



Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

July 30, 2021

Mr. Ricardo Maestas, Acting Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Subject: Class 3 Permit Modification Request, Construction and Use of Hazardous Waste Disposal Units 11 and 12 for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit Number: NM4890139088-TSDF

Dear Mr. Maestas:

Enclosed is a Class 3 Permit Modification Request for the following item:

- Construction and Use of Hazardous Waste Disposal Units 11 and 12

We certify under penalty of law that this document and enclosure were prepared under our direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact Mr. Michael R. Brown at (575) 706-0072.

Reinhard Knerr
Manager
Carlsbad Field Office

Sincerely,

Sean Dunagan
President and Project Manager
Nuclear Waste Partnership LLC

Enclosure

cc: w/enclosure
N. Barka, NMED *ED
D. Biswell, NMED ED
M. McLean, NMED ED
CBFO M&RC
*ED denotes electronic distribution

Class 3 Permit Modification Request

Construction and Use of Hazardous Waste Disposal Units 11 and 12

**Waste Isolation Pilot Plant
Carlsbad, New Mexico**

WIPP Permit Number - NM4890139088-TSDF

July 2021

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
CH	contact-handled
DOE	U.S. Department of Energy
ft	feet
ft ³	cubic feet
HWDU	Hazardous Waste Disposal Unit
HWMU	hazardous waste management unit
LWA	Land Withdrawal Act
m	meter
m ³	cubic meters
MOC	Management and Operating Contractor
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
Permit	WIPP Hazardous Waste Facility Permit
PMR	Permit Modification Request
RCRA	Resource Conservation and Recovery Act
RH	remote-handled
TRU	transuranic
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant

Overview of the Permit Modification Request

This document contains a Class 3 Permit Modification Request (**PMR**) for the Waste Isolation Pilot Plant (**WIPP**) Hazardous Waste Facility Permit (**Permit**), Permit Number NM4890139088-TSDF.

This PMR is being submitted by the U.S. Department of Energy (**DOE**) and its Management and Operating Contractor (**MOC**), collectively referred to as the Permittees, in accordance with the Permit Part 1, Section 1.3.1 (20.4.1.900 New Mexico Administrative Code [**NMAC**] incorporating Title 40 Code of Federal Regulations [**CFR**] §270.42(c)).

BACKGROUND

The WIPP facility is located in Eddy County in southeast New Mexico, 26 miles east of Carlsbad, New Mexico. The WIPP facility is a mined geologic repository for the disposal of defense-generated transuranic (**TRU**) waste and TRU mixed waste generated at various United States defense facilities. References to TRU waste in the remainder of the PMR include both TRU and TRU mixed waste.

The WIPP project was authorized by the U.S. Congress by Public Law 96-164. Subsequently, Congress enacted Public Law 102-579 as amended by Public Law 104-201, known as the Land Withdrawal Act (**LWA**), to designate the area of land to be used for the WIPP facility. As written in Section 7(a)(3) of the LWA, the total capacity of the WIPP facility by volume is 6.2 million cubic feet (**ft**³) (175,564 cubic meters [**m**³]) of TRU waste.

The WIPP facility is divided into surface structures, shafts, and underground structures. The surface structures accommodate the personnel, equipment, and support services required for the receipt, storage, and transfer of TRU waste from the surface to the underground for disposal.

The Permittees dispose of TRU mixed waste at the WIPP facility in rooms mined out of a salt formation approximately 2,150 feet (**ft**) (655 meters [**m**]) below the surface. Waste is emplaced in Resource Conservation and Recovery Act (**RCRA**) permitted Hazardous Waste Disposal Units (**HWDUs**) commonly referred to as panels. The current design of the WIPP repository consists of 10 panels. Panels 1-8 consist of seven disposal rooms, each with an intake and an exhaust drift. Panels 9 and 10 are made up of a portion of the main access drifts in the underground and have not been authorized for waste emplacement (See Appendix C, Figure 1).

Panels 1-6 have been filled with TRU waste and permanently closed pursuant to the Permit requirements. Waste disposal is taking place in Panel 7, while Panel 8 construction and outfitting is underway.

Panels 9 and 10 consist of the main entries and cross-cuts from S-1600 to S-3650 (See Appendix C, Figure 1). The areas designated as Panels 9 and 10 were mined to facilitate the operation of the underground facility (e.g., ventilation, access, mining transport, transport of TRU waste to Panels 1-8) in addition to their potential use as waste disposal panels. Panel 9 is no longer accessible due to permanent closures installed for Panels 3 – 6.

DISPOSAL CAPACITY

Underground panels have a capacity limit of 662,150 ft³ (18,750 m³) of contact-handled (**CH**) TRU mixed waste (based on the gross container volume of 89,286 55-gallon drums). Additionally, Panels 4-8 were designed to accommodate a maximum remote-handled (**RH**) TRU mixed waste capacity of up to 22,950 ft³ (650 m³).

One cause of the inability to use mined areas in any panel (i.e., the loss of disposal capacity) is due to deterioration of the condition of the excavations (referred to as “ground conditions”). Design of waste throughputs at the WIPP facility anticipated opening new panels for waste emplacement approximately every 30 months. Therefore, panels were designed with a lifetime of approximately 60 months, with the time split evenly between construction and emplacement and closure. As is common with most underground mined excavations, ground conditions deteriorate over time. This notwithstanding, ground conditions can be maintained and kept safe for personnel for an extended period of time using an active ground control maintenance program.

In order to reduce the effects of time on ground conditions in panels, the Permittees employ a “just-in-time” philosophy to panel mining. Mining of a panel is planned to ensure that the panel will be ready and certified just before it is needed for waste emplacement (i.e., during the 30 months that the Permittees are filling a panel, the Permittees are also mining the next panel). The amount of active maintenance (ground control work) needed to keep the panel safe for workers emplacing waste is reduced with the “just-in-time mining” approach.

According to Part B of the 2020 RCRA Permit 10-Year Renewal Application, Addendum G1, *Need for Additional Panels for the Ten-year Hazardous Waste Facility Permit Renewal* (See Appendix D of this PMR), Panels 1 and 7 experienced longer than anticipated time periods between mining and waste emplacement. This delay led to deteriorating ground conditions in portions of each panel. Disposal capacity was lost in both Panels 1 (Rooms 6, 5, and 4) and 7 (Room 4) due to ground conditions. Disposal capacity was also lost in Panel 7 (Rooms 7 and 6) as a direct result of radiological contamination from the 2014 radiological event. The equivalent panels lost from lost disposal capacity in Panels 1 and 7 is approximately 0.7 panels.¹

The Permittees plan to replace the lost disposal capacity with replacement panels. The requirement for replacement panels is not new and has been documented previously. Engineering judgments of Panels 9 and 10 concluded that the relocation of Panels 9 and 10 was preferred over widening the main entries of Panels 9 and 10 to accommodate both CH-TRU and RH-TRU waste. Subsequently, the Permittees submitted a Class 3 PMR in March 2013 to construct two additional panels, referred to as Panels 9A and 10A, south of Panels 4

¹ Resource Conservation and Recovery Act Permit Ten-Year Renewal Application for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit, March 2020, Addendum G1, *Need for Additional Panels for the Ten-Year Hazardous Waste Facility Permit Renewal*, Table 2, Lost TRU Mixed Waste Volume Capacity in Equivalent Panels.

and 5 for waste emplacement in lieu of using Panels 9 and 10. The two additional panels would have had the same dimensions as Panels 1-8. The New Mexico Environment Department (NMED) issued a draft permit on February 14, 2014; however, the draft permit was withdrawn due to the radiological event that occurred on the same day.

After the February 2014 events, ground control efforts in Panel 9 could not be performed quickly enough in order to make the ground safe throughout the panel. Based on the ground conditions, engineering judgment, and contamination in portions of the Panel 9 area, a decision was made to abandon the area, and therefore it is no longer available for TRU mixed waste emplacement. Panel closures were installed in the north-south mains (E-300, E-140, W-30, and W-170) between S-2520 and S-2750 to simultaneously close Panels 3-6, remove Panel 9 from the ventilation system, and barricade entry to Panel 9.

The lost disposal capacity of Panel 9, due to ground conditions and contamination, is the equivalent of one panel.² The lost disposal capacity of Panels 1 and 7, due to ground conditions, is 0.7 panels. The sum of the lost disposal capacity from Panels 1, 7, and 9 is 1.7 panels. Partially mined panels are not part of the approved design. Accordingly, 1.7 panels is rounded up to two panels. Part B of the 2020 RCRA Permit Ten-Year Renewal Application Attachment G, Table G-1 indicates that a minimum of two additional panels, Panels 11 and 12, will be required during the next Ten-Year Permit period.

SUMMARY

The following summarizes the needed modifications to the Permit text and figures:

- Panels 11 and 12 will be constructed and authorized for use to the south of the West Mains. The WIPP underground facility layout and location of the replacement panels, along with the West Mains, are shown in necessary revisions to figures in Permit Attachments A2, A3, A4, B, D, and G.
- Modifications are necessary to Permit text indicating the number of HWDUs in the WIPP repository in Permit Part 4, Table 4.1.1, *Underground HWDUs*, Section 4.5.2.1, *Construction Requirements*, and in Permit Part 7, Section 7.2., *Unit Identification*.
- Modifications are necessary to Permit Part 4, Section 4.4, *Volatile Organic Compound Limits*, to add and separate specific volatile organic compound (**VOC**) room-based limits for Panels 11 and 12 from the existing VOC room-based limits for Panels 1-8.
- Modifications are necessary to Permit Part 4, Section 4.6.3., *Disposal Room Volatile Organic Compound Monitoring*, to show that the specific action levels for Panels 11 and 12 are different from action levels for Panels 1-8. Additionally, changes are necessary to clarify that the remedial actions apply to Panels 1-8, as well as Panels 11 and 12, based on action levels identified in separate tables for the aforementioned panel groupings.

² Resource Conservation and Recovery Act Permit Ten-Year Renewal Application for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit, March 2020, Attachment G.

- Modifications to descriptive text regarding the number of underground panels are necessary for Permit Attachment A, Section A-4, *Facility Type*, Permit Attachment A2, Sections A2-1, *Description of the Geologic Repository*, A2-2a(3), *Subsurface Structures*, A2-2b, *Geologic Repository Process Description*, and A2-5b(2)(a), *Description of the Geomechanical Monitoring*.
- Modifications to descriptions of traffic patterns are necessary for text in Permit Attachment A4, Section A4-4, *Underground Traffic*, along with an additional figure that will show the waste transport routes for Panels 11 and 12.
- Modifications are necessary to the Hazardous Waste Permit Application Part A in Permit Attachment B to reflect the correct number of HWDUs.
- Modifications are necessary to Permit Attachment G, *Closure Plan*, and Permit Attachment G1, *WIPP Panel Closure Design Description and Specifications*, to ensure that replacement Panels 11 and 12 are incorporated as appropriate. Additionally, Permit Attachment G, Table G-2, is modified to show final facility closure start dates by month and activity durations.
- Modifications are necessary to Permit Attachment G2, *Waste Isolation Pilot Plant Shaft Sealing System Compliance Submittal Design Report*, Figure G2-1, *View of the WIPP Underground Facility*, to incorporate Panels 11 and 12 in the figure and to make this figure consistent with similar spatial view figures in the Permit.
- Modifications are necessary to Permit Attachment H1, *Active Institutional Controls During Post-Closure*, to describe the perimeter fence encompassing the area of Panels 11 and 12, as well as that of Panels 1-8. Modifications are necessary to Figure H1-1 to include Panels 11 and 12 and to Figure H1-4 to show the additional perimeter fence location.
- Modifications are necessary to Permit Attachment J, Table J-3, *Underground Hazardous Waste Disposal Units*, to ensure the replacement Panels 11 and 12 are incorporated in the table.
- Modifications are necessary to Permit Attachment N, Sections N-1a, *Background*, and N-3a(1), *Sampling Locations for Repository VOC Monitoring*, to ensure that replacement Panels 11 and 12 are appropriately incorporated in the descriptive text. A modification is also necessary to Figure N-4, *Disposal Room Sample Head Arrangement*, to indicate the height dimensions in the disposal room can be a total of 13 ft – 14 ft and to change the name of this figure to “*Typical Disposal Room Sample Head Arrangement*.”

SUMMARY OF CHANGES

The Permittees are proposing modifications to the following Permit Parts and Attachments. The exact modifications are indicated with redline/strikeout text in Appendix B *Revised Permit Text*.

- Part 4, *Geologic Repository Disposal*, Section 4.1.1.2, *Disposal Locations and Quantities*

- Part 4, *Geologic Repository Disposal*, Section 4.1.1, *Underground Hazardous Waste Disposal Units*, Table 4.1.1 – *Underground HWDUs*
- Part 4, *Geologic Repository Disposal*, Section 4.4.1., *Room-Based Limits*, Table 4.4.1, *VOC Room-Based Limits for Panels 1-8*, and Table 4.4.2, *VOC Room-Based Limits for Panels 11 and 12*.
- Part 4, *Geologic Repository Disposal*, Section 4.6.3., *Disposal Room Volatile Organic Compound Monitoring*, descriptive text, and Table 4.6.3.2, *Action Levels for Disposal Room Monitoring in Panels 1-8*, and Table 4.6.3.3., *Action Levels for Disposal Room Monitoring in Panels 11-12*.
- Part 4, *Geologic Repository Disposal*, Section 4.5.2.1, *Construction Requirements*
- Part 7, *Post-Closure Care Plan*, Section 7.2, *UNIT IDENTIFICATION*
- Attachment A, *General Facility Description and Process Information*, Section A-4, *Facility Type*
- Attachment A2, *Geologic Repository*, Section A2-1, *Description of the Geologic Repository*
- Attachment A2, *Geologic Repository*, Section A2-2a(3), *Subsurface Structures*
- Attachment A2, *Geologic Repository*, Section A2-2b, *CH TRU Mixed Waste Emplacement*
- Attachment A2, *Geologic Repository*, Section A2-5b(2)(a), *Description of the Geomechanical Monitoring System*
- Attachment A2, *Geologic Repository*, Figure A2-1, *Repository Horizon*
- Attachment A2, *Geologic Repository*, Figure A2-2, *Spatial View of the Miscellaneous Unit and Waste Handling Facility*
- Attachment A3, *Typical Disposal Panel*
- Attachment A4, *Traffic Patterns*, *List of Figures*
- Attachment A4, *Traffic Patterns*, Section A4-4, *Underground Traffic*
- Attachment A4, *Traffic Patterns*, Figure A4-4, *Typical Underground Transport Route Using E-140*
- Attachment A4, *Traffic Patterns*, Figure A4-4a, *Typical Underground Transport Route Using W-30*
- Attachment B, *Hazardous Waste Permit Application Part A, Process Codes and Design Capacities*
- Attachment B, *Hazardous Waste Permit Application Part A, Narrative to Item 6*.

