased heat, drought, and insect outbreaks, declining water supplies, reduced agricultural yields, health impacts in cities due to heat, and flooding and erosion are not anticipated to affect the WIPP facility or the Proposed Action.

3.1.2 Greenhouse Gas Emissions

Where appropriate, DOE NEPA documents consider the potential impacts associated with GHG emissions. The 2016 site-wide SA presented results of a GHG analysis to continue the transportation of TRU waste to the WIPP facility by truck and to continue the operation of the WIPP facility for the disposal of TRU waste generated by atomic defense-related activities (DOE, 2016a). The GHG emissions from the construction of two replacement panels for the disposal of TRU waste would be negligible. The Proposed Action would not increase the quantity of TRU waste transported to the WIPP facility, thus, it would not increase transportation-related GHG emissions. Temporary changes associated with the construction activities for Shaft #5 may occur; however, no new permanent activities are anticipated following project completion. Therefore, there is no change to the 2016 GHG emissions analysis.

3.1.3 Geology and Hydrology

Based on the results of site investigations summarized in numerous publications, including the WIPP *Geological Characterization Report* (Powers et al., 1978); the *WIPP Design Validation Final Report* (DOE, 1986); and *Summary of Site-Characterization Studies Conducted from 1983 through 1987 at the Waste Isolation Pilot Plant (WIPP) Site Southeastern New Mexico* (Lappin, 1988), no substantive changes have occurred in the understanding of the site or regional geology since the publication of the 1997 SEIS-II. The geologic information from the cores related to Shaft #5 indicate the same stratigraphic/geologic sequences as seen in the other four shafts (NWP, 2018; Stephens, 2017).

The geological system, including seismicity, has been within expected conditions. There are not any active faults (less than 150 years) in the area of the WIPP Site (United States Geologic Society Interactive Fault Map). This geologic media (rock salt) and specific geologic formation and location is specifically chosen to house the WIPP deep geologic repository for TRU waste. Since 1926, seismic events have been recorded in the Delaware Basin (DOE, 2020a). These events have had no observable effects on WIPP facility structures. In the 30 plus years of site investigations and ongoing awareness of the geologic setting at and around the WIPP facility, no substantive changes have occurred in the understanding of the site and regional and local geology over this time period and since publication of the 1997 SEIS-II.

There are no hydrologic resources (surface water, groundwater, floodplains, or wetlands) in the WLWA that would be impacted by the Proposed Action. No major surface water bodies are located within 10 miles of the WIPP Site boundary. The Pecos River is approximately 12 miles west of the WIPP Site boundary at its closest point. The Proposed Action does not have the potential to discharge to waters of the U.S. or a storm sewer. In the vicinity of the WIPP Site boundary, there are limited occurrences of potable water, and several water-bearing zones, which produce poor-quality water at substantive depths below the surface. The presence of a caliche layer near the surface indicates that runoff, which infiltrates into the subsurface will not infiltrate beyond the caliche layer. Hydrologic features are not impacted by the Proposed Action.

3.1.3.1 Surface Water

No surface water occurs in the area of the WIPP Site or the proposed project area, but surface water bodies lie within a 25-mile (40-km) radius of the center of the site, such as the Pecos River, Laguna Grande de la Sal, and livestock ponds (termed “tanks”), which are fed from surface runoff. These surface water bodies are sampled as part of the *Waste Isolation Pilot Plant Environmental Monitoring Plan* (DOE, 1996a). The nearest substantial surface water body, Laguna Grande de la Sal, is 8 miles (13 km) west-southwest of the center of the WIPP Site in Nash Draw where shallow brine ponds occur.

The rate of evapotranspiration exceeds normal precipitation by about a factor of four. This means that precipitation does not infiltrate deeply into the soil except in areas where there are sand dunes. Infiltration generally does not go beyond the Mescalero Caliche. Precipitation that falls would not infiltrate to the Rustler. Based on the lack of vertical infiltration, and distant recharge and discharge locations, changes in the Proposed Action would have no effect on the potential impacts presented in the 1997 SEIS-II.

3.1.3.2 Groundwater

In the vicinity of the WIPP Site, there are limited occurrences of potable water, and several water-bearing zones that produce poor-quality water. Several water-bearing zones have been identified and extensively studied at and near the WIPP Site. Limited amounts of potable water are found in the middle Dewey Lake Formation and the overlying Santa Rosa and Gatuña Formations (**Santa Rosa, Gatuña**) in the southern part of the WLWA. Two fluid-bearing units, the Culebra and the Magenta Dolomite Member (**Magenta**), occur in the Rustler and produce brackish to saline water at and near the WIPP Site. In the immediate vicinity of the WIPP Site, groundwater is commonly of such poor quality that it is not usable for most purposes.

Hydrology/water quality has been studied at the WIPP Site for over 40 years. Surface water bodies are not impacted by activities at the WIPP Site. Water-bearing beds (Culebra and Magenta) are deep and separated from the surface by several hundred feet of low-permeability geologic formations (aquitards), limiting or preventing infiltration. Recharge to the Culebra is north and northwest of Nash Draw. Discharge from the Culebra is south of Laguna de la Sal near Malaga Bend. Recharge for the Magenta is north of the WIPP Site near Bear Grass Draw and in Clayton Basin (refer to *Geohydrology of the Proposed Waste Isolation Pilot Plant Site*) (Mercer, 1983). Vertical infiltration into these water-bearing zones does not exist at the WIPP Site; therefore, changes in the Proposed Action would have no effect on the potential impacts presented in the 1997 SEIS-II.

3.1.3.3 Floodplains

Floodplains are areas of low, level ground present along rivers, stream channels, or coastal waters that are subject to periodic or infrequent inundation due to rain or melting snow. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, nutrient cycling, water quality maintenance, and provision of habitat for a diversity of plants and animals. Implementation of the Proposed Action would have no impact on floodplains because the WIPP facility surface structures are approximately 500 ft above the river bed and over 400 ft above the 100-year floodplain, and no major surface-water bodies exist within a 10-mile radius of the WIPP facility (DOE, 1990a).

3.1.4 Biological Resources

In 1996, the DOE conducted a Threatened and Endangered Species Survey on the WLWA and associated lands to investigate the potential for impact to rare, threatened, endangered, or sensitive plant or animal species (DOE, 1997a). No threatened, endangered, or state-listed species were found on the WLWA during this survey. According to the most recent *Annual Site Environmental Report* (DOE, 2020a), there have been no substantive changes in the biological resources at the WIPP Site since the 1997 SEIS-II.

3.1.5 Cultural Resources

In August 1978, the Agency for Conservation Archaeology from Eastern New Mexico University conducted an archaeological survey of the area around the WIPP facility (Schermer, 1978). The agency surveyed various north/south corridors in the areas south of the WIPP Site. None of these corridors indicated any archaeological sites within or near the corridors except in areas farther south than the project area. A Class III cultural resource inventory was conducted in the area of effect, and no Historic Properties were identified. In 1987, Mariah & Associates (1987) conducted a Class II survey and testing of the cultural resources at the WIPP facility as well. There were no known Native American sacred sites or burials found within the LWA. The Proposed Action would not affect cultural resources because the Proposed Action would be located on previously disturbed land, which has already been surveyed.

3.1.6 The Socioeconomic Environment (including Environmental Justice)

3.1.6.1 Socioeconomics

The Proposed Action would not result in any appreciable effects to the local or regional socioeconomic environment beyond those already evaluated in the 1997 SEIS-II. The Proposed Action would have minor beneficial effects associated with temporary employment of construction personnel and transportation of goods and materials to the WIPP Site. No new operational personnel would be permanently hired to support the project.

3.1.6.2 Environmental Justice

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, (Executive Order [**EO**] No. 12898, 1994) requires that "each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health effects of its programs, policies, and activities on minority populations and low-income populations." Due to the remote location of the WIPP facility and the large land withdrawal area, there are no minority or low-income populations adjacent to the WLWA that would be impacted by the Proposed Action (refer to Figure 2-2). Therefore, impacts related to EO 12898 would not occur.

3.2 Resource Areas Analyzed in Detail in this SA

The following subsections present analyses of the potential impacts relevant to environmental concerns resulting from changes or new circumstances since the issuance of the 1997 SEIS-II, as informed further by the 2005 site-wide SA [DOE, 2005], the 2009 site-wide SA [DOE, 2009a] and the 2016 site-wide SA [DOE, 2016a]. Potential environmental impacts are compared to those analyzed in the 1997 SEIS-II to determine if any of the changes are substantial or new circumstances are significant and relevant to environmental concerns bearing on the 1997 SEIS-II Preferred Alternative or its impacts.