- Attachment B, *Hazardous Waste Permit Application Part A, Appendix B3, Facilities, Figure B3-1, Spatial View of the WIPP Facility*
- Attachment B, *Hazardous Waste Permit Application Part A, Appendix B3, Facilities, Figure B3-2, Repository Horizon*
- Attachment D, *RCRA Contingency Plan, Figure D-2, Spatial View of the WIPP Facility*
- Attachment D, *RCRA Contingency Plan, Figure D-3, WIPP Underground Facilities*
- Attachment D, *RCRA Contingency Plan, Figure D-7, Designated Underground Assembly Areas*
- Attachment G, *Closure Plan, Introduction*
- Attachment G, *Closure Plan, Section G-1c, Maximum Waste Inventory*
- Attachment G, *Closure Plan, Section G-1e(1), Panel Closure*
- Attachment G, *Closure Plan, Table G-1, Anticipated Earliest Closure Dates for the Underground HWDUs*
- Attachment G, *Closure Plan, Table G-2, Anticipated Overall Schedule for Closure Activities*
- Attachment G, *Closure Plan, Figure G-1, Location of Underground HWDUs and WPC Locations*
- Attachment G, *Closure Plan, Figure G-5, Typical Disposal Panel*
- Attachment G, *Closure Plan, Figure G-6, Approximate Locations of Boreholes in Relation to the WIPP Underground*
- Attachment G1, *WIPP Panel Closure Design Description and Specifications, Section G1-1, Introduction*
- Attachment G1, *WIPP Panel Closure Design Description and Specifications, Section G1-2, WPC Description*
- Attachment G1, *WIPP Panel Closure Design Description and Specifications, Section G1-2b, Design Component Descriptions*
- Attachment G2, *Waste Isolation Pilot Plant Shaft Sealing System Compliance Submittal Design Report, Figure G2-1, View of the WIPP Underground Facility*
- Attachment H1, *Active Institutional Controls During Post-Closure, Section H1-1, Active Institutional Controls*
- Attachment H1, *Active Institutional Controls During Post-Closure, Section H1.1.1, Repository Footprint Fencing*

- Attachment H1, *Active Institutional Controls During Post-Closure*, Figure H1-1, *Spatial View of WIPP Surface and Underground Facilities*
- Attachment H1, *Active Institutional Controls During Post-Closure*, Figure H1-4.
- Attachment J, *Hazardous Waste Management Unit Tables*, Table J-3, *Underground Hazardous Waste Disposal Units*
- Attachment N, *Volatile Organic Compound Monitoring Plan*, Section N-1a, *Background*
- Attachment N, *Volatile Organic Compound Monitoring Plan*, Section N-3a(1), *Sampling Locations for Repository VOC Monitoring*
- Attachment N, *Volatile Organic Compound Monitoring Plan*, Figure N-4, *Disposal Room Sample Head Arrangement*

In summary, the text changes and other modifications do not reduce the ability of the Permittees to provide continued protection to human health and the environment.

The requested modification to the Permit and related supporting documents are provided in this PMR. The proposed modification to the text of the Permit has been identified using **red** text and **double underline** and a **strikeout** font for deleted information. All direct quotations are indicated by italicized text. The exact changes being proposed are described in Item 1 below, and indicated with redline/strikeout text in Appendix B. The following information specifically addresses how compliance has been achieved with Permit Part 1, Section 1.3.1., for submission of this Class 3 PMR.

1. 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)(1)(i)) requires the applicant to describe the exact change to be made to the permit conditions and supporting documents referenced by the Permit.

This section of the PMR provides a description of the changes to Permit conditions that are being made to accommodate the construction and use of two replacement panels. The replacement panels are required to replace lost disposal capacity in Panels 1, 7, and 9, and to allow the DOE to continue its mission to safely dispose of defense-related TRU waste up to the LWA limit of 175,564 m³ (6.2 million ft³) at the WIPP facility. The requirement for replacement panels was explained in the Part B of the 2020 RCRA Permit Ten-Year Renewal Application, Addendum G1, *Need for Additional Panels for the Ten-year Hazardous Waste Facility Permit Renewal* (See Appendix D).

A Notification of Planned Change was submitted to the NMED on June 23, 2021³, regarding the excavation of the west main access drifts. The west main access drifts will be comprised of five drifts. These access drifts will be located at S-400, S-550, S-700, S-850, and S-1000 (See Appendix C, Figure 2). These access drifts will be to the west of the W-170 access drift and will be referred to as the West Mains throughout this PMR.

³ Notification of Planned Change to the Permitted Facility Construction of the West Mains, Hazardous Waste Facility Permit, Number: NM4890319088-TSDF. Letter to Mr. Kevin Pierard, Chief, Hazardous Waste Bureau, New Mexico Environment Department, June 23, 2021.

As with the existing facility, the West Mains will provide access, ventilation, waste transport routes, and infrastructure to the proposed replacement panels. Two of the access drifts will be used for mining and the construction ventilation circuit (Construction circuit), while the other three drifts will eventually be used for waste transport and exhaust in the disposal ventilation circuit (Disposal circuit). Once waste transport begins in the West Mains, a pressure differential will be maintained between the Construction and Disposal circuits such that air will flow from the Construction circuit to the Disposal circuit.

Panel 11 will be located to the south of the West Mains at W-1640 and W-1970. Panel 12 will be located at W-2300 and W-2640.

Replacement Panels 11 and 12 will be located at the same geologic horizon within the Salado Formation as Panels 1-8, approximately 2,150 feet below the surface. Both replacement panels will have the same layout as approved Panels 1-8 with the exception that Panels 11 and 12 will be separated from each other by 300 feet, as opposed to the 200 feet. The replacement panels will each consist of seven disposal rooms with an intake and an exhaust drift. These panels will have the same nominal dimensions as those described in Permit Attachment A2, Section A2-2a(3) with the following exceptions: nominal room height will be 14 feet rather than 13 feet and the abutment pillars will be 400 feet rather than 200 feet wide. Each room in Panels 11 and 12 will consist of the following nominal dimensions:

- 33 feet wide by 14 feet high by 300 feet long
- Disposal rooms will be separated from the adjacent room/s by pillars of salt nominally 100 feet wide by 300 feet long
- The panel intake drift (from the main access drift to the panel entrance) will be nominally 20 feet wide by 13 feet high
- The panel exhaust drift (from the main access drift to the panel exit) will be nominally 14 feet wide by 12 feet high
- Within the panel, the intake and exhaust drifts will be nominally 33 feet wide by 14 feet high

Room 1 of the replacement panels will be separated from the closest West Mains access drift (S-1000) by an abutment pillar that is nominally 400 feet wide. The abutment pillars in Panels 1-8 are 200 feet wide. The wider abutment pillar for the replacement panels is an enhancement that will improve ground conditions in the West Mains, thereby reducing the time and effort needed to maintain the West Mains. Additionally, Panels 11 and 12 will be separated from each other by 300 feet, as opposed to the 200 feet separation used between panels for Panels 1-8. This will improve the ground conditions of each replacement panel.

The underground repository will continue to operate under the requirements listed in Permit Part 4. The requirements in Permit Part 4 consist of the following:

- Section 4.1, Designated Disposal Units
- Section 4.2, Permitted and Prohibited Waste Identification
- Section 4.3, Disposal Containers

- Section 4.4, Volatile Organic Compound Limits
- Section 4.5, Design, Construction, and Operation Requirements
- Section 4.6, Maintenance and Monitoring Requirements
- Section 4.7, Inspection Schedules and Procedures
- Section 4.8, Record Keeping

The underground repository will continue to maintain four ventilation circuits and ensure that air flow is from the Construction circuit moving toward the Disposal circuit, as described in Permit Attachment A2, Section A2-2a(3), *Subsurface Structures*.

Waste handling traffic will use one of two designated intake drifts for transport of TRU mixed waste to provide isolation of this activity from other underground traffic. These two drifts are referred to as S-700 and S-850. The Disposal circuit exhaust drift (S-1000) will generally not be used for personnel access. Construction equipment and construction personnel will generally use the S-550 and the S-400 drifts for travel. Pursuant to Permit Attachment A4, Section A4-4, *Underground Traffic*, the Permittees will designate the traffic routes for TRU mixed waste handling equipment and construction equipment and record this designation on a map that is posted in a location where it can be examined by personnel entering the underground. The map will be updated whenever the routes are changed. Maps will be available in facility files until facility closure.

Emergency procedures for underground personnel will continue to be performed as described in Permit Attachment D, Section D-8, *Evacuation Plan*. In accordance with Permit Attachment D, Section D-8b, *Underground Assembly Areas and Egress Hoist Stations*, assembly areas will continue to be used for emergencies that do not require immediate evacuation. As development to the west proceeds, it is anticipated that assembly areas may need to be relocated, or others added, to accommodate new work locations. Relocation or addition of assembly areas will be addressed in separate Class 1 modifications once the excavation is advanced enough to accommodate the appropriate changes. Self-contained self-rescuer caches will continue to be maintained in the underground as depicted in Permit Attachment D, Table D-2, *Emergency Equipment Maintained at the Waste Isolation Pilot Plant*.

Preparedness and Prevention will continue as described in Permit Part 2, Section 2.10, *Preparedness and Prevention*.

Volatile organic compound limits specified in Permit Part 4, Table 4.4.1, *VOC Room-Based Limits*, will not change. The title for Table 4.4.1 will change to indicate that the table applies to Panels 1-8. Table 4.4.2 will be added to provide the room-based VOC limits that will apply to Panels 11 and 12. Table 4.4.2 is necessary as the nominal height at time of emplacement in Panels 11 and 12 is expected to be 14 ft. Permit Part 4, Section 4.6.3, *Disposal Room Volatile Organic Compound Monitoring*, will be modified to indicate the difference between action levels for Panels 1-8 and Panels 11 and 12. A new action level table for Panels 11 and 12 will be added to Section 4.6.3. Monitoring for VOCs at the WIPP facility will continue as described in Permit Attachment N, *Volatile Organic Compound Monitoring Plan*.

Operation and maintenance of the WIPP facility will continue to comply with Permit Part 1, Section 1.7.7, *Proper Operation and Maintenance*. Maintenance and monitoring requirements

will continue in the replacement panels as described in Permit Part 4, Section 4.6, *Maintenance and Monitoring Requirements*.

Closure of each replacement panel will be performed in accordance with Permit Part 6, *Closure Requirements*, and the design and specifications described in Permit Attachment G1, *WIPP Panel Closure Design Description and Specifications*. No changes are proposed to the panel closure design.

Mining and outfitting the West Mains and the replacement panels will be performed consistent with applicable Mine Safety and Health Administration regulations, relevant Permit Conditions, and applicable DOE Health and Safety Orders.

Note that this PMR does not propose authorization to use Panel 10. However, as stated in Part B of the 2020 RCRA Permit Ten-Year Renewal Application, Addendum G1, *Need for Additional Panels for the Ten-year Hazardous Waste Facility Permit Renewal* (See Appendix D) “In the future, the Permittees may request Permit modifications to allow disposal of TRU mixed waste in other areas of the underground, one of which may be Panel 10.”

Specific information requirements for miscellaneous units

Except as otherwise provided in §264.600, owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units must provide the following additional information:

- (a) *A detailed description of the unit being used or proposed for use, including the following:*
(1) *Physical characteristics, materials of construction, and dimensions of the unit;*

In the original Part B Permit Application, the Permittees submitted Appendix D3 which contained detailed engineering information regarding the disposal units and associated buildings and structures in the form of drawings and diagrams. These represented the “as-built” condition of the facility. Some of these drawings and diagrams will change as the result of this PMR because the nominal dimensions of the HWDU will change. These are included in this PMR package and are listed below. There are no changes in the physical characteristics and materials of construction. Through this PMR, the Permittees are proposing the authorization to construct and to dispose of both CH and RH TRU-mixed waste in Panels 11 and 12.

Prior to using Panels 11 and 12 for TRU mixed waste disposal, the Permittees will submit to the Secretary, by certified mail or hand delivery, a letter signed by the Permittees and a New Mexico registered professional engineer stating Panels 11 and 12 have been constructed in compliance with the Permit, and the Permittees will not manage any hazardous waste in Panels 11 or 12 until the Secretary has either inspected the modified portion of the facility and finds it is in compliance with the conditions of this Permit; or waived the inspection or, within 15 calendar days of the date of submission of the letter required above, has not notified the Permittees of his intent to inspect.

- (2) *Detailed plans and engineering reports describing how the unit will be located, designed, constructed, operated, maintained, monitored, inspected, and closed to comply with the requirements of §§264.601 and 264.602; and*

Except as noted in this PMR, there are no changes to detailed plans and engineering reports describing how the unit will be located, designed, constructed, operated, maintained, monitored, inspected, and closed to comply with the requirements of §264.601 and §264.602, as described in Permit Attachment A1, *Container Storage*; Attachment A2, *Geologic Repository*; Attachment E, *Inspection Schedule, Process and Forms*; Attachment L, *WIPP Groundwater Detection Monitoring Program Plan*; Attachment N, *Volatile Organic Compounds Monitoring Plan*; and the WIPP facility Closure Plan documents: Permit Attachment G through Attachment G3, and Post-Closure Plan documents: Attachments H and H1.

A new table, Table 4.4.2, *VOC Room-Based Limits for Panels 11 and 12*, is needed to provide updated VOC limits based on a change in room height, at the time of waste emplacement. The nominal room height for Panels 11 and 12 is 14 feet versus 13 feet for Panels 1-8. The room based limits in Table 4.4.2 will provide the same level of hazard protection to the worker in an active disposal room should there be an event (*i.e.*, ground fall) in the adjacent closed room resulting in a release of VOCs to the active disposal room. In concert with the new VOC room-based limits for Panels 11 and 12, the Permittees are proposing a new table, Table 4.6.3.3, that will provide the 50% and 95% action levels for Panels 11 and 12. The action levels for Panels 11 and 12 will provide the same level of hazard protection to the worker. Appendix F includes the methodology used to calculate the proposed VOC room-based limits for Panels 11 and 12.

(3) For disposal units, a detailed description of the plans to comply with the post-closure requirements of §264.603.

Except as noted in this PMR, there are no changes to the plans to comply with the post-closure requirements of §264.603 as detailed in Post-Closure Plan documents: Attachments H and H1.

(b) Detailed hydrologic, geologic, and meteorologic assessments and land-use maps for the region 13 surrounding the site that address and ensure compliance of the unit with each factor in the environmental performance standards of §264.601.

There are no changes to the detailed hydrologic, geologic, and meteorologic assessments and land-use maps for the region surrounding the Site that address and ensures compliance of the unit with each factor in the environmental performance standards of §264.601. Updated information was recently provided in the 2020 Renewal Application Addendum L1, *Site Characterization*.

(c) Information on the potential pathways of exposure of humans or environmental receptors to hazardous waste or hazardous constituents and on the potential magnitude and nature of such exposures.

The Permittees have reevaluated the performance demonstration information submitted and have updated that information in the 2020 Renewal Application Addendum N1, *300-year Performance Demonstration Re-Evaluation*. There is no change to the conclusions reached in the original permit application, that is, the only viable mechanism for a release from the repository is the air emissions pathway. This pathway exists prior to final closure. No viable releases along soil or water pathways were identified. There is

no change to the potential exposure of humans or environmental receptors to hazardous waste or hazardous constituents or to the magnitude and nature of such exposures.