3.2.1 Land Use and Management

The type of land use surrounding the WIPP facility has not substantively changed since the preparation of the 1997 SEIS-II, although the level of development has increased. The WIPP Site is divided into several areas under DOE control (refer to Figure 1-2). The Exclusive Use Area, set off by a barbed-wire fence, surrounds the innermost Property Protection Area, which includes the WIPP surface facilities. Enclosing these areas is the Off-Limits Area, which is unfenced to allow livestock grazing but, like the other two, is patrolled and posted against trespass or other land uses. Beyond the Off-Limits Area, but within the 16-section WIPP Site, the land is managed as multiple use; however, mining and drilling for purposes other than support of the WIPP project are restricted.

To manage the mined salt for the Proposed Action, a new lined salt pile and evaporation pond may be needed. The proposed location of a new lined salt pile would be within the WLWA. Currently, there is an existing salt pile that is permitted, and it can accommodate run-of-mine salt for the initial main access drifts (to the west of the facility) and at least one replacement disposal panel. The 1997 SEIS-II analyzed the environmental impacts of a 30-acre working salt pile during disposal operations. The analysis concluded that the salt pile would not affect the ecosystem balance, and that salt tolerant plant species would replace less saline-tolerant species. The analysis also concluded that the salt pile would not affect biodiversity.

The new proposed salt pile could include land use up to ten acres. The current land use for the existing aggregated salt pile at the WIPP facility is 30 acres. When including this additional use to the existing aggregated salt pile, the total working salt pile would be approximately 40 acres, an increase of approximately 33%. The 1997 SEIS-II concluded that decommissioning and closure of the WIPP Site would result in the dismantling of aboveground structures and reclamation of the area. These activities would affect approximately 175 acres, resulting in the loss of much of the plant community and avian and small mammal habitats within and near the area. The DOE would return decommissioned lands used in the operation of WIPP to a stable ecological condition and maintain or enhance the ecological condition of wildlife habitat within the WLWA (DOE, 1997a).

Because the proposed salt pile (10 acres) would reside within the 175 acres claimed for decommissioning and closure of the WIPP Site, the Proposed Action would not affect land use and management beyond what was analyzed for in the 1997 SEIS-II Preferred Alternative. The new salt pile would be on previously disturbed land within the WLWA. The new proposed salt pile would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative because the DOE would return decommissioned lands used in the operation of WIPP to a stable ecological condition and maintain or enhance the ecological condition of wildlife habitat within the WLWA (DOE, 1997a).

The DOE developed a Land Management Plan (**LMP**), as required by the LWA, to identify resource values, promote multiple-use management, and identify long-term goals for the management of WIPP lands (DOE, 2019f). The LMP was developed in consultation with the Bureau of Land Management (**BLM**) and the state of New Mexico. The LMP sets forth cooperative arrangements and protocols for addressing land management actions. It is reviewed biennially to assess the adequacy and effectiveness of the document, and may be necessary to address emerging issues affecting lands within the WLWA. There are no known BLM grazing leases, other land use management changes, or proposed changes within the WIPP Site boundary (DOE, 2019f).

3.2.2 Soils

The Mescalero caliche, Berino soil, and surficial sands overlie the Gatuña. The Mescalero is an informal soil stratigraphic unit defined in *Geologic Processes and Cenozoic History Related to Salt Dissolution in Southeast New Mexico* (Bachman, 1974). It is widespread in southeastern New Mexico and is a continuous stratigraphic unit at the WIPP Site. The Mescalero near the WIPP Site is about 5 ft (1.5 m) thick and about 5 to 10 ft (1.5 to 3 m) below ground surface. Overlying the Mescalero is the Berino soil overlain by surficial sands. The Berino soil is not a geologic unit, it is pedogenic. The surface sand across much of the WIPP Site is aeolian, generally fine to medium grained and well sorted. Sand dunes in the vicinity of the WIPP area are generally stabilized by vegetation (*Basic Data Report for Drillhole C-2737*) (Powers, 2002). The FEIS [Table 7-13] provides details regarding the engineering suitability of Berino soil at the WIPP Site (DOE, 1980).

The Proposed Action could include additional surface-based structures (e.g., a lined salt pile and its accompanying evaporation pond) for mined salt disposal and runoff management. These structures do not require the modification of the Berino soil at the WIPP Site. Soils would be temporarily removed where necessary to make room for properly engineered base material for the lined salt pile and associated drainage and pond features. Removal of topsoil would be a minor change and the topsoil would be stored for eventual reclamation activities as is the

practice at the WIPP facility (DOE, 2019f). Therefore, impacts to soils from implementation of the Proposed Action would be minor.

3.2.3 Visual Resources

To manage the mined salt for the Proposed Action, a new lined salt pile and evaporation pond would be constructed and permitted by the NMED Groundwater Quality Bureau. Currently there is an existing salt pile that is permitted and it would accommodate run-of-mine salt for the initial main access drifts and at least one replacement disposal panel. The proposed location for a new lined salt pile would be on previously disturbed land within the WLWA (refer to Figure 1-2).

The Proposed Action would not alter the current land use or recreation value of the project area or the WLWA. The lined salt pile would be constructed within the WLWA property boundary on land that has previously been disturbed. The Proposed Action would be consistent with the visual characteristics of the existing infrastructure at the WIPP Site. There are no aesthetically sensitive areas within the viewshed of the WIPP Site. The addition of a new lined salt pile would be a minor change in regards to the overall land planned for reclamation; 10 acres versus 175 acres. Therefore, there would be minor changes to visual impacts from the implementation of the Proposed Action.

The DOE implements the BLM manual Visual Resource Management to determine the degree to which any Proposed Action or other activities within the WLWA would affect the visual quality of the landscape (BLM, 1984). The location of the surface construction portion of the Proposed Action is within a BLM Visual Resource Management Class IV zone. The objective of a Visual Resource Management Class IV is to provide for management activities which may require modifications of the existing character of the landscape (BLM, 1984).

The Proposed Action activities would not dominate the viewshed and would not be a major focus of viewer attention. However, attempts would be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements of color, form, line, and texture. The Proposed Action would cause some short-term and long-term visual impacts to the natural landscape. Short-term impacts would occur during construction operations. These include the presence of construction equipment vehicle traffic and shallow excavation activities associated with the development of an additional lined salt pile and accompanying evaporation pond.

Long-term impacts would be visible to the casual observer through the life of the Proposed Action. These include the visual evidence of a growing salt pile and the presence of an evaporation pond, both of which would be in an area with existing salt piles and ponds. These impoundments would cause visible contrast to form, line, color, and texture. Removal of vegetation due to construction of the impoundments would expose bare soil lighter in color and smoother in texture than the surrounding vegetation.

Short-term and long-term impacts are minimized by best management practices such as color selection, reducing cut and fill, and screening facilities with natural features and vegetation. The DOE has committed to remove surface structures and restore the surface area at the WIPP facility to as near its original contours as possible at the time the WIPP facility is dismantled and decommissioned (NMED, 2020). Due to its remote location, the impacts of the Proposed Action would not be visible to the public. Implementation of the Proposed Action

would have a minor impact on visual resources and would be consistent with current land use within the WLWA.

3.2.4 Transportation

The DOE is proposing to continue the transportation of waste to the WIPP facility by truck and to continue the operation of the WIPP facility for the disposal of TRU waste generated by atomic defense-related activities. Impacts associated with the transportation of TRU waste and the operation of the WIPP facility have not substantively changed since the preparation of the 1997 SEIS-II, the updated transportation analysis in the 2009 site-wide SA, or the 2016 site-wide SA (DOE, 1997a; DOE, 2009a; DOE, 2016a). Figure 3-1 shows the anticipated shipping rate projections through 2033, which are less than the 1997 SEIS-II projections. The 1997 SEIS-II Preferred Alternative analyzed an average of 1,078 shipments per year during the 35 year WIPP disposal phase (DOE, 1997a). The Proposed Action would not extend beyond the current estimated WIPP final facility closure date of 2033 and would not include the use of more than ten total equivalent disposal panels for the WIPP repository. The overall quantity of TRU waste to be disposed of at the WIPP facility would not change compared to prior WIPP analyses.

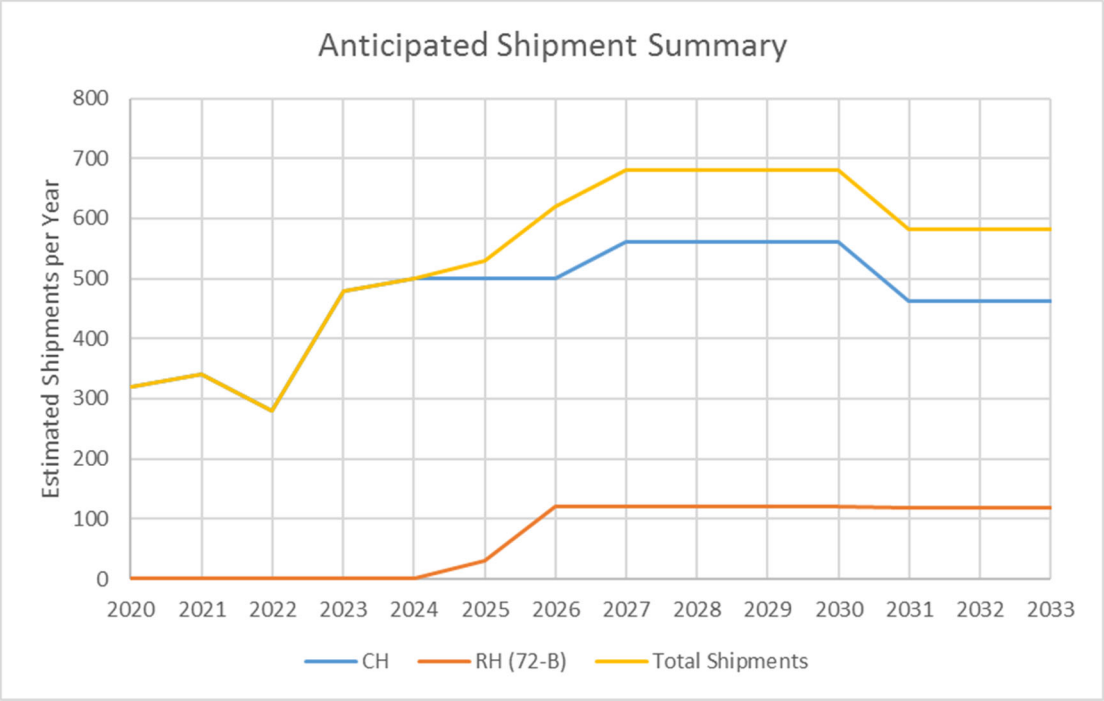


FIGURE 3-1. ANTICIPATED SHIPMENTS PER YEAR

3.2.4.1 Lifetime Incident-Free Radiological Impacts

In the 1997 SEIS-II, the bounding lifetime incident-free radiological impact to the maximum exposed individual (**MEI**) from truck transportation for the Preferred Alternative is listed at 8.5E-03 LCFs (DOE, 1997a). Applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the lifetime incident-free radiological impact to the MEI from truck transportation would increase to 1.0E-02 LCFs. As such, the associated incident-free

transportation impacts to the MEI associated with the Proposed Action would result in a negligible increase compared to the impacts previously analyzed in the 1997 SEIS-II Preferred Alternative and the 2016 site-wide SA.

The population demographics of the transportation corridor were not evaluated in detail for this SA. Given that the population corridors span much of the continental United States, this SA assumes that changes in the corridor population are likely to be similar to the overall changes in the U.S. population. In the 1997 SEIS-II, the aggregate incident-free population radiological impacts (non-occupational) from truck transportation for the Preferred Alternative is listed at 3.0 LCFs (DOE, 1997a). A total of 3.0 non-occupational LCFs are estimated due to routine transportation under the Preferred Alternative. However, default parameters of the RADTRAN code substantially overestimates impacts due to WIPP shipments (DOE, 1997a). Because WIPP shipments use two-driver teams (eliminating the need for overnight stops to sleep) and because the shipments would stop at sites chosen, in part, because they are not near population centers, the actual impacts from stops would be much lower (DOE, 1997a).

Since publication of the 1997 SEIS-II, the U.S. population has increased by approximately 32 percent (refer to Section 2.7.3). This change would have a proportional effect on the dose to the public residing within the transportation corridor. Adjusting for population increases and applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the aggregate incident-free population radiological impacts from truck transportation would increase from 3.0 LCFs to 4.8 LCFs. As such, the associated aggregate incident-free transportation impacts associated with the Proposed Action would result in a minor increase compared to the impacts previously analyzed in the 1997 SEIS-II Preferred Alternative.

In the 1997 SEIS-II, the aggregate incident-free radiological impacts (occupational) from truck transportation for the Preferred Alternative are listed at 0.3 LCFs (DOE, 1997a). Applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the aggregate incident-free radiological impacts (occupational) from truck transportation would increase from 0.3 LCFs to 0.5 LCFs. As such, the associated aggregate incident-free transportation impacts associated with the Proposed Action would result in a negligible increase compared to the impacts previously analyzed in the 1997 SEIS-II Preferred Alternative.

3.2.4.2 Lifetime Radiological Impacts from Potential Truck Transportation Accidents

The 1997 SEIS-II evaluated the potential doses to the population within the transportation corridor from potential vehicle accidents and presented those results in Table 5-9, *Aggregate Radiological Impacts from Potential Truck Transportation Accidents for the [Preferred Alternative] (LCFs)* (DOE, 1997a). The 1997 SEIS-II estimated 0.43 LCFs occurring to the aggregate population within the transportation corridor from TRU waste disposal over the lifetime of WIPP facility operations. As a result of the 32 percent population increase, the risk probability would be estimated at 0.57 LCFs. Applying the updated dose conversion factor (refer to Section 2.7.4), the lifetime potential human health impacts to the transportation corridor population would be 0.68 LCFs. This change, about 0.25 LCFs, represents a negligible impact.

FRACTIONAL LCFs

Sometimes calculations of the number of latent cancer fatalities associated with radiation exposure do not yield whole numbers, and, especially in environmental applications, may yield numbers less than 1.0. For example, if each member of a population of 100,000 were exposed to a total dose of 0.001 rem (i.e., 1 mrem), the collective dose would be 100 person-rem, and the corresponding estimated number of latent cancer fatalities would be 0.06 (100,000 persons x 0.001 rem x 0.0006 latent cancer fatalities/person-rem = 0.06 latent cancer fatalities).

How should one interpret a fractional number of latent cancer fatalities, such as 0.06? The answer is to interpret the result as a statistical estimate. That is, 0.06 is the ***average*** number of deaths that would result if the same exposure situation were applied to many different groups of 100,000 people. For most groups, no one would incur a latent cancer fatality from the 0.001 rem dose each member would have received. In a small fraction of the groups, 1 latent fatal cancer could result; in exceptionally few groups, two or more latent fatal cancers could occur. The ***average*** number of deaths over all of the groups would be 0.06 latent fatal cancers (just as the average of 0, 0, 0, 0, 0, 0, 0, 0, 0 and 1 is 0.1 for ten groups). The most likely outcome is zero latent cancer fatalities.

3.2.5 Human Health Impacts

3.2.5.1 Public Health Impacts from Normal Operations in the Region of Influence

This section evaluates the differences or changes that have occurred, or are expected to occur, at the WIPP facility that are related to human health impacts. Since the publication of the 1997 SEIS-II, the population in the ROI has increased by approximately 24 percent (U.S. Census Bureau, Population Estimates Program, 2019). This change would have a proportional effect on the public population dose from normal WIPP operations.

The 1997 SEIS-II evaluated the potential doses to the population surrounding the WIPP Site from normal operations and presented those results in Table 5-11, *Lifetime Human Health Impacts to the Public from Waste Treatment and WIPP Disposal Operations for the [Preferred Alternative]* (DOE, 1997a). The 1997 SEIS-II Preferred Alternative estimated 3E-04 LCFs occurring in the exposed population from TRU waste disposal over the WIPP facility lifetime. As a result of the 24 percent population increase (refer to Section 2.7.2), the risk probability would be estimated at 4E-04 LCFs. Applying the updated dose conversion factor (refer to Section 2.8), the lifetime potential human health impacts to the public population would be 5E-04 LCFs. This change, approximately 2E-04 LCF, represents a negligible impact.

3.2.5.2 Worker Dose from TRU Waste Emplacement Operations

This section evaluates the differences or changes that have occurred, or are expected to occur, at the WIPP facility that are related to worker impacts. Three main factors are used to minimize potential worker exposures from WIPP facility operations. These factors include (1) using appropriate personal protective equipment; (2) minimizing times of exposure; and (3)

configuration of the U/G ventilation so that airflow is always from the involved workers towards areas of potential contamination and then to the high-efficiency particulate air filtration system.