Changes to the descriptive text, figures, and tables in the Permit parts and attachments are listed below:

- Permit Part 4, *Geologic Repository Disposal*, is being modified to ensure that ten panels are referenced, as opposed to eight panels, and to include Panels 11 and 12 in Table 4.1.1, *Underground HWDUs* and in Section 4.5.2.1., *Construction Requirements*. Table 4.4.2, *VOC Room-Based Limits for Panels 11 and 12* is being added to Permit Part 4. This table provides room-based VOC limits based on a disposal room height of 14 ft at the time of emplacement in Panels 11 and 12. Table 4.6.3.3, *Action Levels for Disposal Room Monitoring in Panels 11-12* is being added to provide different action levels for Panels 11 and 12.
- Permit Part 7, *Post-Closure Care Plan*, Section 7.2, *Unit Identification*, is being modified to include ten panels as opposed to eight panels.
- Permit Attachment A, *General Facility Description and Process Information*, Section A-4, *Facility Type*, is being modified to include Panels 11 and 12.
- Permit Attachment A2, Section A2-1, *Description of the Geologic Repository*, is being modified to include the 29.2 acre mined area to the west, to include Panels 11 and 12 where appropriate, and to modify the maximum waste volume capacity available for TRU mixed waste emplacement. Additionally, Figures A2-1, *Repository Horizon* and A2-2, *Spatial View of the Miscellaneous Unit and Waste Handling Facility*, are being modified to show the location of the West Mains and Panels 11 and 12.
- Permit Attachment A3, *Typical Disposal Panel*, is being modified to show the length of the panel, including the abutment pillar for Panels 1-8 as well as for Panels 11 and 12. Additionally the height of the disposal rooms and intake drifts is being modified on the figure to show that the nominal height is in a range of 13 ft-14 ft.
- Permit Attachment A4, Figure A4-4b, *Typical Underground Transport Route using S-700 or S-850*, is being added to show the waste transport routes for Panels 11 and 12. Additionally the *List of Figures* is being modified to include Figure A4-4b. Figures A4-4, *Typical Underground Transport Route Using E-140*, and A4-4a, *Typical Underground Transport Route Using W-30*, are being modified to show the proposed West Mains and Panels 11 and 12 in order to ensure accuracy of the figures.
- Permit Attachment B, *Hazardous Waste Permit Application Part A, Process Codes and Design Capacities*, as well as the *Narrative to Item 6*, is being modified to include Panels 11 and 12 and their design capacities.
- Permit Attachment B, Appendix B3, Figure B3-1, *Spatial View of the WIPP Facility*, is being modified to include the West Mains and Panels 11 and 12.
- Permit Attachment B, Appendix B3, Figure B3-2, *Repository Horizon*, is being modified to include the West Mains and Panels 11 and 12.

- Permit Attachment D, Figure D-2, *Spatial View of the WIPP*, is being modified to include the West Mains and Panels 11 and 12.
- Permit Attachment D, Figure D-3, *WIPP Underground Facilities*, is being modified to include the West Mains and Panels 11 and 12.
- Permit Attachment D, Figure D-7, *Designated Underground Assembly Areas*, is being modified to include the West Mains and Panels 11 and 12.
- Permit Attachment G, *Closure Plan*, is being modified to include Panels 11 and 12 in descriptive text where appropriate.
- Permit Attachment G, Table G-1, *Anticipated Earliest Closure Dates for the Underground HWDUs*, is being modified to add Panels 11 and 12.
- Permit Attachment G, Table G-2, *Anticipated Overall Schedule for Closure Activities*, is being modified to show start times in months, counted from time zero, as well as durations as opposed to an estimated completion date.
- Permit Attachment G, Figure G-1, *Location of Underground HWDUs and WPC Locations*, is being modified to include the location of the West Mains and Panels 11 and 12.
- Permit Attachment G, Figure G-5, *Typical Disposal Panel*, is being modified to show the length of the panel, including the abutment pillar, for Panels 1-8, as well as for Panels 11 and 12. Additionally the height of the disposal rooms and intake drifts is being modified on the figure to show that the nominal height is in a range of 13 ft-14 ft.
- Permit Attachment G, Figure G-6, *Approximate Locations of Boreholes in Relation to the WIPP Underground*, is being modified to include the location of the West Mains and Panels 11 and 12.
- Permit Attachment G1, *WIPP Panel Closure Design Description and Specifications*, is being modified to include Panels 11 and 12 where appropriate in Sections G1-1, *Introduction*, G1-2, *WPC Description*, G1-2b, *Design Component Descriptions*.
- Permit Attachment G2, Figure G2-1, *View of the WIPP Underground Facility*, is being modified to include proposed Panels 11 and 12, and to make this figure consistent with similar spatial view figures in the Permit.
- Permit Attachment H1, *Active Institutional Controls During Post-Closure*, is being modified to include the area over Panels 11 and 12 within the perimeter fence that will be installed on the surface.
- Permit Attachment H1, Figure H1-1, *Spatial View of WIPP Surface and Underground Facilities*, is being modified to include the West Mains and Panels 11 and 12
- Permit Attachment H1, Figure H1-4, *Perimeter Fenceline and Roadway*, is being modified to show the proposed layout of the perimeter fence with the West Mains and Panels 11 and 12 included within the fenced area.

- Permit Attachment J, Table J-3, *Underground Hazardous Waste Disposal Units*, is being modified to include Panels 11 and 12, as well as their maximum TRU waste capacities.
- Permit Attachment N, *Volatile Organic Compound Monitoring Plan*, Section N-1a, *Background*, and Section N-3a(1), *Sampling Locations for Repository VOC Monitoring*, is being modified to include Panels 11 and 12.
- Permit Attachment N, *Volatile Organic Compound Monitoring Plan*, Figure N-4, *Disposal Room Sample Head Arrangement*, is being modified to indicate a nominal total disposal room height of 13 ft–14 ft, and to change the name of this figure to “*Typical Disposal Room Sample Head Arrangement*”.

Changes are described in Appendix A and Appendix B of this PMR. Appendix A provides a detailed list of changes by Permit section, and Appendix B provides the proposed redline/strikeout to the existing Permit. Note also a table entitled “Description of Changes and Explanation of Need” is included in Section 3 of this Overview. The following is the list of the appendices to this PMR:

- Appendix A, *Table of Changes*, describes each change that is being made.
- Appendix B, *Proposed Revised Permit Text*, identifies the changes to the permit text and tables in redline strikeout. This Appendix includes proposed changes to Permit figures. The existing Permit figures are depicted first with the new or new replacement figure immediately following.
- Appendix C, Figure 1, *Status of Panels at the WIPP Facility*, shows the status of Panels 1-10 at the WIPP facility. Figure 2, *WIPP West Mains and Panels 11-12*, identifies the location and dimensions of the West Mains and Panels 11 and 12. These figures are included to support the discussion in this Overview.
- Appendix D, *2020 Permit Renewal Part B Application*, Addendum G1, *Need for Additional Panels for the Ten-year Hazardous Waste Facility Permit Renewal*.
- Appendix E, *Design Layout*, shows the Professional Engineer certified plan of the West Mains with Panels 11 and 12.
- Appendix F, *Basis for Replacement Panels VOC Room-Based Limits Update*, documents the methodology used to determine the VOC room based limits for Panels 11 and 12.

2. 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)(1)(ii)), requires the applicant to identify that the modification is a Class 3 modification.

The regulations, at 20.4.1.900 NMAC (incorporating 40 CFR §270.42(d)), address a proposed permit modification not explicitly listed in 20.4.1.900 NMAC (incorporating 40 CFR §270.42 Appendix I). One option available to the Permittees is to submit a Class 3 modification request to the NMED. Therefore, for this specific modification, construction and use of replacement Panels 11 and 12 to the WIPP underground repository, the Permittees have chosen to submit the modification as a Class 3 modification request.

This PMR also addresses an update to the VOC room-based limits for the replacement panels. Pursuant to 20.4.1.900 NMAC incorporating 40 CFR 270.42, Appendix I, an update to the VOC room-based limits is identified as a Class 2 PMR.

20.4.1.900 NMAC incorporating 40 CFR 270.42, Appendix I, Item A, General Permit Provisions, 4. Changes in frequency of or procedures for monitoring, reporting, sampling, or maintenance activities by the Permittees: b, other changes ...2”

Updates to Permit conditions related to VOC room-based limits do not alter the level of protectiveness afforded by the environmental performance standards imposed by Permit Part 4 or reduce the capacity of the facility to protect human health or the environment. Permit conditions for VOC room-based limits in Panels 11 and 12 are being updated to maintain an equivalent level of worker protection as was required for Panels 1 through 8. No Permit conditions are being removed, and the list of hazardous waste managed at the WIPP facility remains unchanged.

3. 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)(1)(iii)), requires the applicant to explain why the modification is needed.

This modification is needed to add descriptive information and to make applicable figure modifications and additions regarding the West Mains and replacement Panels 11 and 12, along with their maximum TRU mixed waste capacities, to the Permit. As detailed in the *March 2020 Permit Renewal Part B Application for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit*, Addendum G1, replacement panels are required to replace a loss of disposal capacity in Panels 1, 7, and 9.

A Permit modification is necessary because the Permit does not currently include descriptive text or figures of the West Mains and replacement Panels 11 and 12. Panels 11 and 12 are alterations to the permitted facility which cause the need for modification of the permit.

The impacts of this PMR on the Permit have been evaluated. The results of the Permit impact assessment are identified in Table 1 below. This table identifies that the impacted portions of the Permit are Part 4, Part 7, Attachment A, Attachment A2, Attachment A3, Attachment A4, Attachment B, Attachment D, Attachment G, Attachment G1, Attachment H1, Attachment J, and Attachment N. This Permit modification is needed to address the changes, modifications, and updates necessary to reflect the addition of Panels 11 and 12 as underground HWDUs.

Table 1: Description of Permit Changes and Explanation of Need

Permit Part/Section	Impact
Part 4, Section 4.1.1.2.	Changed the first sentence to refer to “ten” Underground HWDUs as opposed to “eight” Underground HWDUs. This change is needed to provide an accurate description of the number of panels in the underground facility.
Part 4, Table 4.1.1	Added Panels 11 and 12 to Table 4.1.1 along with their Maximum TRU Mixed Waste Capacity. Additionally, changed the Total Maximum TRU Mixed Waste Capacity numbers in the table to reflect the new total with Panels 11 and 12. This change is needed to provide an accurate number of panels and an accurate Maximum TRU Mixed Waste Capacity to the table.
Part 4, Section 4.4.1	Removed “an” before “Underground HWDU”. Added “Panels 1-8” after “HWDUs”. This change is needed to ensure an understanding of different room-based limits and different action levels for Panels 1-8 and Panels 11 and 12.

Permit Part/Section	Impact
Part 4, Table 4.4.1	Changed the title of Table 4.4.1 from <i>VOC Room-Based Limits</i> to <i>VOC Room-Based Limits for Panels 1-8</i> . This change is needed to indicate that the table applies to Panels 1-8. Panels 11 and 12 will have a nominal room height of 14 feet. The room-based limits for Panels 11 and 12 have been recalculated based on the nominal 14-foot room height and will be included in a separate table.
Part 4, Table 4.4.2	Added Table 4.4.2, <i>VOC Room-Based Limits for Panels 11 and 12</i> . This change is needed as the room-based limits of VOCs in Panels 11 and 12 will be different from the room-based limits of VOCs for Panels 1-8 due to a difference in the nominal room height at the time of emplacement.
Part 4, Section 4.5.2.1.	Added Panels 11 and 12 to the bullet list of Panels under the <i>Construction Requirements</i> heading. This change is needed to accurately list the panels in the underground repository.
Part 4, Section 4.6.3.2.	Modified text to identify that Table 4.4.1 and Table 4.6.3.2 apply to Panels 1-8 while Table 4.4.2 and Table 4.6.3.2 apply to Panels 11 and 12. This change is needed to ensure an understanding of different room-based limits and different action levels for Panels 1-8 and Panels 11 and 12.
Part 4, Table 4.6.3.2	Changed the title of Table 4.6.3.2 from <i>Action Levels for Disposal Room Monitoring</i> to <i>Action Levels for Disposal Room Monitoring in Panels 1-8</i> . This change is needed to indicate that Table 4.6.3.2 applies to Panels 1-8. This table is based on the VOC room-based limits in Table 4.4.1.
Part 4, Table 4.6.3.3	Added Table 4.6.3.3, <i>Action Levels for Disposal Room Monitoring in Panels 11-12</i> . This change is needed to provide the action levels for Panels 11 and 12 that are based on Table 4.4.2.
Part 4, Section 4.6.3.3.	Modified text to identify that Table 4.4.1 and Table 4.6.3.2 apply to Panels 1-8 while Table 4.4.2 and Table 4.6.3.2 apply to Panels 11 and 12. This change is needed to ensure an understanding of different room-based limits and different action levels for Panels 1-8 and Panels 11 and 12.
Part 7, Section 7.2	Changed the wording in the parentheses in the first sentence from “eight panels and two access drifts” to “ten panels”. This change is needed to accurately reflect the number of panels in the underground repository.
Attachment A, Section A-4	Replaced “10” with “12”. Replaced “1” with “7”, and “8” with “12”. Added “because Panels 1-6 are filled and closed”. This change is needed to clarify which Panels are filled.
Attachment A2, Section A2-1	Added the acreage that covers the two replacement panels to the fourth paragraph. Also added Panels 11 and 12 to the description of HWDUs authorized for emplacement in the fourth paragraph. Added a sentence at the end of the fourth paragraph regarding the Permittees’ ability to request Permit modifications for TRU waste disposal in other areas of the underground, one of which may be Panel 10. Added Panels 11 and 12 to the first sentence of the fifth paragraph, describing the panel design. Modified the maximum TRU mixed waste volume for CH and RH to include Panels 11 and 12 in the seventh and eighth paragraphs. Modified the description of the barrier pillar width, 150 feet, to be used in the calculation of a panel area for Panels 11 and 12 in the eighth paragraph. These changes are needed for accuracy of descriptive text in the Permit.
Attachment A2, Section A2-2a(3)	In the first and second paragraphs below the <i>Underground Hazardous Waste Disposal Units (HWDUs)</i> header, added Panels 11 and 12 in descriptive text regarding HWDUs. Deleted references to Panel 9 from the discussion of future panels in the third paragraph. Additionally, modified bulleted text after the third paragraph describing the drifts that are part of the waste transport route. These changes are needed for accuracy of the descriptive text.
Attachment A2, Section A2-2a(3)	Modified the sixth paragraph under the <i>CH TRU Mixed Waste Emplacement</i> header by changing “Underground” to lower-case and adding Panels 11 and 12 to the descriptive text.