Table 3-1 depicts worker dose information from WIPP facility operations from 2016 through 2019. For comparison, aggregated historical doses are provided from 1999 through 2015. Data are presented for the average worker, the maximally exposed worker, and all workers (collective annual). 10 CFR 835.202, *Occupational Dose Limits for General Employees,* states that occupational dose received by general employees shall be controlled such that a total effective dose of 5,000 mrem (i.e., 5 rem) for an employee is not exceeded in any one year.

Table 3-1. WIPP FACILITY – WORKER DOSE

	1999 – 2015 Historical Doses	2016 Dose	2017 Dose	2018 Dose	2019 Dose
Average worker	1.11 mrem/yr	0.52 mrem/yr	0.45 mrem/yr	1.53 mrem/yr	2.60 mrem/yr
Maximally exposed worker	< 250 mrem/yr (2010)	< 100 mrem/yr	< 100 mrem/yr	< 100 mrem/yr	< 100 mrem/yr
All workers (annual)	0.834 person-rem/yr	0.311 person-rem/yr	0.279 person-rem/yr	0.909 person-rem/yr	1.113 person-rem/yr

Source: U.S. DOE Radiation Exposure Monitoring System Database. [Last updated 15 December 2020]. https://oriseapps.orau.gov/CER/REMSQueryTool

The 1997 SEIS-II estimated the radiological impacts to workers at the WIPP facility from emplacement operations to be less than or equal to 1 LCF over the 35-year lifetime of operations (DOE, 1997a [Table 5-13]). This equates to a maximum annual risk of 0.03 LCFs to all workers, which results in a collective dose of 50 person-rem/yr. As shown by Table 3-1, the annual collective worker doses are well below the estimates evaluated in the 1997 SEIS-II.

For the Proposed Action, the DOE estimates that the annual average worker exposures by conducting future TRU waste emplacement would be similar to the doses measured from 1999 to 2015. The doses in 2018 and 2019 reflect the historical averages; thus, the Proposed Action to continue WIPP waste emplacement operations in two replacement panels would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

3.2.5.3 Public Doses from TRU Waste Emplacement Operations

With regard to potential impacts to the public from normal operations, Table 3-2 presents dose information for the hypothetical public MEI residing at the WIPP Exclusive Use Area fence line (defined as the 290-acre area containing the WIPP facility that is surrounded by a barbed wire fence, posted no trespassing, and restricted to DOE use only).

Table 3-2. PUBLIC MEI DOSE FROM WIPP OPERATIONS

Year	Public MEI Dose (mrem/yr)
2016	1.71E-04
2017	1.04E-04
2018	9.31E-05
2019	4.88E-05

Source: DOE, 2020a

Future doses to the public MEI are expected to be similar to the doses received from 2016 through 2019. The DOE expects that the average public MEI dose from implementation of the Proposed Action would be no greater than 1E-03 mrem/yr as a conservative estimation. This equates to a maximum annual risk of 6E-10 LCF.

The 1997 SEIS-II evaluated the potential dose to the public MEI and presented the result in Table 5-11, *Lifetime Human Health Impacts to the Public from Waste Treatment and WIPP Disposal Operations for the [Preferred Alternative].* The 1997 SEIS-II estimated that the risk of an LCF to the public MEI would be 3E-07 over the lifetime of operations (35 years). This equates to a maximum annual risk of 8E-09 LCF. The potential risk of an LCF to the public MEI from implementation of the Proposed Action (6E-10 LCF) is well below the estimated value in 1997 SEIS-II (8E-09 LCF). The Proposed Action to continue WIPP waste emplacement operations in two replacement panels would not change the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

3.2.5.4 PCB-comingled TRU Waste Risk Analysis

In the *Supplement Analysis for Disposal of Polychlorinated Biphenyl-Commingled Transuranic Waste at the Waste Isolation Pilot Plant* (DOE, 2004b), the DOE determined that no additional cancer incidence would be expected in the total population from exposure to PCB-commingled TRU waste (2E-10 probability of a cancer incidence or less) as a result of characterization and handling of 2,500 cubic meters of anticipated inventory of PCB-commingled TRU waste at the generator/storage sites.

The incremental probability of a cancer incidence associated with the exposure to PCB-commingled TRU waste is so small (2E-10) that when added to the potential probability due to hazardous chemical exposure identified in the 1997 SEIS-II (3E-7), it would not increase the result above 3E-7. In 2019, an analysis was performed using conservative assumptions that estimated the PCB-comingled TRU waste to be disposed of in the WIPP repository to be no greater than 12,500 cubic meters (Vajda, 2019). If the estimate was increased to 25,000 cubic meters, the risk would increase from 2E-10 to 2E-9. This still would not change the hazardous chemical exposure risk identified in the 1997 SEIS-II; therefore, an increase in PCB-comingled TRU waste above 2,500 cubic meters would not change the environmental impacts previously evaluated in the 2004 PCB SA.

3.2.6 Facility Accidents and Industrial Safety

The principal operations at the WIPP facility involve the receipt and disposal of TRU waste. The WIPP facility CH TRU waste operations considered in the *Waste Isolation Pilot Plant Documented Safety Analysis,* (DOE, 2018b), includes the processes for receipt, movement, and emplacement of CH TRU waste containers with battery-powered and diesel-fueled forklifts, electric-powered automated guided vehicles, cranes, and the waste hoist. The DOE uses the

safety analysis process to describe and analyze the hazards and risks associated with the WIPP facility (i.e., site-wide operations). Regarding the condition of the existing environment, the safety basis demonstrates that the DOE employs the necessary controls to provide an acceptable level of safety compliance with 10 CFR 830, Subpart B.

Transuranic waste eligible for disposal at the WIPP facility is characterized to demonstrate that it meets the WIPP WAC, including defined Pu-239 fissile-gram equivalents (**FGE**) limits based on individual containers, the Waste Analysis Plan, transportation requirements, and the EPA certification criteria. The planning-basis WAC has established criteria for both CH TRU and RH TRU waste that define the maximum allowable quantity of fissile material. The planning-basis WAC allows up to 200 Pu-239 FGEs for a 55-gallon drum, 325 Pu-239 FGEs for the ten drum overpack and the standard waste box, and 380 FGEs for the criticality control overpack.

Each disposal accident scenario analyzed in the 1997 SEIS-II Preferred Alternative utilized the planning-basis WAC criteria. Annual occurrence frequency and radiological consequences were based on TRU waste handling operations at the surface, CH TRU waste emplacement operations, and RH TRU waste emplacement operations. Because there is no change to the planning-basis WAC criteria or the principle operations at the WIPP facility, the annual occurrence frequency and the radiological consequences of the WIPP facility disposal accidents remain unchanged. The Proposed Action would have no additional impact to the facility accident scenarios evaluated in the 1997 SEIS-II Preferred Alternative.

The 1997 SEIS-II evaluated eight potential accidents that could occur at the WIPP facility during emplacement operations (Table 5-18, *WIPP Disposal Accident Scenarios for the [Preferred Alternative]*). These accidents include container drops, a container fire, a hoist failure, a roof fall, and a container breach. Table 5-19 of the 1997 SEIS-II, *Radiological Consequences of WIPP Disposal Accident Scenarios for the [Preferred Alternative],* shows the risks for each accident scenario.

The 2016 site-wide SA evaluated changes that occurred from 2009 through 2016 including reasonably foreseeable activities. The WIPP management & operating contractor performed and documented a comprehensive revision of their hazards evaluation. This analysis addressed potential exothermic chemical reactions in noncompliant containers at the WIPP facility and propagating fires involving multiple waste containers. The unmitigated dose to the public MEI from this event was estimated at 3.1 rem (2E-03 LCFs) (DOE, 2016a). In comparison, the 1997 SEIS-II estimated probability of an LCF to the public MEI from a container fire to be 4E-03. Consequently, the potential MEI impacts of an exothermic chemical reaction in a noncompliant container are bounded by the analysis in the 1997 SEIS-II. The DOE has not conducted any new activities since 2016 that would require further analysis; therefore, there is no change to this information.

In the 1997 SEIS-II [Table 5-19], the probability of an LCF to an exposed worker from a container fire was estimated to be 3E-03 (DOE, 1997a). Applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the risk would increase from 3E-03 LCFs to 5E-03 LCFs. Using data from the 2014 radiological release event, the exposed worker dose of <100 mrem equates to a probability of an LCF of 6E-05. The potential dose to a worker from a container fire is negligible compared to the 1997 SEIS-II.

In the 1997 SEIS-II [Table 5-19], the probability of an LCF to the aggregate population from a container fire was estimated to be 0.3 LCFs (DOE, 1997a). Adjusting for population increases and applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the risk would increase from 0.3 LCFs to 0.5 LCFs. As such, the associated risk to the aggregate population associated with the Proposed Action would result in a negligible change compared to the impacts previously analyzed in the 1997 SEIS-II Preferred Alternative.

3.2.7 Intentional Destructive Acts

The potential impacts from intentional destructive acts (i.e., acts of sabotage or terrorism) would be similar to the impacts of a severe accident scenario as analyzed in the 1997 SEIS-II Preferred Alternative. The initiating forces and resulting quantities of radioactive or hazardous materials potentially released by an intentional destructive act would be similar to those for the severe accident scenarios. Intentional destructive acts and severe accident scenarios both involve the same containers with the same radionuclide loadings. The hoist accident scenario bounds the intentional destructive acts scenario.

The 1997 SEIS-II estimated the probability of an LCF to the public MEI from a hoist failure, which is considered the worst accident scenario, to be 0.08. Applying the dose conversion factor changes since the issuance of the 1997 SEIS-II, the probability of an LCF to the public MEI from a hoist failure would be 0.10. The potential impacts from the implementation of the Proposed Action would result in a negligible change compared to the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

The 1997 SEIS-II estimated the probability of an LCF to the aggregate population from a hoist failure, which is considered the worst accident scenario, to be 5. Adjusting for population increases and applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the risk would increase from 5 LCFs to 7 LCFs. As such, the associated risk to the aggregate population associated with the Proposed Action would result in a minor increase compared to the impacts previously analyzed in the 1997 SEIS-II Preferred Alternative.

3.3 Environmental Impacts Conclusions

As part of the environmental impact analyses for this SA, the DOE analyzed and carried forward specific environmental resource areas that could have potential impacts on the 1997 SEIS-II Preferred Alternative from implementing the Proposed Action. These areas included land use and management, soils, visual resources, and transportation. Human health was also evaluated due to changes in the ROI since the publication of the 1997 SEIS-II, which includes facility accident scenarios and industrial safety.

Potential impacts to environmental resources associated with the continuation of DOE waste emplacement operations in two replacement panels are compared to the impacts previously analyzed in the 1997 SEIS-II Preferred Alternative, and other relevant documents (i.e., the 2016 site-wide SA) to evaluate whether the impacts represent a substantial change, or a significant new circumstance, or new information relative to the proposal analyzed in the 1997 SEIS-II (DOE, 1997a). Table 3-3*, Environmental Consequences and Comparison of Impacts*, summarizes the discussions presented in Sections 3.2.1 through 3.2.7. Both qualitative and quantitative analyses are used to identify differences in environmental impacts between the 1997 SEIS-II Preferred Alternative and the Proposed Action.

TABLE 3-3, ENVIRONMENTAL CONSEQUENCES AND COMPARISON OF IMPACTS

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Land Use	During disposal operations, the [existing] salt pile[s] [are] anticipated to stabilize as a 30-acre working pile, which would not affect the ecosystem balance. Salt tolerant plant species would replace less saline-tolerant species and are not expected to affect biodiversity (DOE, 1997a). The plans for decommissioning the WIPP Site under the 1997 SEIS-II Preferred Alternative includes reclamation of the salt pile[s]. Reclaimed salt may be used to either close the shafts or as a base for the berm. Excess salt may be sold for other purposes and transported off-site by a private carrier. Decommissioning would produce temporary increases in dust and other criteria pollutants but no substantial long-term impacts. Decommissioning and closure of the WIPP Site would result in the dismantling of above	The Proposed Action would include additional surface-based structures (a lined salt pile and its accompanying evaporation pond) for mined salt disposal and runoff management. The new proposed lined salt pile could include land use up to 10 acres in addition to the 30-acre working salt pile.	Increase of 33% (10 acres) in areas of analyzed salt piles. Because the proposed lined salt pile would reside within the 175 acres claimed for decommissioning and closure of the WIPP Site, the Proposed Action would not affect land use and management beyond what was analyzed for in the 1997 SEIS-II Preferred Alternative.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Land Use (continued)	ground structures and reclamation of the area. These activities would affect approximately 175 acres, resulting in the loss of much of the plant community and avian and small mammal habitats within and near the area. The DOE would return decommissioned lands used in the operation of WIPP to a stable ecological condition and maintain or enhance the ecological condition of wildlife habitat within the WLWA (DOE, 1997a).		
Soils	The Mescalero caliche, Berino soil, and surficial sands overlie the Gatuña. The Mescalero is an informal soil stratigraphic unit defined in *Geologic Processes and Cenozoic History Related to Salt Dissolution in Southeast New Mexico* (Bachman, 1974). It is widespread in southeastern New Mexico and is a continuous stratigraphic unit at the WIPP Site. The surface sand across much of the WIPP Site is aeolian, generally fine to medium grained and well sorted. Sand dunes in the vicinity of the WIPP area are generally stabilized by vegetation	The Proposed Action would include additional surface-based structures (a lined salt pile and its accompanying evaporation pond) for mined salt disposal and runoff management. The new proposed lined salt pile could include land use up to 10 acres in addition to the 30-acre working salt pile. Soils would be temporarily removed where necessary to make room for properly engineered base material for the lined salt pile and associated drainage and pond features.	Minor short-term impacts due to the temporary removal of topsoil with eventual reclamation activities. No long-term impacts because the salt pile would be lined.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Soils (continued)	(*Basic Data Report for Drillhole C-2737*) (Powers, 2002). The FEIS [Table 7-13] provides details regarding the engineering suitability of Berino soil at the WIPP Site (DOE, 1980).	Removal of topsoil would be a minor change and the topsoil would be stored for eventual reclamation activities as is the practice at the WIPP facility (DOE, 2019f).	
Visual Resources	The location of the WIPP Site is within a BLM Visual Resource Management Class IV zone. The objective of Visual Resource Management Class IV is to provide for management activities which require modifications of the existing character of the landscape. The DOE intends to maintain recreation resource values and to continue to provide opportunities for individuals to participate in recreational activities within designated parts of the WLWA. Planned actions include environmental monitoring of the WLWA, regulating off-road vehicle use, and determining the potential effect of anticipated projects or other activities on the visual quality of the landscape.	The Proposed Action would include additional surface-based structures (a lined salt pile and its accompanying evaporation pond) for mined salt disposal and runoff management. The new proposed lined salt pile could include land use up to 10 acres in addition to the 30-acre working salt pile. Short-term impacts would occur during construction operations. These include the presence of construction equipment, vehicle traffic, and shallow excavation activities. Long-term impacts would be visible to the casual observer through the life of the Proposed Action. These include the visual evidence of a growing salt pile and the presence of an evaporation pond.	There are no aesthetically sensitive areas within the viewshed of the WIPP Site. The addition of a new salt pile would be a minor change in regards to the overall land planned for reclamation; 10 acres versus 175 acres. Due to its remote location, the minor impacts of the Proposed Action would not be visible to the public. Implementation of the Proposed Action would have a minor impact on visual resources.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Visual Resources (continued)	Decommissioning and closure of the WIPP Site would result in the dismantling of aboveground structures and reclamation of the area. These activities would affect approximately 175 acres, resulting in the loss of much of the plant community and avian and small mammal habitats within and near the area. The DOE would return decommissioned lands used in the operation of WIPP to a stable ecological condition and maintain or enhance the ecological condition of wildlife habitat within the WLWA (DOE, 1997a).	Short-term and long-term impacts are minimized by best management practices such as color selection, reducing cut and fill, and screening facilities with natural features and vegetation. The DOE has committed to remove surface structures and restore the surface area at the WIPP facility to as near its original contours as possible at the time the WIPP facility is dismantled and decommissioned (NMED, 2020).	