Permit Part/Section	Impact
Attachment A2, Section A2-5b(2)(a)	Changed the third paragraph to reference ten panels as opposed to eight panels. This change is needed for accuracy and to show that the Geomechanical Monitoring System will apply to the replacement panels as well as the existing panels.
Attachment A2, Figures	Modified Figures A2-1, <i>Repository Horizon</i> , and A2-2, <i>Spatial View of the Miscellaneous Unit and waste Handling Facility</i> , to show the West Mains and proposed Panels 11 and 12 as planned excavations in the underground repository. This change is needed for accurate depiction of the layout of the underground repository.
Attachment A3, Typical Disposal Panel	Replaced the figure of the <i>Typical Disposal Panel</i> to show that the length of the panel (from the centerline of the main access drift to the centerline of Room 7) is 1,021'-6" for Panels 1-8, and 1,221'-6" for proposed Panels 11 and 12. Modified Section A-A' of the figure to show the room height as 13-14 feet. This change is needed to accurately depict the dimensions of the panels in the underground repository.
Attachment A4, List of Figures	Added a new figure, Figure A4-4b, <i>Typical Underground Transport Route Using S-700 or S-850</i> , to the <i>List of Figures</i> . The <i>List of Figures</i> needs to be updated for accuracy.
Attachment A4, Section A4-4	Modified descriptive text in the fourth paragraph to indicate the difference between the waste transport routes for Panels 1-8 and the waste transport route for Panels 11 and 12. This change is needed for accuracy in the description of the proposed waste transport routes.
Attachment A4, Figures	Modified Figure A4-4, <i>Typical Underground Transport Route Using E-140</i> , to show the West Mains and Panels 11 and 12. This change is needed to accurately reflect the underground layout.
Attachment A4, Figures	Modified Figure A4-4a, <i>Typical Underground Transport Route Using W-30</i> , to show the West Mains and Panels 11 and 12. This change is needed to accurately reflect the underground layout.
Attachment A4, Figures	Added a new figure, Figure A4-4b, <i>Typical Underground Transportation Route Using S-700 or S-850</i> to show the planned transport route for waste to Panels 11 and 12. This figure is needed to show the planned waste transport routes in the West Mains.
Attachment B, Hazardous Waste Permit Part A Form	Added Panels 11 and 12, along with their Process Design Capacity to the table at 6. <i>Process Codes and Design Capacities (continued)</i> . Also modified the narrative to Item 6, <i>Process Codes and Design Capacities</i> , to show ten panels as opposed to eight panels in the first paragraph. Modified the second paragraph to show the maximum design capacity volume with Panels 11 and 12. Changed "eight" underground HWDUs to "ten" underground HWDUs in the third paragraph. Added two sentences to the end of the fourth paragraph stating that Panels 11 and 12 will be constructed during the term of this permit and the maximum CH and RH disposal capacities that the panels will be certified for. These changes are needed to accurately describe the number of underground HWDUs and their design capacity.
Attachment B, Appendix B3	Modified Figure B3-1, <i>Spatial View of the WIPP Facility</i> , to accurately show the West Mains and Panels 11 and 12. This modification is needed to accurately show the planned underground repository.
Attachment B, Appendix B3	Modified Figure B3-2, <i>Repository Horizon</i> , to accurately show the West Mains and Panels 11 and 12. This modification is needed to accurately show the planned underground repository.
Attachment D, Figures	Modified Figure D-2, <i>Spatial View of the WIPP Facility</i> , to show the planned underground repository layout with the West Mains and Panels 11 and 12. This modification is needed to accurately depict the planned underground repository layout.
Attachment D, Figures	Modified Figure D-3, <i>WIPP Underground Facilities</i> , to show the planned underground repository layout with the West Mains and Panels 11 and 12. This modification is needed to accurately depict the planned underground repository layout.
Attachment D, Figures	Modified Figure D-7, <i>Designated Underground Assembly Areas</i> , to show the planned underground repository layout with the West Mains and Panels 11 and 12. This modification is needed to accurately depict the planned underground repository layout.

Permit Part/Section	Impact
Attachment G, Introduction	Added proposed Panels 11 and 12 to description of hazardous waste management units (HWMUs) in the 2 nd paragraph to indicate that the closure plan for the HWMUs applies to Panels 11 and 12 as well as Panels 1-8. This change is needed for accuracy of the description of the application of the HWMU closure plan.
Attachment G, Section G-1c	Modified descriptive text in the second paragraph to indicate that Panel 9 is excluded from TRU waste disposal and that Panels 11 and 12 will be used for waste disposal during the term of this permit. This change is needed for accuracy of the descriptive text.
Attachment G, Section G-1e(1)	Deleted the sentence in the first paragraph that describes not using Panel 9 for TRU mixed waste disposal if the alternative to simultaneously close panels by placing closures in the north-south mains is used. This text is no longer needed as the decision was made, and the work has been completed, to place the closures for Panels 3, 4, 5, and 6 in the north-south mains.
Attachment G, Table G-1	Changed the dates for anticipated operations start and end along with closure start and end for Panels 7 and 8. Added Panels 11 and 12 with their respective operations and closure start and end dates to the table. This change is needed to reflect the anticipated dates as of July 2021, as well as to include Panels 11 and 12.
Attachment G, Table G-2	Changed the title of the table from, <i>Anticipated Overall Schedule for Closure Activities</i> , to <i>Anticipated Overall Schedule for Final Facility Closure Activities</i> . Changed the "Final Facility Closure" header to "Final Facility Closure Durations". Changed the <i>Start</i> column header to <i>Start Month</i> . Changed the dates in the "Start" column to reflect the start time from month zero (month zero being the start of final facility closure activities) as opposed to a month and year. Changed the "Stop" column header to "Duration". Changed the entries in the "Stop" column from dates to the duration, in months, for the activity. Deleted the asterisk at the bottom of the table as it is no longer applicable.
Attachment G, Figures	Modified Figure G-1, <i>Location of Underground HWDUs and WPC Locations</i> , and G-6, <i>Approximate Locations of Boreholes in Relation to the WIPP Underground</i> , to show the location of the West Mains and Panels 11 and 12. This change is needed to accurately describe the layout of the underground repository.
Attachment G, Figures	Modified Figure G-5, <i>Typical Disposal Panel</i> , to show the difference in the length of Panels 1-8 and Panels 11 and 12 based on the increased abutment pillar for Panels 11 and 12. Also modified the A-A' cross section to show the height of the disposal room as 13-14 feet. This modification is needed to accurately depict the panel dimensions.
Attachment G, Figures	Modified Figure G-6, <i>Approximate Locations of Boreholes in Relation to the WIPP Underground</i> , to show the location of the West Mains and Panels 11 and 12. This change is needed to accurately describe the layout of the underground repository.
Attachment G1, Section G1-1	In the first paragraph, modified the description of the panels to include Panels 11 and 12. Additionally, delete Panel 9 from the description of the panels in the north/south main entries. This modification is needed for accuracy regarding the WIPP panel closures.
Attachment G1, Section G1-2	Modified the description of the application of WPC-A to include Panels 11 and 12. This modification is needed for accuracy regarding the WIPP panel closures.
Attachment G1, Section G1-2b	Added Panels 11 and 12 to the description of the WPC-A locations. This modification is needed for accuracy regarding the design component descriptions of the panel closures.
Attachment G2, Figure G2-1	Added Panels 11 and 12 as well as the West Mains to the figure. This modification is needed to accurately reflect the underground layout and make consistent with similar spatial view figures in the Permit.
Attachment H1, Section H1.1	At 1, modified the description of the surface fence line in the post-closure plan that will be used to establish access control around the panel areas since the fenced area will no longer be a rectangle. This modification includes wording regarding the gates to be installed in the fence. This modification is needed to ensure accuracy of the description of the repository footprint fencing.

Permit Part/Section	Impact
Attachment H1, Section H1.1.1.	Modified the description of the repository footprint fencing to include an area around the West Mains and Panels 11 and 12. This includes adding the nominal dimensions of the new area. Additionally, modified the description of the gates in the repository footprint fencing since the area is no longer a rectangle. This modification is needed to ensure accuracy of the description of the repository footprint fencing.
Attachment H1, Figures	Modified Figure H1-1, <i>Spatial View of WIPP Surface and Underground Facilities</i> , to include the West Mains and Panels 11 and 12. This modification is needed for accuracy of the figure.
Attachment H1, Figures	Modified Figure H1-4, <i>Perimeter Fenceline and Roadway</i> , to show the additional repository footprint fencing encompassing the area around the West Mains and Panels 11 and 12.
Attachment J, Table J-3	Modified Table J-3, <i>Underground Hazardous Waste Disposal Units</i> , to include Panels 11 and 12, as well as, their respective maximum capacities for CH and RH TRU waste capacity and container equivalents. Additionally, changed the total CH and RH TRU waste capacities for the underground repository. This change is needed for accuracy regarding HWDUs and their respective maximum TRU waste capacities.
Attachment N, Section N-1a	Modified the reference to underground HWDUs to include Panels 11 and 12. This modification is needed for accuracy regarding the description of HWDUs in the Permit.
Attachment N, Section N-3a(1)	Added proposed Panels 11 and 12 to the HWDU description. This change is needed for accuracy regarding the number of HWDUs in the permit.
Attachment N, Figure N-4	Modified the upper height dimension of the room on Figure N-4. This change is needed to cover both the nominal 13 ft height at time of emplacement in Panels 1-8 as well as the anticipated nominal 14 ft height at time of emplacement in Panels 11 and 12, and to change the name of this figure to " <i>Typical Disposal Room Sample Head Arrangement</i> ".

4. **20.4.1.900 NMAC (incorporating 40 CFR 270.42 (c)(1)(iv)), requires the applicant to provide the applicable information required by 40 CFR §§270.13 through 270.22, 270.62, 270.63, and 270.66.**

Table 2, *Regulatory Crosswalk*, describes those portions of the Permit that are affected by this PMR. Where applicable, regulatory citations in this modification reference Title 20, Chapter 4, Part 1, NMAC, revised December 1, 2018, incorporating 40 CFR Parts 264 and 270. 40 CFR §§270.16 through 270.22, 270.62, 270.63, and 270.66 are not applicable at the WIPP facility. Consequently, they are not listed in Table 2. This crosswalk indicates the technical information that is being provided with this PMR in order to facilitate the NMED's review.

5. **20.4.1.900 NMAC (incorporating 40 CFR §270.11(d)(1) and 40 CFR 270.30(k)), requires that any person signing under paragraphs a and b must certify the document in accordance with 20.4.1.900 NMAC.**

The transmittal letter for this PMR contains the signed certification statement in accordance with Permit Part 1, Section 1.9.

Table 2: Regulatory Crosswalk

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit	Yes	No
§270.13		Contents of Part A permit application	Attachment B, Part A	✓	
§270.14(b)(1)		General facility description	Attachment A	✓	
§270.14(b)(2)	§264.13(a)	Chemical and physical analyses	Section 2.3.1 Attachment C		✓
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Section 2.3.1.1 Attachment C		✓
	§264.13(c)	Off-site waste analysis requirements	Section 2.2.1 Attachment C		✓
§270.14(b)(4)	§264.14(a-c)	Security procedures and equipment	Section 2.6		✓
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Section 2.7 Attachment E, Section E1-a		✓
	§264.174	Container inspections	Attachment E, Section E-1b(1)		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Section E-1b Section E-1b(2) Attachment E		✓
§270.14(b)(6)		Request for waiver from preparedness and prevention requirements of Part 264 Subpart C	NA		
§270.14(b)(7)	§264 Subpart D	Contingency plan requirements	Section 2.12 Attachment D		✓
	§264.51	Contingency plan design and implementation	Section 2.12.1 Attachment D		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment D	✓	
	§264.53	Contingency plan copies	Section 2.12.2 Attachment D		✓
	§264.54	Contingency plan amendment	Section 2.12.3 Attachment D		✓
	§264.55	Emergency coordinator	Section 2.12.4 Section D-4a(1)		✓
	§264.56	Emergency procedures	Section D-4 Attachment D		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Section 2.11 Attachment A		✓
§270.14(b)(8)(i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Section 2.11		✓
§270.14(b)(8)(ii)		Runoff or flood prevention (e.g., berms, trenches, and dikes)	Section A1-1c(1) Section 2.11		✓
§270.14(b)(8)(iii)		Prevention of contamination of water supplies	Section 2.11		✓
§270.14(b)(8)(iv)		Mitigation of effects of equipment failure and power outages	Section 2.11		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit	Yes	No
§270.14(b)(8)(v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Section 2.11		✓
§270.14(b)(8)(vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Section 2.11 Part 4 Attachment A2 Section D-4e Section G-1a Attachment N	✓	
	§264 Subpart C	Preparedness and Prevention	Section 2.10		✓
	§264.31	Design and operation of facility	Section 2.10		✓
	§264.32	Required equipment	Section 2.10.1 Attachment D		✓
	§264.33	Testing and maintenance of equipment	Section 2.10.2 Section E-1a		✓
	§264.34	Access to communication/alarm system	Section E-1a Section 2.10.3		✓
	§264.35	Required aisle space	Section 2.10.4		✓
	§264.37	Arrangements with local authorities	Section D-4a(3)		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes	Section 2.9		✓
§270.14(b)(10)		Traffic pattern, volume, and controls, for example: Identification of turn lanes Identification of traffic/stacking lanes, if appropriate Description of access road surface Description of access road load-bearing capacity Identification of traffic controls	Attachment A4	✓	
§270.14(b)(11)(i) and (ii)	§264.18(a)	Seismic standard applicability and requirements	Section G2-2.2 Part B, Regulatory Requirements Crosswalk		✓
§270.14(b)(11)(iii-v)	§264.18(b)	100-year floodplain standard	Section A1-1c(1) Part B, Regulatory Requirements Crosswalk		✓
§270.14(b)(12)	§264.16(a-e)	Personnel training program	Section 2.8 Attachment F		✓
§270.14(b)(13)	§264 Subpart G	Closure and post-closure plans	Attachment G	✓	
§270.14(b)(13)	§264.111	Closure performance standard	Section G-1a		✓
§270.14(b)(13)	§264.112(a), (b)	Written content of closure plan	Attachment G-1	✓	
§270.14(b)(13)	§264.112(c)	Amendment of closure plan	Section 6.3 Section G-1d(4)		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure	Section G-2a		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit	Yes	No
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Section G-1e(2)		✓
§270.14(b)(13)	§264.113	Time allowed for closure	Section 6.5 Section G-1d		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Section 6.6 Section G-1e(2)		✓
§270.14(b)(13)	§264.115	Certification of closure	Section 6.7 Section G-2a		✓
§270.14(b)(13)	§264.116	Survey plat	Section 6.8 Section G-2b		✓
§270.14(b)(13)	§264.117	Post-closure care and use of property	Section 7.3 Section H-1a		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Section 7.5 Section H-1a(1)		✓
§270.14(b)(13)	§264.178	Closure/ containers	Section 6.9 Section A1-1h Section G-1		✓
§270.14(b)(13)	§264.601	Environmental performance standards-Miscellaneous units	Section A-4 Section D-1 Section G-1a		✓
§270.14(b)(13)	§264.603	Post-closure care	Section 7.3 Section G-1a(3)		✓
§270.14(b)(14)	§264.119	Post-closure notices	Section 7.4 Section H-2		✓
§270.14(b)(15)	§264.142	Closure cost estimate	NA		
	§264.143	Financial assurance	NA		
§270.14(b)(16)	§264.144	Post-closure cost estimate	NA		
	§264.145	Post-closure care financial assurance	NA		
§270.14(b)(17)	§264.147	Liability insurance	NA		
§270.14(b)(18)	§264.149-150	Proof of financial coverage	NA		
§270.14(b)(19)(i), (vi), (vii), and (x)		Topographic map requirements Map scale and date Map orientation Legal boundaries Buildings Treatment, storage, and disposal operations Run-on/run-off control systems Fire control facilities	Attachment B Appendix B2 Appendix B3	✓	
§270.14(b)(19)(ii)	§264.18(b)	100-year floodplain	Attachment B Part A		✓
§270.14(b)(19)(iii)		Surface waters	Attachment B Part A		✓
§270.14(b)(19)(iv)		Surrounding Land use	Attachment B Part A		✓
§270.14(b)(19)(v)		Wind rose	Attachment B Part A		✓
§270.14(b)(19)(viii)	§264.14(b)	Access controls	Attachment B Part A		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit	Yes	No
§270.14(b)(19)(ix)		Injection and withdrawal wells	Attachment B Part A		✓
§270.14(b)(19)(xi)		Drainage on flood control barriers	Attachment B Part A		✓
§270.14(b)(19)(xii)		Location of operational units	Attachment B Part A		✓
§270.14(b)(20)		Other federal laws Wild and Scenic Rivers Act National Historic Preservation Act Endangered Species Act Coastal Zone Management Act Fish and Wildlife Coordination Act Executive Orders	Attachment B Part A		✓
§270.15	§264 Subpart I	Containers	Part 3 Section 4.3 Attachment A1		✓
	§264.171	Condition of containers	Section 3.3 Attachment A1		✓
	§264.172	Compatibility of waste with containers	Section 3.4 Attachment A1		✓
	§264.173	Management of containers	Section 3.5 Attachment A1		✓
	§264.174	Inspections	Section 3.7 Section E-1 Section A1-1e		✓
§270.15(a)	§264.175	Containment systems	Section 3.6 Attachment A1		✓
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Section A1-1g Section 2.1		✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Section A1-1g Section 2.3.3.4		✓
	§264.178	Closure	Part 6 Attachment G	✓	
§270.15(e)	§264.179	Air emission standards	Section 4.4.2 Attachment N		✓
§270.23	§264 Subpart X	Miscellaneous units	Attachment A2	✓	
§270.23(a)	§264.601	Detailed unit description	Part 4 Attachment A2	✓	
§270.23(b)	§264.601	Hydrologic, geologic, and meteorologic assessments	Part 4 Part 5 Attachment A2 Attachment L		✓
§270.23(c)	§264.601	Potential exposure pathways	Part 4 Attachment A2 Attachment N		✓
§270.23(d)		Demonstration of treatment effectiveness	NA		

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit	Yes	No
	§264.602	Monitoring, analysis, inspection, response, reporting, and corrective action	Part 4 Attachment A2 Section E-1 Attachment N	✓	
	§264.603	Post-closure care	Attachment H Attachment H1	✓	
	§264 Subpart E	Manifest system, record keeping, and reporting	Part 1 Sections 2.13 & 2.14 Part 4 Attachment C		✓
	§264 Subpart F	Releases from solid waste management units	Parts 5 & 7 Attachment G2 Attachment L		✓
	§264.90	Applicability	Part 5 Attachment L		✓
	§264.91	Required programs	Attachment L		✓
	§264.92	Ground-water protection standard	Attachment L		✓
	§264.93	Hazardous constituents	Attachment L		✓
	§264.94	Concentration limits	Part 5 Attachment L		✓
	§264.95	Point of compliance	Part 5 Attachment L		✓
	§264.96	Compliance period	Attachment L		✓
	§264.97	General ground-water monitoring requirements	Part 5 Attachment L		✓
	§264.98	Detection monitoring program	Part 5 Attachment L		✓
	§264.99	Compliance monitoring program	Part 5 Attachment L		✓
	§264.100	Corrective action program	Part 5 Attachment L		✓
	§264.101	Corrective action for solid waste management units	Part 8 Attachment L		✓
	§264 Appendix IX	Ground-water Monitoring List	Part 5 Attachment L		✓

Appendix A
Table of Changes

Table of Changes

Affected Permit Section	Explanation of Change
Part 4, Section 4.1.1.2.	Changed the first sentence to refer to “ten” Underground HWDUs as opposed to “eight” Underground HWDUs.
Part 4, Table 4.1.1	Added Panels 11 and 12 to Table 4.1.1 along with their Maximum TRU Mixed waste capacity. Changed the total Maximum TRU Mixed Waste Capacity numbers in the table also.
Part 4, Table 4.4.1	Modified the title of Table 4.4.1 to indicate that Table 4.4.1 applies to Panels 1-8.
Part 4, Table 4.4.2	Added Table 4.4.2, <i>VOC Room-Based Limits for Panels 11 and 12</i> .
Part 4, Section 4.4.1	Added text to indicate that the measured concentration of VOCs in any open room and in each closed room in active Panels 11 and 12 are provided in Table 4.4.2. Additionally, added Table 4.4.2, <i>VOC Room-Based Limits for Panels 11 and 12</i> .
Part 4, Section 4.5.2.1.	Added Panels 11 and 12 to the bullet item list of HWDUs.
Part 4, Section 4.6.3.2.	Modified language to indicate that room-based limits in Table 4.4.1 (Panels 1-8) and Table 4.4.2 (Panels 11 and 12) apply to the active panels as appropriate, as well as Table 4.6.3.2 (Panels 1-8) and Table 4.6.3.3 (Panels 11 and 12) applying to the active panel, as appropriate.
Part 4, Table 4.6.3.2	Modified the title of the table to <i>Action Levels for Disposal Room Monitoring in Panels 1-8</i> .
Part 4, Table 4.6.3.3	Added Table 4.6.3.3, <i>Action Levels for Disposal Room Monitoring in Panels 11-12</i> , to provide the 50% and 95% action levels based on Table 4.4.2, <i>VOC Room-Based Limits for Panels 11 and 12</i> .
Part 4, Section 4.6.3.3.	Modified language to indicate that Table 4.4.1 and Table 4.6.3.2 apply to Panels 1-8 while Table 4.4.2 and Table 4.6.3.2 apply to Panels 11 and 12.
Part 7, Section 7.2	Changed the wording in the parentheses in the first sentence from “ <i>eight panels and two access drifts</i> ” to “ <i>ten panels</i> ”.
Attachment A, Section A-4	Added Panels 11 and 12 to the 3 rd sentence of the 4 th paragraph.
Attachment A2, Section A2-1	<p>Modified the descriptive text in the 4th paragraph to include the acreage covering the two replacement panels to the west of the existing underground repository. Deleted text regarding future disposal in Panels 9 and 10 and replaced it with a sentence that addresses Panel 10 alone. Also deleted the sentence that describes Panels 1-8 being authorized for this Permit 10-year term and changed the wording to eliminate authorization for Panels 5 through eight, replacing it with Panels 7, 8, 11, and 12.</p> <p>Modified the 5th paragraph, adding Panels 11 and 12 to the first sentence. Also deleted the sentence regarding design of Panels 9 and 10.</p> <p>Modified paragraph eight to include Panels 11 and 12 along with the total maximum allowable volume of CH and RH to be emplaced in the underground. Also modified the description of the area of a panel used for calculating the RH kilowatts per acre. The description remains the same for Panels 4-8, however, it is modified for Panels 11 and 12 since they are 100 feet further apart than Panels 4-8.</p>
Attachment A2, Section A2-2a(3)	<p>Modified the first two paragraphs under the <i>Underground Hazardous Waste Disposal Units (HWDUs)</i> header to include Panels 11 and 12.</p> <p>Modified the descriptive text in the 3rd paragraph and bullet points,</p>

Affected Permit Section	Explanation of Change
	changing the word “areas” to “access drifts” and to eliminate Panel 9 from the waste emplacement discussion.
Attachment A2, Section A2-2b	Modified the 2 nd to the last paragraph, changing “Underground” to all lower-case letters and adding Panels 11 and 12 to the sentence talking about the anticipated schedule for filling each of the panels.
Attachment A2, Section A2-5b(2)(a)	Changed the number of panels from “eight” to “ten” in the third paragraph. Changed “will be” to “is”.
Attachment A2, Figures	Replaced Figure A2-1, <i>Repository Horizon</i> , by adding the West Mains and Panels 11 and 12 to the repository layout.
Attachment A2, Figures	Replaced Figure A2-2, <i>Spatial View of the Miscellaneous Unit and Waste Handling Facility</i> , to include the West Mains and Panels 11 and 12.
Attachment A3, <i>Typical Disposal Panel</i>	Replaced the figure, <i>Typical Disposal Panel</i> , to show the length of the panel as 1,021’-6” for Panels 1-8 and 1,221’-6” for Panels 11 and 12. Modified Section A-A’ to show the disposal room height at 13’-14’.
Attachment A4, <i>List of Figures</i>	Added Figure A4-4b, <i>Typical Underground Transport Route Using S-700 or S-850</i> , to the List of Figures.
Attachment A4, Section A4-4	Changed the sentence in the 4 th paragraph to show that the traffic routes for waste disposal in Panels 1-8 will use the same main access drifts, while traffic routes for waste disposal in Panels 11 and 12 will use the designated access drifts in the West Mains.
Attachment A4, Figure A4-4	Replaced figure to show the West Mains and Panels 11 and 12.
Attachment A4, Figure A4-4a	Replaced figure to show the West Mains and Panels 11 and 12.
Attachment A4, Figures	Added a new Figure A4-4b to show the proposed waste transport routes in S-700 or S-850 of the West Mains.
Attachment B, <i>Hazardous Waste Permit Part A Form</i>	Modified Section 6 of the Part A form to include Panels 11 and 12 in the list of process codes along with their design capacity in the associated table.
Attachment B, <i>Hazardous Waste Permit Part A Form</i>	<p>Modified the <i>Narrative to Item 6</i> by changing “eight” to “ten” in the last sentence of the first paragraph.</p> <p>Modified the volume for the total design capacity by changing “151,135” to “189,935” in the 2nd paragraph. Additionally, added Panels 11 and 12 in the sentence talking about total design capacity.</p> <p>Changed “eight” to “ten” underground HWMUs in the 3rd paragraph.</p> <p>Add two sentences to the last paragraph reading, “<i>Panels 11 and 12 will be constructed during the term of this permit. Each panel will be certified for a maximum CH TRU mixed waste volume of up to 18,750 m³ and a maximum RH TRU mixed waste volume of up to 650 m³.</i>”</p>
Attachment B, Appendix B3, Figure B3-1	Replaced figure to include the West Mains and Panels 11 and 12.
Attachment B, Appendix B3, Figure B3-2	Replaced figure to include the West Mains and Panels 11 and 12.
Attachment D, Figure D-2	Replaced figure to show the West Mains and Panels 11 and 12 in the spatial view of the WIPP facility.
Attachment D, Figure D-3	Replaced figure to show the West Mains and Panels 11 and 12 in the plan view of the underground facilities.
Attachment D, Figure D-7	Replaced figure to show the West Mains and Panels 11 and 12 in the underground assembly areas figure.

Affected Permit Section	Explanation of Change
Attachment G, Introduction	Added Panels 11 and Panel 12 to the first sentence of the 2 nd paragraph.
Attachment G, Section G-1c	Modified the 2 nd paragraph as follows: changed “Panels 1 through 10” to “Panels 1-8 and Panels 10-12”. Additionally, changed the 2 nd sentence of the 2 nd paragraph to read as follows: <i>“Note that panel 9 will not be used for TRU mixed waste disposal and Panel 10 is not authorized for waste emplacement under this permit.”</i>
Attachment G, Section G-1e(1)	Deleted the sentence, <i>“If this alternative is used to close Panels 3, 4, 5, and 6, then Panel 9 will not be used for TRU mixed waste disposal.”</i>
Attachment G, Table G-1	Modified to provide updated anticipated closure dates for Panels 7 and 8 and to add Panels 11 and 12 with their anticipated closure dates to the table.
Attachment G, Table G-2	Modified to show durations as opposed to month/year for final facility closure. Also deleted the asterisk note at the bottom of the table.
Attachment G, Figure G-1	Replaced figure to show the West Mains and Panels 11 and 12 along with the future panel closure locations.
Attachment G, Figure G-5	Replaced figure to show that the length of a typical panel is 1,021'-6" for Panels 1-8 and 1,221'-6" for Panels 11 and 12. Also modified the A-A' section to show the disposal room height at 13'-14'.
Attachment G, Figure G-6	Replaced figure to show the West Mains and Panels 11 and 12 for accuracy of the repository layout.
Attachment G1, Section G1-1	Panels 11 and 12 were added to the description of panels in the first paragraph.
Attachment G1, Section G1-2	Added Panels 11 and 12 to the sentence describing where the WPC-A design is intended to be used.
Attachment G1, Section G1-2b	Added Panels 11 and 12 to the first sentence of the 2 nd paragraph, describing where the WPC-A is to be used.
Attachment G2, Figure G2-1	Replaced the figure with a figure showing the Panels 11 and 12 as well as the West Mains, and to make consistent with similar spatial view figures in the Permit.
Attachment H1, Section H1.1	Modified the paragraph at “1.” to change the description of the location of the gates for the repository footprint fence line.
Attachment H1, Section H1.1.1.	Modified the first paragraph to describe the repository footprint fence as encompassing the original rectangular area over Panels 1-8 and an adjoining rectangular area over Panels 11 and 12, as well as adding the approximate dimensions of the adjoining rectangular area. Additionally, modified the description of the location of the gates in the fence line.
Attachment H1, Figure H1-1	Replaced figure to include the West Mains and Panels 11 and 12 in the spatial view of the WIPP facility.
Attachment H1, Figure H1-4	Replaced figure to show the adjoining perimeter fence line and roadway around the Panels 11 and 12 footprint.
Attachment J, Table J-3	Modified to include Panels 11 and 12 and their respective maximum capacities for CH and RH waste. Additionally, changed the totals for Total Maximum Waste Capacity in the table to include the capacities for Panels 11 and 12.
Attachment N, Section N-1a	Added Panels 11 and 12 to the last sentence of the first paragraph describing the underground HWDUs.

Affected Permit Section	Explanation of Change
Attachment N, Section N-3a(1)	Added Panels 11 and 12 to the first sentence of the first paragraph describing the underground HWDUs.
Attachment N, Figure N-4	Replaced figure and renamed figure to " <i>Typical Disposal Room Sample Head Arrangement</i> ".

Appendix B
Revised Permit Text

PART 4 - GEOLOGIC REPOSITORY DISPOSAL

4.1 **DESIGNATED DISPOSAL UNITS**

4.1.1.2 **Disposal Locations and Quantities**

The Permittees shall dispose TRU mixed waste containers in ~~eight~~^{ten} Underground HWDUs, as specified in Table 4.1.1 below and depicted in Permit Attachment A2, Figure A2-1. The Permittees may dispose quantities of TRU mixed waste containers in these locations not to exceed the maximum capacities specified in Table 4.1.1 below. The Permittees may increase these capacities subject to the following conditions:

Table 4.1.1 - Underground HWDUs				
Description¹	Waste Type	Maximum TRU Mixed Waste Capacity²	Final TRU Mixed Waste Volume³	Final LWA TRU Waste Volume⁴
Panel 1	CH TRU	636,000ft ³ (18,000 m ³)	370,685.70 ft ³ (10,496.65 m ³)	267,096.48 ft ³ (7,563.33 m ³)
Panel 2	CH TRU	636,000 ft ³ (18,000 m ³)	635,581.72 ft ³ (17,997.67 m ³)	462,712.19 ft ³ (13,102.55 m ³)
Panel 3	CH TRU	662,150 ft ³ (18,750 m ³)	603,600.40 ft ³ (17,092.06 m ³)	348,299.73 ft ³ (9,862.75 m ³)
Panel 4	CH TRU	662,150 ft ³ (18,750 m ³)	503,500.27 ft ³ (14,257.54 m ³)	367,973.88 ft ³ (10,419.86 m ³)
	RH TRU	12,570 ft ³ (356 m ³)	6,223.15 ft ³ (176.22 m ³)	2,974.91 ft ³ (84.24 m ³)
Panel 5	CH TRU	662,150 ft ³ (18,750 m ³)	562,454.22 ft ³ (15,926.93m ³)	427,749.61 ft ³ (12,112.52 m ³)
	RH TRU	15,720 ft ³ (445 m ³)	8,297.53 ft ³ (234.96 m ³)	5,416.21 ft ³ (153.37 m ³)
Panel 6	CH TRU	662,150 ft ³ (18,750 m ³)	510,911.06 ft ³ (14,467.39 m ³)	403,569.65 ft ³ (11,427.82 m ³)
	RH TRU	18,860 ft ³ (534 m ³)	7,578.53 ft ³ (214.60 m ³)	3,990.20 ft ³ (112.99 m ³)
Panel 7	CH TRU	662,150 ft ³ (18,750 m ³)		
	RH TRU	22,950 ft ³ (650 m ³)		
Panel 8	CH TRU	662,150 ft ³ (18,750 m ³)		

	RH TRU	22,950 ft ³ (650 m ³)		
<u>Panel 11</u>	<u>CH TRU</u>	<u>662,150 ft³</u> <u>(18,750 m³)</u>		
	<u>RH TRU</u>	<u>22,950 ft³</u> <u>(650 m³)</u>		
<u>Panel 12</u>	<u>CH TRU</u>	<u>662,150 ft³</u> <u>(18,750 m³)</u>		
	<u>RH TRU</u>	<u>22,950 ft³</u> <u>(650 m³)</u>		
Total	CH TRU	5,244,9006,569,200 ft³ (148,500186,000 m³)		
	RH TRU	93,050138,950 (2,6353,935 m³)		

¹ The area of each panel is approximately 124,150 ft² (11,533 m²).