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Transportation	In the 1997 SEIS-II, the bounding lifetime incident-free radiological impact to the MEI from truck transportation for the Preferred Alternative was 8.5E-3 LCFs (DOE, 1997a).	Applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the lifetime incident-free radiological impact to the MEI from truck transportation would increase to 1.0E-2 LCFs.	A change of approximately 1.5E-03 LCFs, represents a negligible impact.
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	In the 1997 SEIS-II, the aggregate incident-free population radiological impacts (non-occupational) from truck transportation for the Preferred Alternative is listed at 3.0 LCFs.	Adjusting for population increases and applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the aggregate incident-free population radiological impacts from truck transportation would increase from 3.0 LCFs to 4.8 LCFs.	A change of approximately 1.8 LCFs in the aggregate population, represents a minor impact.
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	In the 1997 SEIS-II, the aggregate incident-free radiological impacts (occupational) from truck transportation for the Preferred Alternative is listed at 0.3 LCFs.	Applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the aggregate incident-free radiological impacts (occupational) from truck transportation would increase from 0.3 LCFs to 0.5 LCFs.	A change of approximately 0.2 LCFs, represents a negligible impact.
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	The 1997 SEIS-II Preferred Alternative estimated 0.43 LCFs occurring to the aggregate population within the transportation corridor from potential truck transportation accidents over the lifetime of WIPP facility operations.	Applying the updated dose conversion factor and population increases, the lifetime potential human health impacts to the transportation corridor population [2019] would be 0.68 LCFs.	A change of approximately 0.25 LCFs, represents a negligible impact.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Human Health Impacts Due to changes in ROI [i.e., population increases] and the dose conversion factor	The 1997 SEIS-II Preferred Alternative estimated 3E-04 LCFs occurring in the exposed population from TRU waste disposal over the WIPP facility lifetime.	Applying the updated dose conversion factor and population increases, the lifetime potential human health impacts to the public population [2019] would be 5E-04 LCFs.	A change of approximately 2E-04 LCFs, represents a negligible impact.
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	The 1997 SEIS-II Preferred Alternative estimated the radiological impacts to workers at the WIPP facility from emplacement operations to be less than or equal to 1 LCF over the 35-year lifetime of operations (DOE, 1997a [Table 5-13]). This equates to a maximum annual risk of 0.03 LCFs to all workers, which is consistent with a collective dose of 50 person-rem/yr.	The historical annual collective worker dose from WIPP operations is 0.834 person-rem/yr.	No Impact.
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	The 1997 SEIS-II Preferred Alternative estimated that the risk of an LCF to the public MEI would be 3E-07 over the lifetime of operations (35 years). This equates to a maximum annual risk of 8E-09 LCF.	The potential risk of an LCF to the public MEI from implementation of the Proposed Action is 6E-10.	No impact.
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	In 2004, regarding PCB-commingled TRU waste, the DOE determined that the 1997 SEIS-II was adequate, and therefore, did not have to	In 2019, an analysis was performed using conservative assumptions that estimated the PCB-comingled TRU waste to be disposed of in the	An increase from 2,500 cubic meters to 12,500 cubic meters of PCB-commingled TRU waste would increase the LCF from 2E-10 to 2E-9.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Human Health Impacts (continued)	supplement the EIS or prepare a new EIS. The DOE determined that no additional cancer incidence would be expected in the total population from exposure to PCB-commingled TRU waste (2E-10 probability of a cancer incidence or less) as a result of characterization and handling of 2,500 cubic meters of anticipated inventory of PCB-commingled TRU waste at the generator/storage sites. The incremental probability of a cancer incidence associated with the exposure to the PCB-commingled TRU waste is so small (2E-10) that when added to the potential probability due to hazardous chemical exposure identified in the 1997 SEIS-II (3E-7), it would not increase the result above 3E-7. On June 30, 2004, the DOE issued a revision to the 1997 SEIS-II ROD, announcing its decision to dispose of up to 2,500 cubic meters of TRU waste containing PCBs at the WIPP facility.	WIPP repository to be no greater than 12,500 cubic meters (Vajda, 2019).	The probability of a cancer incidence associated with the exposure to the PCB-commingled TRU waste is so small (2E-09) that when added to the potential probability due to hazardous chemical exposure identified in the 1997 SEIS-II (3E-7), it would not increase the result above 3E-7. Therefore, an increase in PCB-comingled TRU waste above 2,500 cubic meters would not change the environmental impacts previously evaluated in the 2004 PCB SA.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Facility Accidents and Industrial Safety	The 1997 SEIS-II Preferred Alternative evaluated eight potential accidents that could occur at the WIPP facility during emplacement operations. These accidents include container drops, a container fire, a hoist failure, a roof fall, and a container breach. The 1997 SEIS-II Preferred Alternative estimated the probability of an LCF to the public MEI from a container fire to be 4E-03.	The WIPP management & operating contractor performed and documented a comprehensive revision of their hazards evaluation. This analysis addressed potential exothermic chemical reactions in noncompliant containers at the WIPP facility and propagating fires involving multiple waste containers. The unmitigated dose to the public MEI from this event was estimated at 3.1 rem (2E-03 LCF).	No Impact.
	--- In the 1997 SEIS-II [Table 5-19], the probability of an LCF to an exposed worker from a container fire was estimated to be 3E-03.	--- Applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the risk would increase from 3E-03 LCFs to 5E-03 LCFs.	--- Using data from the 2014 radiological release event, the exposed worker dose of <100 mrem equates to a probability of an LCF of 6E-05. The potential dose to a worker from a container fire is negligible compared to the 1997 SEIS-II.
	--- In the 1997 SEIS-II [Table 5-19], the probability of an LCF to the aggregate population from a container fire was estimated to be 0.3 LCFs.	--- Adjusting for population increases and applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the risk would increase from 0.3 LCFs to 0.5 LCFs.	--- A change of approximately 0.2 LCFs, represents a negligible impact.

Resource Area	Summary of Potential Impacts in the WIPP 1997 SEIS-II	Summary of Potential Impacts as a Result of the Proposed Action or New Information	Difference in Potential Impacts
Intentional Destructive Acts	The potential impacts from intentional destructive acts (i.e., acts of sabotage or terrorism) would be similar to the impacts of a severe accident scenario as analyzed in the 1997 SEIS-II Preferred Alternative. The initiating forces and resulting quantities of radioactive or hazardous materials potentially released by an intentional destructive act would be similar to those for the severe accident scenarios. Intentional destructive acts and severe accident scenarios both involve the same containers with the same radionuclide loadings. The 1997 SEIS-II Preferred Alternative estimated the probability of an LCF to the public MEI from a hoist failure, which is considered the worst accident scenario, to be 0.08.	Applying the dose conversion factor changes since the issuance of the 1997 SEIS-II, the probability of an LCF to the public MEI from a hoist failure would be 0.10.	A change of approximately 0.02 LCFs, represents a negligible impact.
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	The 1997 SEIS-II estimated the probability of an LCF to the aggregate population from a hoist failure, which is considered the worst accident scenario, to be 5.	Adjusting for population increases and applying the updated dose conversion factors since the issuance of the 1997 SEIS-II, the aggregated risk would increase from 5 LCFs to 7 LCFs.	A change of approximately 2 LCFs in the aggregate population, represents a minor impact.

4.0 CUMULATIVE IMPACTS

4.1 Technical Approach

The 1978 CEQ 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 over a period of time." This chapter presents an analysis of the resource-specific cumulative impacts resulting from implementation of the Proposed Action in conjunction with any reasonably foreseeable projects to be initiated at the WIPP Site. As stated earlier, the DOE has opted to proceed with this SA under the 1978 CEQ Regulations.

4.2 Present Activities Considered for Cumulative Impacts

4.2.1 The Permanent Ventilation System and Shaft #5

The DOE has begun implementing a three-phase ventilation system upgrade to support increased U/G operations at the WIPP facility. The first phase, the interim ventilation system, and the second phase, the supplemental ventilation system, are already operational. The third phase of the ventilation upgrade includes construction and installation of a new PVS. The PVS would support a return to pre-2014 conditions when there were simultaneous waste emplacement, mining, and mine maintenance operations. The PVS includes a salt reduction building, a new filter building along with its appurtenances, and a new ventilation shaft with its two main access drifts (Shaft # 5). These site-specific infrastructure projects were evaluated under previous NEPA procedures and they have a final decision (DOE, 2016a; DOE, 2017b). These actions are not further analyzed in this SA; however, they are included here for information as they continue to be ongoing projects at the WIPP facility with potential effects when included with foreseeable future actions.

The PVS is designed with the best available radionuclide control technology to minimize the potential release of radionuclides into the atmosphere. The dose to the population within 80 kilometers (50 miles) of the WIPP Site is less than 0.00001 person-rem, with no latent cancer fatalities expected (DOE, 2017b). Over a hypothetical 30-year PVS lifetime, no latent cancer fatalities would be expected either (DOE, 2017b). The PVS does not affect quantities of radioactive or hazardous materials managed at the WIPP facility.