² “Maximum TRU Mixed Waste Capacity” is the maximum TRU mixed waste volume that may be emplaced in each panel. This volume is calculated based on the gross internal volume of the outermost disposal containers.

³ Final TRU Mixed Waste Volume is calculated based on the gross internal volume of the outermost disposal containers. The volume listed here is reported pursuant to Permit Part 6, Section 6.10.1.

⁴ Final LWA TRU Waste Volume is calculated based on the volume of TRU waste inside a disposal container. The volume listed here is tracked and reported by the DOE internally pursuant to the WIPP Land Withdrawal Act total capacity limit of 6.2 million ft³ (175,564 m³) of TRU waste (Pub. L. 102-579, as amended) and is included here for informational purposes. A link to the LWA TRU Waste Volume is posted on www.wipp.energy.gov.

Note: The final TRU mixed waste and final LWA TRU waste volumes in Table 4.1.1 are reported to the nearest hundredth ft³ and m³.

4.4 VOLATILE ORGANIC COMPOUND LIMITS

4.4.1 Room-Based Limits

The measured concentration of VOCs in any open (active) room and in each closed room in active panels within an Underground HWDUs s Panels 1-8 shall not exceed the limits specified in Table 4.4.1 below:

Table 4.4.1 - VOC Room-Based Limits <u>for Panels 1-8</u>	
Compound	VOC Room-Based Concentration Limit (PPMV)
Carbon Tetrachloride	9,625
Chlorobenzene	13,000
Chloroform	9,930
1,1-Dichloroethylene	5,490
1,2-Dichloroethane	2,400
Methylene Chloride	100,000
1,1,2,2-Tetrachloroethane	2,960
Toluene	11,000
1,1,1-Trichloroethane	33,700
Trichloroethylene	48,000

There are no maximum concentration limits for other VOCs.

The measured concentration of VOCs in any open (active) room and in each closed room in active panels within Underground HWDUs Panels 11-12 shall not exceed the limits specified in Table 4.4.2 below:

<u>Table 4.4.2 – VOC Room-Based Limits for Panels 11 and 12</u>	
<u>Compound</u>	<u>VOC Room-Based Concentration Limit (PPMV)</u>
<u>Carbon Tetrachloride</u>	<u>5,775</u>
<u>Chlorobenzene</u>	<u>13,000</u>
<u>Chloroform</u>	<u>5,958</u>
<u>1,1-Dichloroethylene</u>	<u>3,294</u>
<u>1,2-Dichloroethane</u>	<u>1,440</u>
<u>Methylene Chloride</u>	<u>60,000</u>
<u>1,1,2,2-Tetrachloroethane</u>	<u>1,776</u>
<u>Toluene</u>	<u>11,000</u>
<u>1,1,1-Trichloroethane</u>	<u>20,220</u>
<u>Trichloroethylene</u>	<u>28,800</u>

There are no maximum concentration limits for other VOCs.

4.5 DESIGN, CONSTRUCTION, AND OPERATION REQUIREMENTS

4.5.2. Repository Construction

4.5.2.1. Construction Requirements

Subject to Permit Section 4.5.1, the Permittees may excavate the following Underground HWDUs, as depicted in Permit Attachment A2, Figure A2-1, “Repository Horizon”, and specified in Section A2-2a(3), “Subsurface Structures (Underground Hazardous Waste Disposal Units (HWDUs))”:

- Panel 10 (Disposal area access drift)
- Panel 2
- Panel 9 (Disposal area access drift)
- Panel 3
- Panel 4
- Panel 5
- Panel 6
- Panel 7
- Panel 8
- Panel 11
- Panel 12

4.6.3 Disposal Room Volatile Organic Compound Monitoring

4.6.3.2 Notification Requirements

The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the concentration of any VOC specified in either Table 4.4.1 or Table 4.4.2, as appropriate, in any closed room in an active panel, or in the immediately adjacent closed room, exceeds the action levels specified in Table 4.6.3.2 or Table 4.6.3.3, as appropriate, below. The Permittees shall post a link to the exceedance notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

Table 4.6.3.2 - Action Levels for Disposal Room Monitoring in Panels 1-8

Compound	50% Action Level for VOC Constituents of Concern in Any Closed Room, ppmv	95% Action Level for VOC Constituents of Concern in Active Open or Immediately Adjacent Closed Room, ppmv
Carbon Tetrachloride	4,813	9,145
Chlorobenzene	6,500	12,350
Chloroform	4,965	9,433
1,1-Dichloroethylene	2,745	5,215
1,2-Dichloroethane	1,200	2,280
Methylene Chloride	50,000	95,000
1,1,2,2-Tetrachloroethane	1,480	2,812
Toluene	5,500	10,450
1,1,1-Trichloroethane	16,850	32,015
Trichloroethylene	24,000	45,600

<u>Table 4.6.3.3 - Action Levels for Disposal Room Monitoring in Panels 11-12</u>		
<u>Compound</u>	<u>50% Action Level for VOC Constituents of Concern in Any Closed Room, ppmv</u>	<u>95% Action Level for VOC Constituents of Concern in Active Open or Immediately Adjacent Closed Room, ppmv</u>
<u>Carbon Tetrachloride</u>	<u>2,887</u>	<u>5,486</u>
<u>Chlorobenzene</u>	<u>6,500</u>	<u>12,350</u>
<u>Chloroform</u>	<u>2,979</u>	<u>5,660</u>
<u>1,1-Dichloroethylene</u>	<u>1,647</u>	<u>3,129</u>
<u>1,2-Dichloroethane</u>	<u>720</u>	<u>1,368</u>
<u>Methylene Chloride</u>	<u>30,000</u>	<u>57,000</u>
<u>1,1,2,2-Tetrachloroethane</u>	<u>888</u>	<u>1,687</u>
<u>Toluene</u>	<u>5,500</u>	<u>10,450</u>
<u>1,1,1-Trichloroethane</u>	<u>10,110</u>	<u>19,209</u>
<u>Trichloroethylene</u>	<u>14,400</u>	<u>27,360</u>

4.6.3.3. Remedial Action

Upon receiving validated analytical results that indicate one or more of the VOCs specified in Table 4.4.1 for Panels 1-8, or Table 4.4.2 for Panels 11-12, in any of the closed rooms in an active panel has reached the “50% Action Level” in Table 4.6.3.2 for Panels 1-8, or Table 4.6.3.3 for Panels 11-12, the sampling frequency for such closed rooms will increase to once per week. The once per week sampling will continue either until the concentrations in the closed room(s) fall below the “50% Action Level” in either Table 4.6.3.2 or Table 4.6.3.3 as appropriate, or until closure of Room 1 of the panel, whichever occurs first. If one or more of the VOCs in Table 4.4.1 for Panels 1-8 or Table 4.4.2 for Panels 11-12, in the active open room or immediately adjacent closed room reaches the “95% Action Level” in Table 4.6.3.2 or Table 4.6.3.3 as appropriate, another sample will be taken to confirm the existence of such a condition. If the second sample confirms that one or more of VOCs in the immediately adjacent closed room have reached the “95% Action Level” in Table 4.6.3.2 or Table 4.6.3.3 as appropriate, the active open room will be abandoned, ventilation barriers will be installed as specified in Permit Section 4.5.3.3, waste emplacement will proceed in the next open room, and monitoring of the subject closed room will continue at a frequency of once per week until commencement of panel closure. Alternatively, prior to reaching these action levels, the Permittees may propose an alternative remedial action plan to the Secretary. The Permittees may implement such plans in lieu of closing and abandoning the active room only after approval by the Secretary.

PART 7 - POST-CLOSURE CARE PLAN

7.2 UNIT IDENTIFICATION

The Permittees shall provide post-closure care for the closed Underground HWDUs (~~eight~~ ten panels ~~and two access drifts~~), and for the facility after final closure, as specified in Permit Attachment H (Post-Closure Plan) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.110(b)).

ATTACHMENT A

GENERAL FACILITY DESCRIPTION AND PROCESS INFORMATION

A-4 Facility Type

The underground structures include the underground Hazardous Waste Disposal Units (**HWDUs**), an area for future underground HWDUs, the shaft pillar area, interconnecting drifts and other areas unrelated to the Hazardous Waste Facility Permit. The underground HWDUs are defined as waste panels, each consisting of seven rooms and two access drifts. The WIPP underground area is designated as Panels 1 through 40~~12~~, although only Panels 4-~~7~~ through ~~8~~12 will be used under the terms of this permit, because Panels 1-6 are filled and closed. Each of the seven rooms is approximately 300 feet long, 33 feet wide and 13 feet high. Part 4 of the permit authorizes the management and disposal of CH and RH TRU mixed waste containers in underground HWDUs. The Disposal Phase consists of receiving CH and RH TRU mixed waste shipping containers, unloading and transporting the waste containers to the underground HWDUs, emplacing the waste in the underground HWDUs, and subsequently achieving closure of the underground HWDUs in compliance with applicable State and Federal regulations. As required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601), the Permittees shall ensure that the environmental performance standards for a miscellaneous unit, which are applied to the underground HWDUs in the geologic repository, will be met. Permit Attachment A2 describes the underground HWDUs, the TRU mixed waste management facilities and operations, and compliance with the technical requirements of 20.4.1.500 NMAC.

ATTACHMENT A2

GEOLOGIC REPOSITORY

A2-1 Description of the Geologic Repository

The WIPP geologic repository is mined within a 2,000-foot (ft) (610-meters (m))-thick bedded-salt formation called the Salado Formation. The Underground HWDUs (miscellaneous units) are located 2,150 ft (655 m) beneath the ground surface. TRU mixed waste management activities underground will be confined to the southern portion of the 120-acre (48.6 hectares) mined area and the western portion of the 29.2-acre (11.8 hectares) mined area during the Disposal Phase. During the term of this Permit, disposal of TRU mixed waste ~~will occur only~~ is authorized in the HWDUs designated as Panels 5 through 8, 7, 8, 11, and 12 ~~and in any currently active panel~~ (See Figure A2-1). ~~RH TRU mixed waste disposal began in Panel 4. The Permittees may also request in the future a Permit to allow disposal of containers of TRU mixed waste in the areas designated as Panels 9 and 10 in Figure A2-1. This Permit, during its 10-year term, authorizes the excavation of Panels 6 through 10 and the disposal of waste in Panels 1 through 8.~~ In the future, the Permittees may request Permit modifications to allow disposal of TRU mixed waste in other areas of the underground, one of which may be Panel 10.

Panels 1 through 8, 11, and 12 will consist of seven rooms and two access drifts each. ~~Panels 9 and 10 have yet to be designed.~~ Access drifts connect the rooms and have the same cross section (see Section A2-2a(3)). The closure system installed in each HWDU after it is filled will prevent anyone from entering the HWDU and will restrict ventilation airflow. The point of compliance for air emissions from the Underground is defined in Permit Attachment N (Volatile Organic Compound Monitoring Plan). The point of compliance is the location where the concentration of volatile organic compounds (VOCs) in the air emissions from the Underground HWDUs will be measured and then compared to the VOC action levels (10^{-5} for carcinogens and $HI > 1$ for non-carcinogens) as required by Permit Part 4, Section 4.6.2.3.

Four shafts connect the underground area with the surface. The Waste Shaft Conveyance headframe and hoist are located within the Waste Handling Building (**WHB**) and will be used to transport containers of TRU mixed waste, equipment, and materials to the repository horizon. The waste hoist can also be used to transport personnel. The Air Intake Shaft and the Salt Handling Shaft provide ventilation to all areas of the mine except for the Waste Shaft Station. This area is ventilated by the Waste Shaft itself. The Salt Handling Shaft is also used to hoist mined salt to the surface and serves as the principal personnel transport shaft. The Exhaust Shaft serves as a common exhaust air duct for all areas of the mine. In some cases (such as during mining activities), the Salt Handling Shaft will be used as an unfiltered exhaust shaft. The Salt Shaft exhaust air will come from the North or Construction Circuits (*i.e.*, areas of the underground that are not contaminated and do not need High-Efficiency Particulate Air (**HEPA**) filtration). The relationship between the WIPP surface facility, the four shafts, and the geologic repository horizon is shown on Figure A2-2.

The HWDUs identified as Panels 1 through 8, 11 and 12 (Figure A2-1) provide room for up to ~~5,244,900~~ 6,569,200 cubic feet (ft^3) (~~148,500~~ 186,000 cubic meters (m^3)) of CH TRU mixed waste. The CH TRU mixed waste containers may be stacked up to three high across the width of the room.

Panels 4 through 8, 11 and 12 provide room for up to ~~93,050~~ 138,950 ft^3 (~~2,635~~ 3,935 m^3) of RH TRU mixed waste. RH TRU mixed waste may be disposed of in up to 730 boreholes per panel,

subject to the limitations in Permit Part 4, Section 4.1.1.2.ii. These boreholes shall be drilled on nominal eight-foot centers, horizontally, about mid-height in the ribs of a disposal room. The thermal loading from RH TRU mixed waste shall not exceed 10 kilowatts per acre when averaged over the area of a panel, as shown in Permit Attachment A3, plus 100 feet of each of a Panel's adjoining barrier pillars for Panels 4 through 8, and 150 feet of each of a Panel's adjoining barrier pillars for Panels 11 and 12.

A2-2a(3) Subsurface Structures

Underground Hazardous Waste Disposal Units (HWDUs)

During the terms of this and the preceding Permit, the TRU mixed waste volume emplaced in the repository will not exceed the maximum capacities listed in Permit Part 4, Table 4.1.1 for each HWDU. CH TRU mixed waste will be disposed of in Underground HWDUs identified as Panels 1 through 8, 11, and 12. RH TRU mixed waste may be disposed of in Panels 4 through 8, 11, and 12.

Main entries and cross cuts in the repository provide access and ventilation to the HWDUs. The main entries link the shaft pillar/service area with the TRU mixed waste management area and are separated by pillars. Each of the Underground HWDUs labeled Panels 1 through 8, 11, and 12 will have seven rooms. The locations of these HWDUs are shown in Figure A2-1. The rooms will have nominal dimensions of 13 ft (4.0 m) or 14 ft (4.3 m) high by 33 ft (10 m) wide by 300 ft (91 m) long and will be supported by 100 ft- (30 m-) wide pillars-

As currently planned, future Permits may allow disposal of TRU mixed waste containers in ~~two~~ additional panels, ~~identified as Panels 9 and~~ one of which may be Panel 10. Disposal of TRU mixed waste in Panels ~~9 and~~ 10 is prohibited under this Permit. If TRU mixed waste volumes disposed of in ~~the eight panels~~ Panels 1 through 8 fail to reach the stated design capacity, the Permittees may request a Permit modification to allow disposal of TRU mixed waste in the four main entries and crosscuts adjacent to the waste panels (referred to as the disposal area access drifts). These ~~areas~~ access drifts are labeled Panels ~~9 and~~ 10 in Figure A2-1. A ~~permit modification or~~ future permit modification request would be submitted describing the condition of those drifts and the controls exercised for personnel safety and environmental protection while disposing of waste in these ~~areas~~ access drifts. These ~~areas~~ access drifts have the following nominal dimensions:

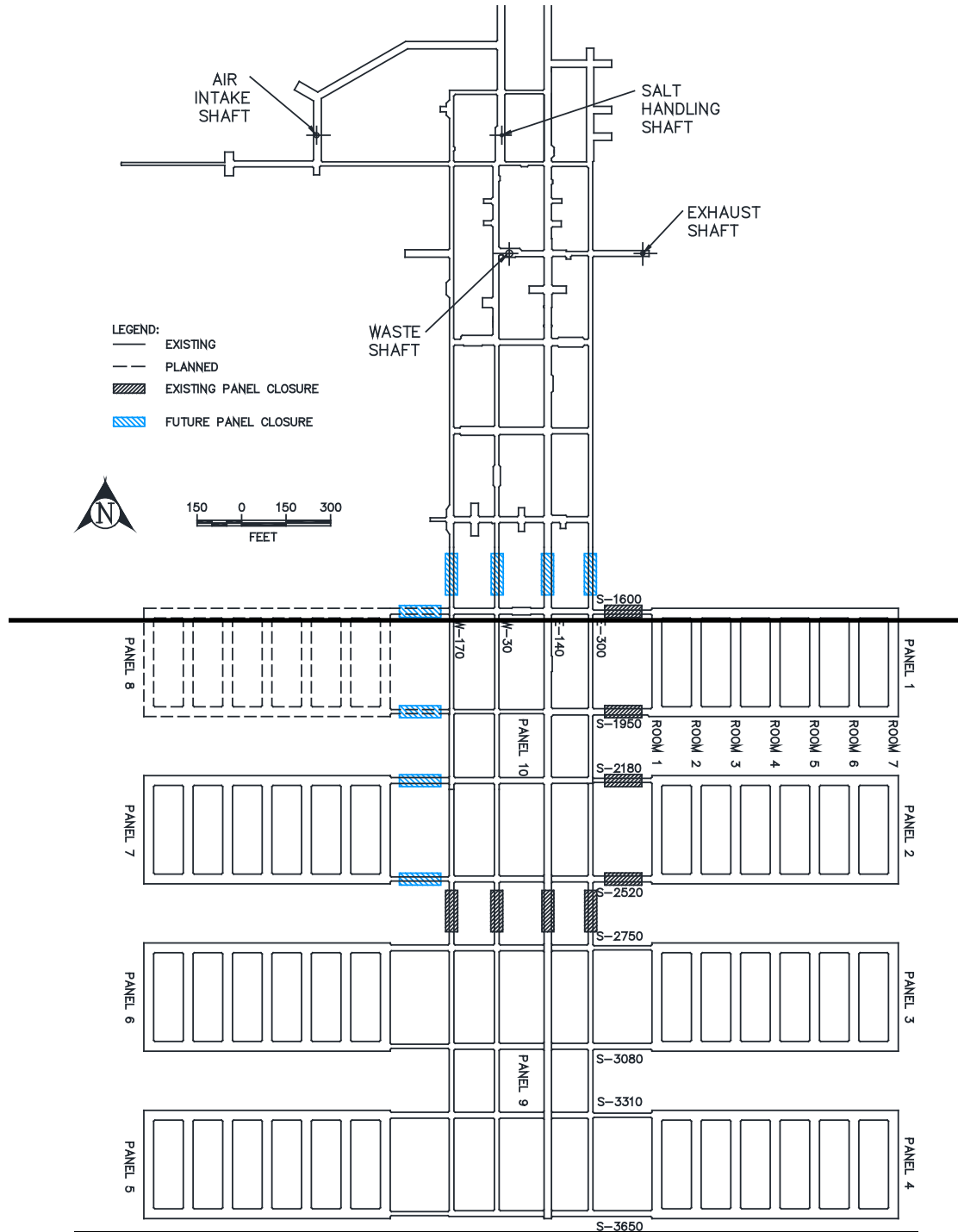
- The E-140 waste transport route south of the Waste Shaft Station is mined to be 25 ft wide nominally and its height ranges from about 14 ft to 20 ft.
- The W-30 waste transport route south of S-700 is mined to be 20 ft wide nominally and its height ~~will be~~ is mined to at least 14 ft.
- ~~All other~~ Other drifts that are part of the waste transport route ~~will be~~ are at least 20 ft wide and 14 ft high to accommodate waste transport equipment.
- Other drifts (i.e. mains and cross-cuts) vary in width and height according to their function typically ranging from 14 ft to 20 ft wide and 12 ft to 20 ft high.

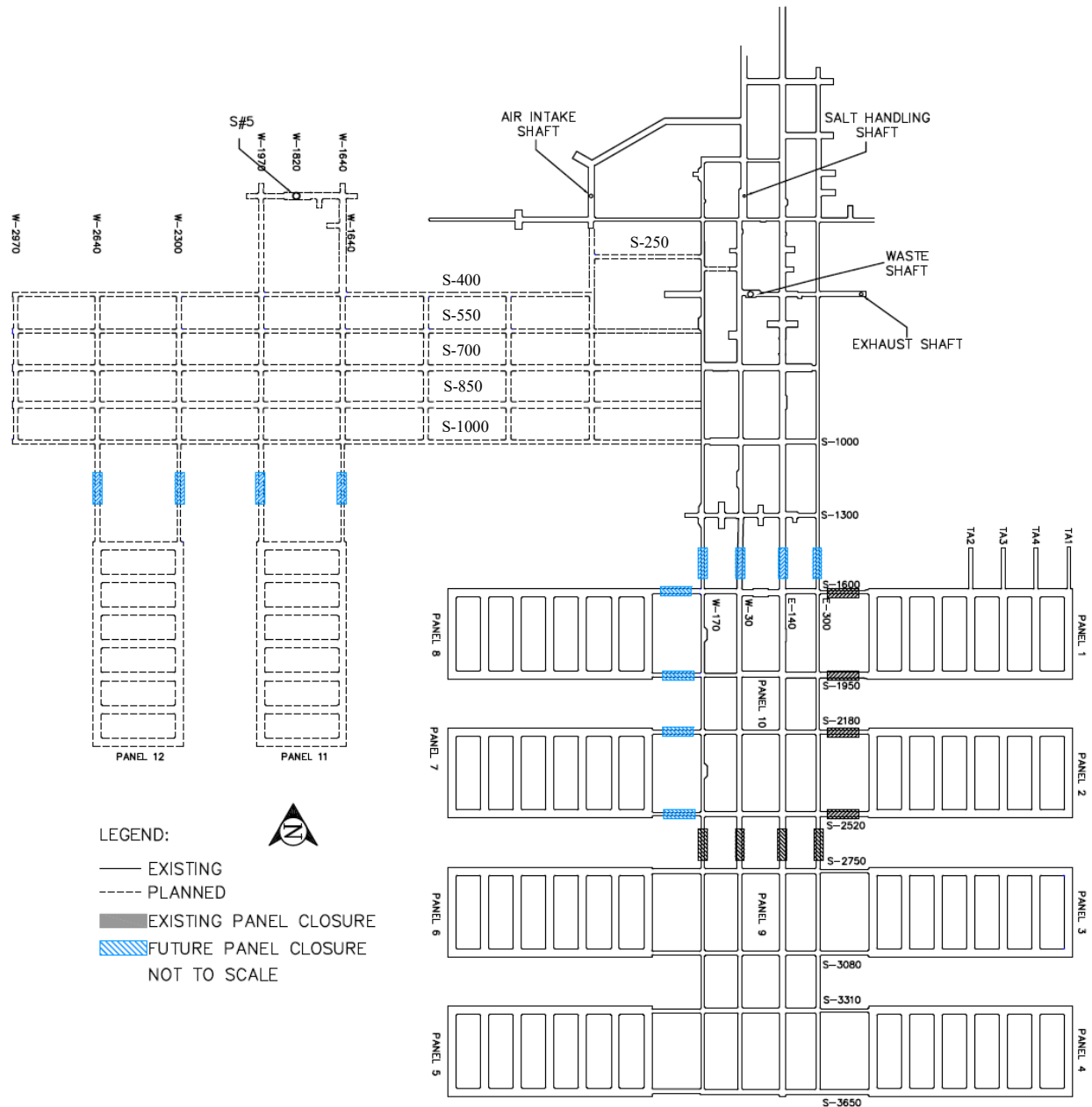
CH TRU Mixed Waste Emplacement

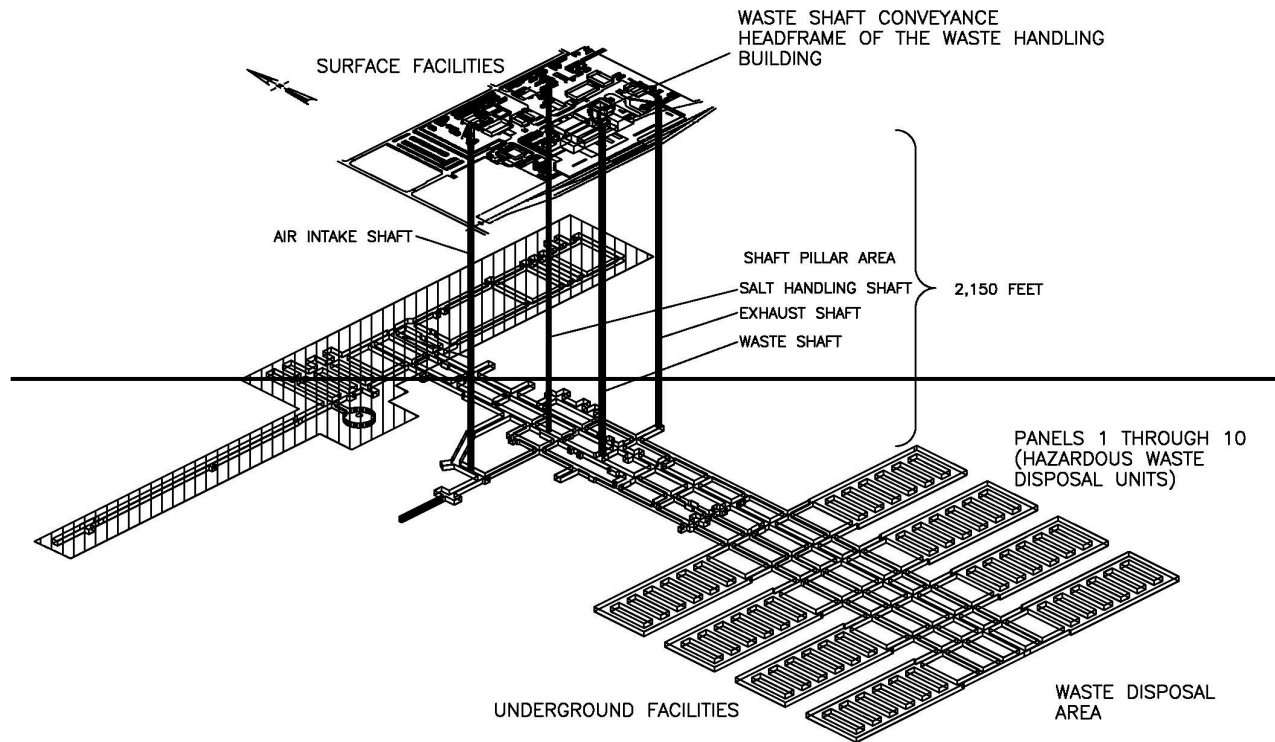
The anticipated schedule for the filling of each of the ~~Underground~~-underground HWDUs known as Panels 1 through 8, 11, and 12, is shown in Permit Attachment G, Table G-1. Panel closure in accordance with the Closure Plan in Permit Attachment G and Permit Attachment G1 is estimated to require an additional 150 days.

A2-5b(2)(a) Description of the Geomechanical Monitoring System

The minimum instrumentation for each of the ~~eight~~-ten panels ~~will be~~is one borehole extensometer installed in the roof at the center of each disposal room. The roof extensometers will monitor the dilation of the immediate salt roof beam and possible bed separations along clay seams. Additional instrumentation will be installed as conditions warrant.