Shaft #5 is designed to ventilate both the construction and disposal circuits of the WIPP repository (DOE, 2017b). The additional airflow capacity facilitates concurrent mining, waste disposal, and maintenance activities. It also provides an unfiltered exhaust path for construction (mining) exhaust. In the WIPP PA, the four existing shafts are combined into a single shaft that captures the combined impacts (DOE, 2014b; DOE, 2019b). Shaft #5 was combined with the four existing shafts in the analysis for the CRA-2019 PA (DOE, 2019b). The rationale for this modeling treatment is set forth by Sandia National Laboratories (SNL, 1992, [Volume 5, Section 2.3]).

4.2.2 Intentional Destructive Acts

Following the terrorist attacks of September 11, 2001, the DOE has implemented measures to address the risk and consequences of potential attacks on its facilities. The DOE subsequently issued guidance on the analysis of accidents and intentional destructive acts in its NEPA documents (Borgstrom, 2006; DOE, 2002b). The DOE considered security scenarios involving intentional destructive acts to assess potential environmental impacts (DOE, 2016a).

4.3 Reasonably Foreseeable Activities Considered for Cumulative Impacts

4.3.1 Disposal of TRU Waste Temporarily Stored at Waste Control Specialists

In 2014, a SA was published, *Supplement Analysis for a Proposal to Temporarily Store Defense Transuranic Waste Prior to Disposal at the Waste Isolation Pilot Plant* (DOE, 2014c), to address temporary storage of LANL TRU waste at WCS. The events of 2014 at the WIPP facility impacted the existing Framework Agreement between the DOE and the State of New Mexico for the disposition of CH TRU waste at LANL and certain LANL TRU waste at the Idaho National Laboratory (**INL**).

In addition, these events impacted DOE's operation to dispose of TRU waste that had already reached the WIPP facility and which was currently stored at the WIPP facility. The DOE needed to temporarily store the TRU waste from LANL and the INL at an off-site facility to meet its commitments and legal obligations. The LANL TRU waste was transported by truck to WCS for temporary storage until such time as the waste could be transported to the WIPP facility for disposal.

When off-site TRU waste emplacement operations at the WIPP facility resumed (startup occurred in 2017), the TRU waste being temporarily stored at WCS began to be transported to WIPP and processed for disposal. When authorized, the remaining TRU waste at WCS, which has to meet the WIPP WAC for CH TRU waste and other regulatory requirements, will be shipped and disposed of at the WIPP facility. The disposal of the TRU waste temporarily stored as WCS was evaluated under previous NEPA procedures and it has a final decision (DOE, 2014c). This action is not further analyzed in this SA; however, it is included here for completeness in conjunction with the Proposed Action.

4.3.2 Adding Hoisting Capability to Shaft #5

The Hoisting Capability Project and associated infrastructure would provide safe, efficient, and reliable hoisting for mined salt, equipment, personnel and potentially for future TRU waste handling functionality. Additional hoisting capability would eliminate single point failures, while increasing mining efficiency and throughput. It would be designed for the WIPP facility to continue to operate more efficiently and safely to meet the TRU waste disposal mission.

Current mining and future mining required to support uninterrupted TRU waste disposal operations challenge the existing WIPP hoisting systems, particularly the Salt Handling Shaft, which was constructed in 1983. The Hoisting Capability Project is envisioned to increase the existing salt hoisting capability and material/personnel hoist capability for just-in-time mining at the WIPP facility. No decision has been made to proceed with the implementation of additional hoisting capability; however, the DOE will continue to evaluate the operational need according to DOE Orders. If needed, a future NEPA evaluation would be conducted at the appropriate time.

4.3.3 Surplus Plutonium Disposition

In 2015, the DOE issued a *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (DOE, 2015a), which described the disposition of up to 13.1 MTs of surplus plutonium at the WIPP facility. In keeping with the U.S. nonproliferation policies and agreements with the Russian Federation to reduce the availability of material that is readily usable in nuclear weapons, the DOE engaged in a program to disposition U.S. non-pit surplus plutonium TRU waste. As authorized through an AROD [85 FR 53350], up to 13.1 MTs of non-pit surplus plutonium TRU waste has been designated to be disposed of at the WIPP facility. This non-pit surplus plutonium TRU waste would be prepared and packaged to ensure compliance with the characterization requirements in the WIPP WAC for CH TRU waste and other regulatory requirements prior to shipment and disposal at the WIPP facility.

4.3.4 Additional Panels Beyond the Two Replacement Panels

The DOE would likely require additional panels in the future to accommodate the disposal of the LWA total TRU waste volume capacity limit of 175,600 cubic meters (6.2 million cubic feet). The DOE has not made any decisions on additional panels beyond the Proposed Action to excavate and use two replacement panels and is not implementing any change associated with additional panels as part of this Proposed Action. This reasonably foreseeable future action will likely be evaluated in a future NEPA analysis prior to its implementation.

4.3.5 Above Ground Storage Capability

The 2016 site-wide SA (DOE, 2016a) analyzed the potential cumulative environmental impacts from the construction activities associated with above ground storage capability (**AGSC**) at the WIPP facility as a reasonably foreseeable future action in conjunction with the PVS. Utilization of AGSC for the temporary storage of TRU waste on the surface is not yet authorized by the NMED. The DOE has not conducted any new activities since 2016 that would require additional analysis; therefore, the DOE has not made any decisions on this potential foreseeable change and is not implementing this change as part of this Proposed Action.

4.3.6 TRU Waste Inventory Updates

The most recent ATWIR, (DOE, 2020e), continues to provide inventory estimate updates that are bounded by the LWA total TRU waste volume capacity limit of 175,600 cubic meters (6.2 million cubic feet). In 2020, the DOE prepared an EIS to evaluate the potential environmental impacts of repurposing the Mixed-Oxide Fuel Fabrication Facility at SRS to produce war reserve pits (DOE, 2020c). The NNSA announced its decision to implement the proposed action with a ROD (85 FR 70601, November 5, 2020). The DOE also finalized an SA to continue the operation of LANL for plutonium operations, which would produce war reserve pits as well (DOE, 2020f). The NNSA's AROD (85 FR 54544, September 2, 2020) enabled the production of war reserve pits at LANL beginning in 2026.

In addition to the SRS and LANL NEPA decisions on pit production, the DOE released the Draft Versatile Test Reactor (**VTR**) Environmental Impact Statement (DOE/EIS-0542) in December of 2020 for public comment. The proposed VTR would be a sodium-cooled, fast-neutron-spectrum test reactor used to enhance and accelerate research, development, and demonstration of innovative nuclear energy technologies. The VTR could produce up to an additional 24,000 cubic meters of TRU waste as by-products, which, in the future, could become part of the WIPP TRU waste inventory estimates.

The estimates of the TRU waste described in the recent SRS and LANL NEPA documents are included in the Potential waste category in the 2020 ATWIR because there was no final NEPA decision at the time of the 2020 ATWIR data collection cutoff date of December 31, 2019. The estimate of TRU waste described in the recent VTR NEPA document is not included in the 2020 ATWIR. The DOE is not considering these TRU waste volume estimates in this Proposed Action. The DOE will determine, in the future, if there is the need for a further NEPA evaluation.

4.4 Potential Cumulative Impacts Analysis

4.4.1 Permanent Ventilation System and Shaft #5

The construction activities related to PVS and Shaft #5 would occur within the WLWA on land that is already controlled by the DOE. The surface disturbing activities are expected to result in fugitive dust from grading, drilling, and mining; diesel emissions from heavy equipment, emergency diesel generators, and drilling. These impacts are typical of industrial mining sites in general and to the WIPP facility in particular and would not represent a change to the existing impacts at the WIPP Site. The construction of both the PVS and Shaft #5 would temporarily increase the construction workforce at the WIPP facility. Considering that this project would be unlikely to increase the workforce over the long term, beyond the assumptions in the 1997 SEIS-II Preferred Alternative, there would be no additional non-radiological impacts to workers that were not already identified and considered in the 1997 SEIS-II Preferred Alternative. Because the operations of the underground ventilation system are segregated, construction and operation of the PVS and Shaft #5 in conjunction with the Proposed Action would not contribute to worker or offsite radiological consequences. Rather, they would enhance protection of the workforce, members of the public, and the environment from potential accidental radiological releases.

4.4.2 Land Disturbances and Visual Resources

The WIPP facility was constructed and is operated with visual resources in mind. The remote location and use of the BLM *Visual Resource Management Guide* mitigates impacts to potentially new visual resources. The Proposed Action would result in minor visual impacts. The only substantive component is the inclusion of a new lined salt pile. There are no aesthetically sensitive areas within the viewshed of the WIPP Site. The addition of a new lined salt pile is minor in regards to the overall land planned for reclamation; 10 acres versus 175 acres within the WLWA.

The PVS and Shaft #5 projects are near existing WIPP facility structures. Because of their proximity to existing structures and the remoteness of the WIPP Site, they would not impact visual resources. Therefore, cumulative impacts to land disturbances and visual resources would be negligible as the result of implementation of the Proposed Action in conjunction with the PVS and Shaft #5 projects.

4.4.3 Intentional Destructive Acts

The potential impacts of intentional destructive acts (i.e., acts of sabotage or terrorism) in conjunction with the Proposed Action would result in a negligible change. The initiating forces and resulting quantities of radioactive or hazardous materials potentially released by an intentional destructive act would be similar to those for the severe accident scenarios as discussed in the 1997 SEIS-II Preferred Alternative (DOE, 1997a). Intentional destructive acts and accident scenarios both involve the same containers with the same radionuclide loadings; therefore, the hoist accident scenario bounds the intentional destructive acts scenario.

4.4.4 Disposal of TRU Waste Temporarily Stored at Waste Control Specialists

The 1997 SEIS-II Preferred Alternative analyzed the potential impacts of disposing of a basic inventory of post-1970 defense TRU waste at the WIPP facility. Because the TRU waste stored at WCS will meet the planning-basis WAC, the WIPP Permit Waste Analysis Plan, and the EPA certification criteria prior to shipment to the WIPP facility, the potential disposal impacts in conjunction with the Proposed Action would not change from those previously analyzed in the 1997 SEIS-II Preferred Alternative.

4.4.5 Adding Hoisting Capability to Shaft #5

The 1997 SEIS-II Preferred Alternative evaluated potential accidents that could occur at the WIPP facility during emplacement operations (Table 5-18, *WIPP Disposal Accident Scenarios for the [Preferred Alternative]*). One of the accident scenarios included a Waste Hoist failure. Table 5-19 of the 1997 SEIS-II, *Radiological Consequences of WIPP Disposal Accident Scenarios for the [Preferred Alternative],* showed the risk from this accident. The 1997 SEIS-II Preferred Alternative estimated the probability of an LCF to the public MEI from a hoist failure to be 0.08. Applying the dose conversion factor changes since the issuance of the 1997 SEIS-II, the potential impacts from the implementation of the Proposed Action would result in a minor change compared to the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative. After applying the adjustment, the probability of an LCF to the public MEI from a hoist failure would be 0.10. The added hoisting capability to Shaft #5 would benefit the existing waste hoist. The number of times the waste hoist is cycled for transporting personnel and equipment would be reduced. This added benefit would offset the risk increase from the ROI population changes that affect the waste hoist analysis; therefore, the overall impact of adding hoisting capability to Shaft #5 is negligible.

4.4.6 Surplus Plutonium Disposition

Transuranic waste eligible for disposal at the WIPP facility is characterized to meet the WIPP WAC, including defined Pu-239 fissile gram equivalent limits based on individual containers, the WIPP Permit Waste Analysis Plan, transportation requirements, and the EPA certification criteria. The WIPP facility has disposed of surplus plutonium in the past (DOE, 2002a); therefore, this foreseeable future activity in conjunction with the Proposed Action does not represent new substantive information.

The 1997 SEIS-II discusses cumulative impacts from the disposition of up to 7,000 cubic meters of surplus plutonium as foreseeable future activities (DOE, 1997a). As authorized by an AROD [85 FR 53350], up to 13.1 MTs of non-pit surplus plutonium has been designated to be disposed of at the WIPP facility (DOE, 2020d). The 13.1 MTs includes 6 MTs previously authorized by the 2016 ROD (DOE, 2016c). This 13.1 MTs corresponds to approximately 9,170

cubic meters of surplus plutonium waste (DOE, 2016c; DOE, 2017c). The volume of surplus plutonium is a minor percentage increase compared to the total TRU waste volume capacity limit authorized by the LWA (9,170 cubic meters versus 175,600 cubic meters). The addition of 13.1 MTs of non-pit surplus plutonium to the WIPP inventory would result in a minor change to the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative.

4.4.7 Additional Panels Beyond the Two Replacement Panels

In 2015, the DOE Office of Waste Management and the DOE Office of Program Planning and Budget issued a memorandum, which authorized CBFO to use FY2050 as the planning basis for capital asset projects and other strategic planning initiatives (DOE, 2015c). The DOE would likely require additional panels to accommodate up to the LWA total TRU waste capacity volume limit of 175,600 cubic meters (6.2 million cubic feet). While the result would be the need for more disposal panels (beyond the two replacement panels) to dispose of the authorized total TRU waste volume capacity limit, the total TRU waste volume remains the same as the volume considered in 1997 SEIS-II. This reasonably foreseeable future action will likely be evaluated in an appropriate future NEPA analysis prior to its implementation. The DOE is not including additional panel beyond the two replacement panels in this Proposed Action.

4.4.8 Above Ground Storage Capability

Construction of the AGSC would involve a new surface facility; however, its location would be in an area that has already been disturbed. The construction would occur within the WLWA on land that is already controlled by the DOE. The surface disturbing activities are expected to result in fugitive dust from grading, drilling, and shallow excavation. Diesel emissions from the use of heavy industrial equipment are likely. These impacts are typical of industrial mining sites and have been sufficiently analyzed in the 1997 SEIS-II Preferred Alternative. The construction of the AGSC would result in a minor change to the environmental impacts previously evaluated in the 1997 SEIS-II Preferred Alternative. Utilization of AGSC for the temporary storage of TRU waste on the surface is not yet authorized by the NMED.

4.4.9 TRU Waste Inventory Updates

There is no change regarding TRU waste volume capacity for disposal at the WIPP facility (DOE, 2020e). The most recent ATWIR, (DOE, 2020e), continues to provide inventory estimate updates that are bounded by the LWA total TRU waste volume capacity limit of 175,600 cubic meters (6.2 million cubic feet). Because WIPP-bound TRU waste is characterized to meet the WIPP WAC, including defined Pu-239 fissile gram equivalent limits based on individual containers, the Waste Analysis Plan, transportation requirements, and the EPA certification criteria, environmental impacts from surplus plutonium disposition or the generation of TRU waste by-products from pit production in conjunction with the Proposed Action would be similar to those analyzed for in the 1997 SEIS-II Preferred Alternative.

4.5 Cumulative Impacts Summary

The Proposed Action in conjunction with the effects of foreseeable future activities would not result in any change to the LWA TRU waste volume capacity limit or the function of the WIPP waste handling facility. The Proposed Action in conjunction with the effects of foreseeable future activities would include the same type of mining equipment, the same waste handling building, including functionally equivalent equipment, and the same disposal room TRU waste

volume capacity. The Proposed Action of two replacement panels would use the same nominal panel and disposal room dimensions as described for Panels 1 through 8 in the original repository design (DOE, 1997a). The two replacement panels would also use the same CH TRU waste and RH TRU waste emplacement processes (i.e., receipt, handling, and permanent disposal) as currently practiced.

Under the Proposed Action in conjunction with the effects of foreseeable future activities, excavation operations, TRU waste handling operations at the surface, waste emplacement operations, panel closures, facility closure, and decommissioning would be similar to those analyzed in the 1997 SEIS-II Preferred Alternative (DOE, 1997a). Therefore, the Proposed Action, in conjunction with the reasonably foreseeable projects listed above, would not result in significant resource-specific cumulative impacts.

5.0 DETERMINATION

The DOE prepared this SA in accordance with 10 CFR 1021.330(d) and 10 CFR 1021.314 to evaluate the Proposed Action to continue the uninterrupted operation of the WIPP facility for the disposal of TRU waste generated by atomic defense-related activities. Based on the analyses in this SA, the DOE's Proposed Action does not represent substantial changes to either the 1997 SEIS-II or the 2016 SA that are relevant to environmental concerns, and there are no significant new circumstances or information relevant to environmental concerns and bearing on the Proposed Action or its environmental impacts. The DOE has therefore determined that no further NEPA documentation is required.

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