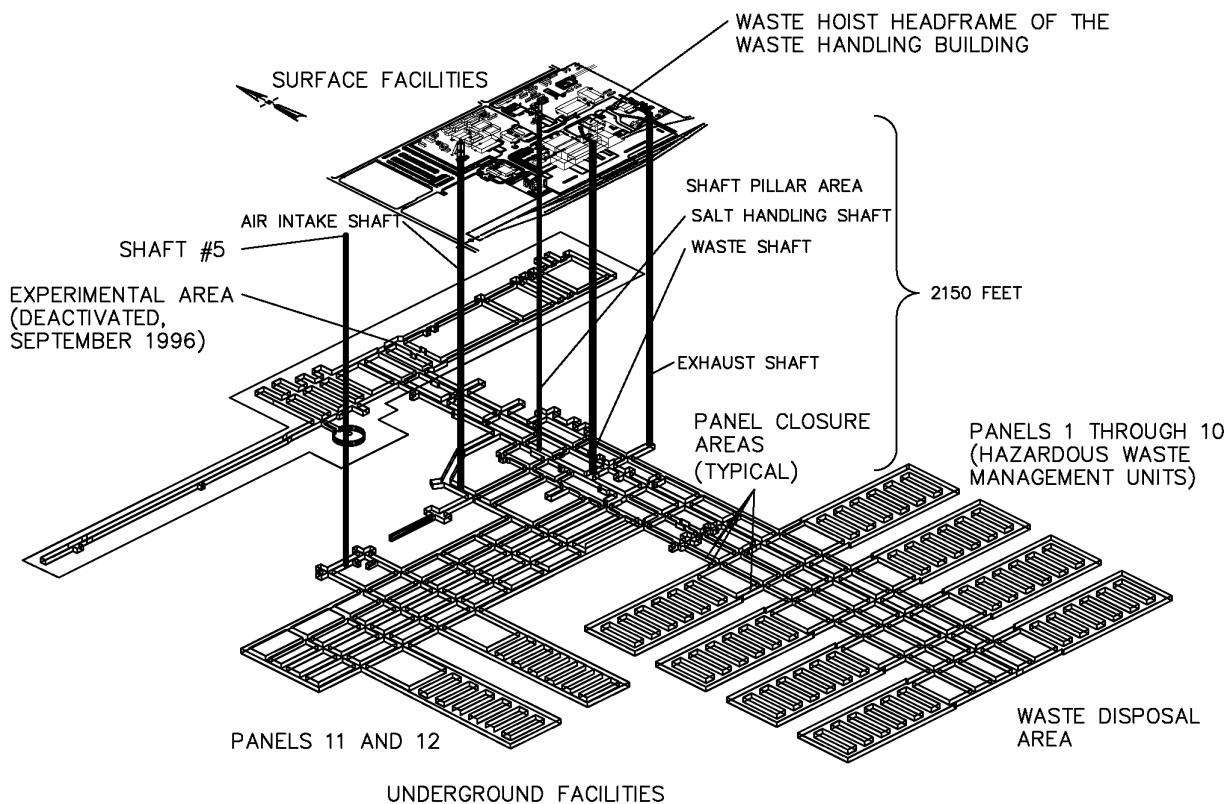
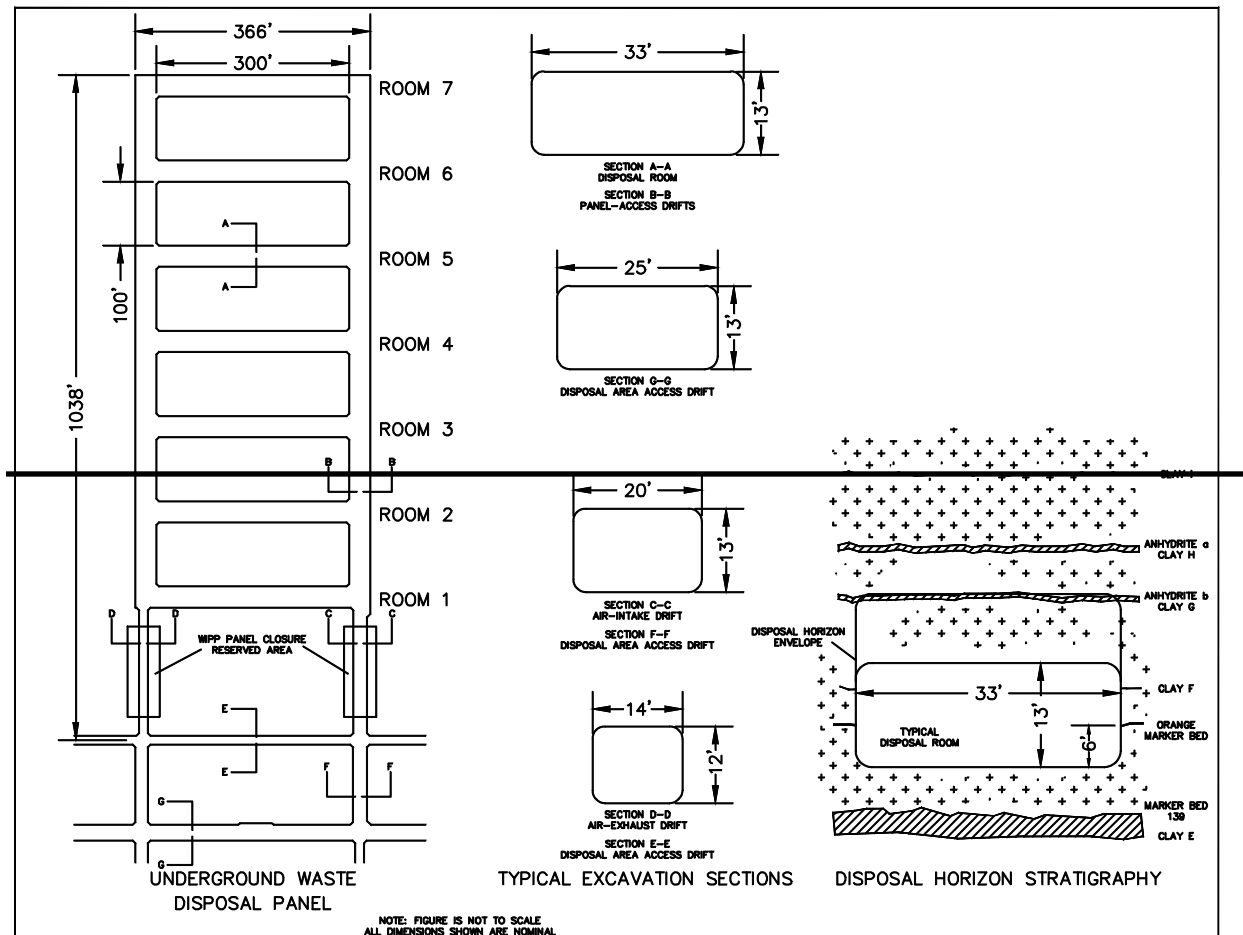
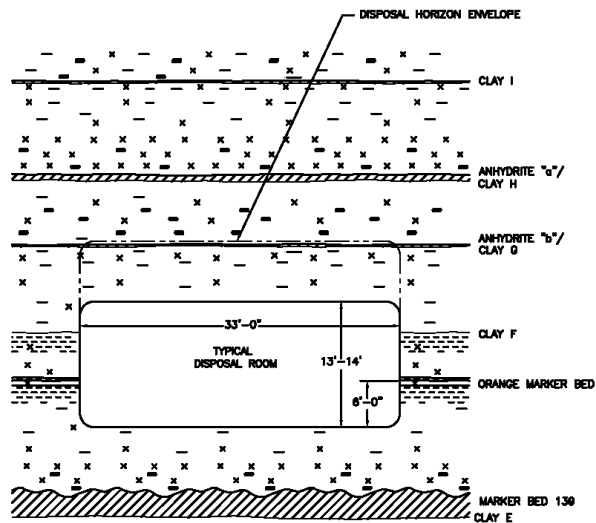


Figure A2-2
Spatial View of the Miscellaneous Unit and Waste Handling Facility

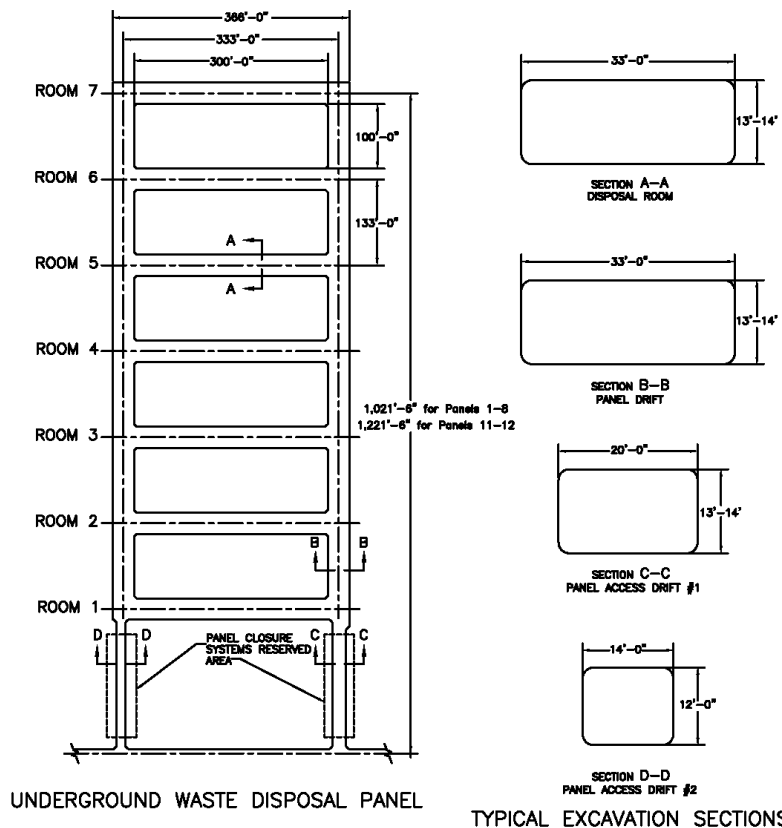
ATTACHMENT A3

TYPICAL DISPOSAL PANEL





DISPOSAL HORIZON



NOTE: FIGURE IS NOT TO SCALE
ALL DIMENSIONS SHOWN ARE NOMINAL

Typical Disposal Panel

ATTACHMENT A4

TRAFFIC PATTERNS

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Figure A4-3	Waste Transport Routes in Waste Handling Building - Container Storage Unit
Figure A4-3a	Typical Transport Route for TRUPACT-II and Standard Large Box 2
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Figure A4-4	Typical Underground Transport Route Using E-140
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Figure A4-5	RH Bay Waste Transport Routes
Figure A4-6	RH Bay Cask Loading Room Waste Transport Route
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A4-4 Underground Traffic

Typically, the traffic routes during waste disposal in all Panels 1-8 will use the same main access drifts, while the traffic routes during waste disposal in Panels 11 and 12 will use the designated access drifts in the West Mains.

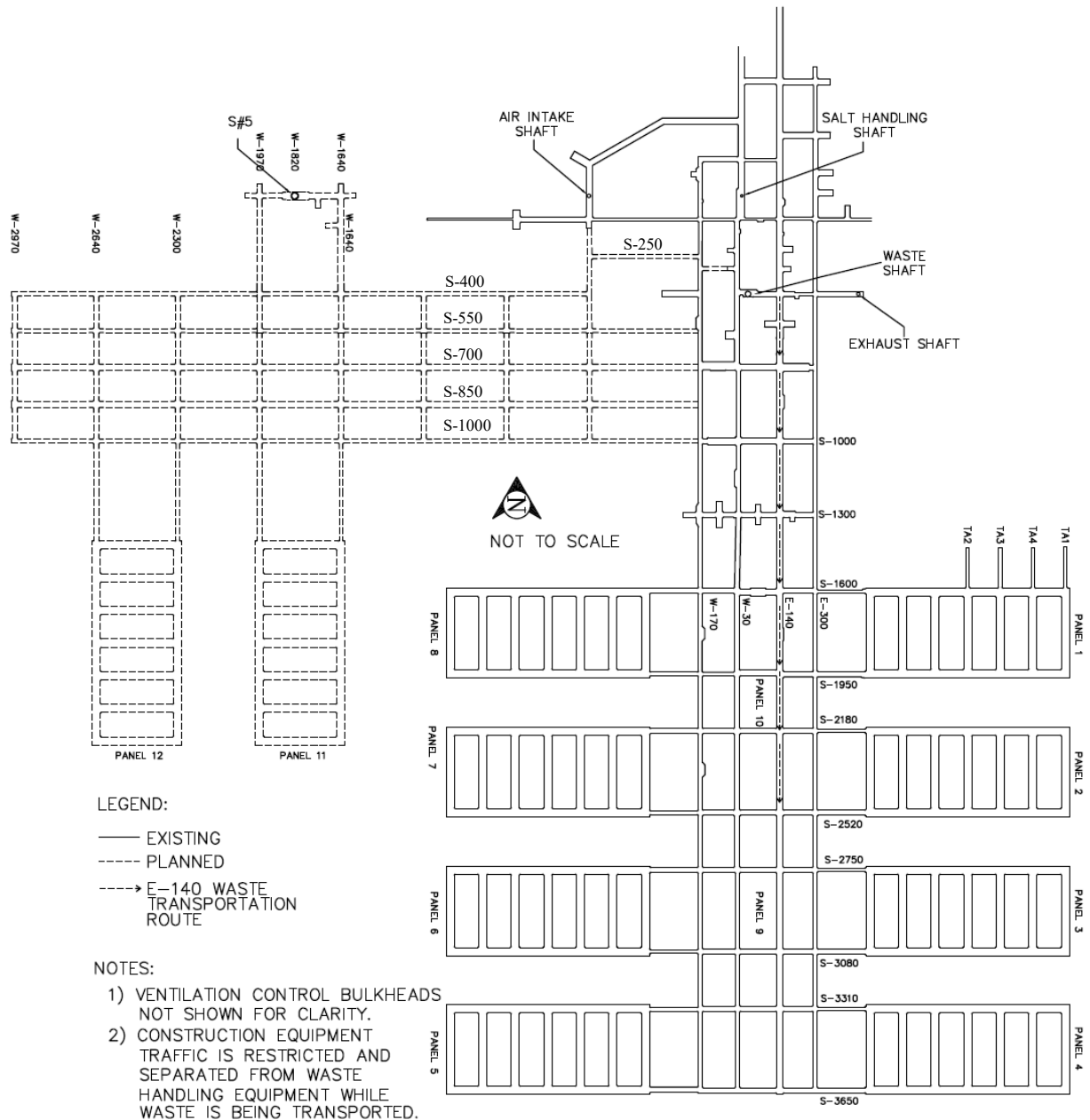
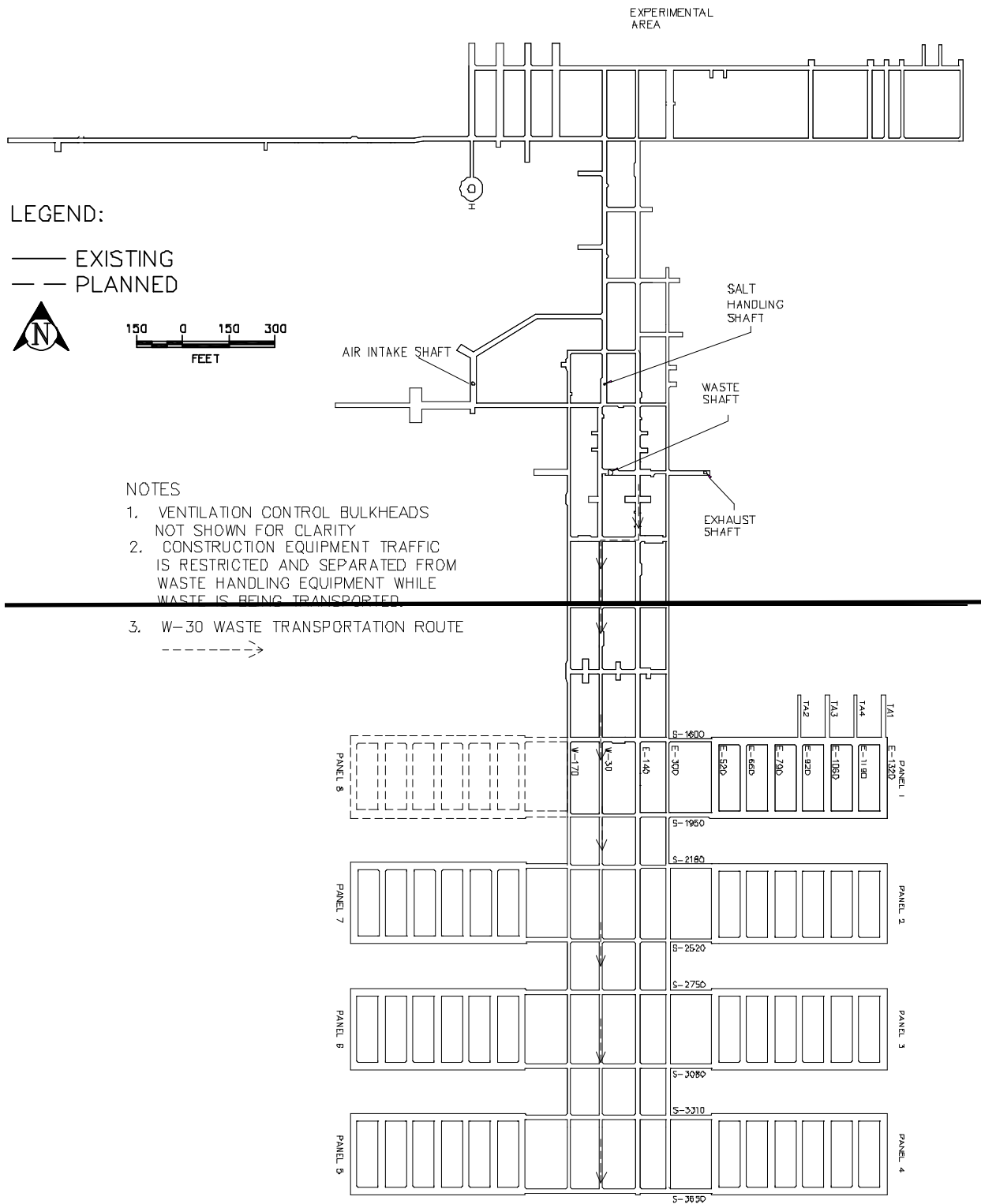


Figure A4-4
Typical Underground Transport Route Using E-140



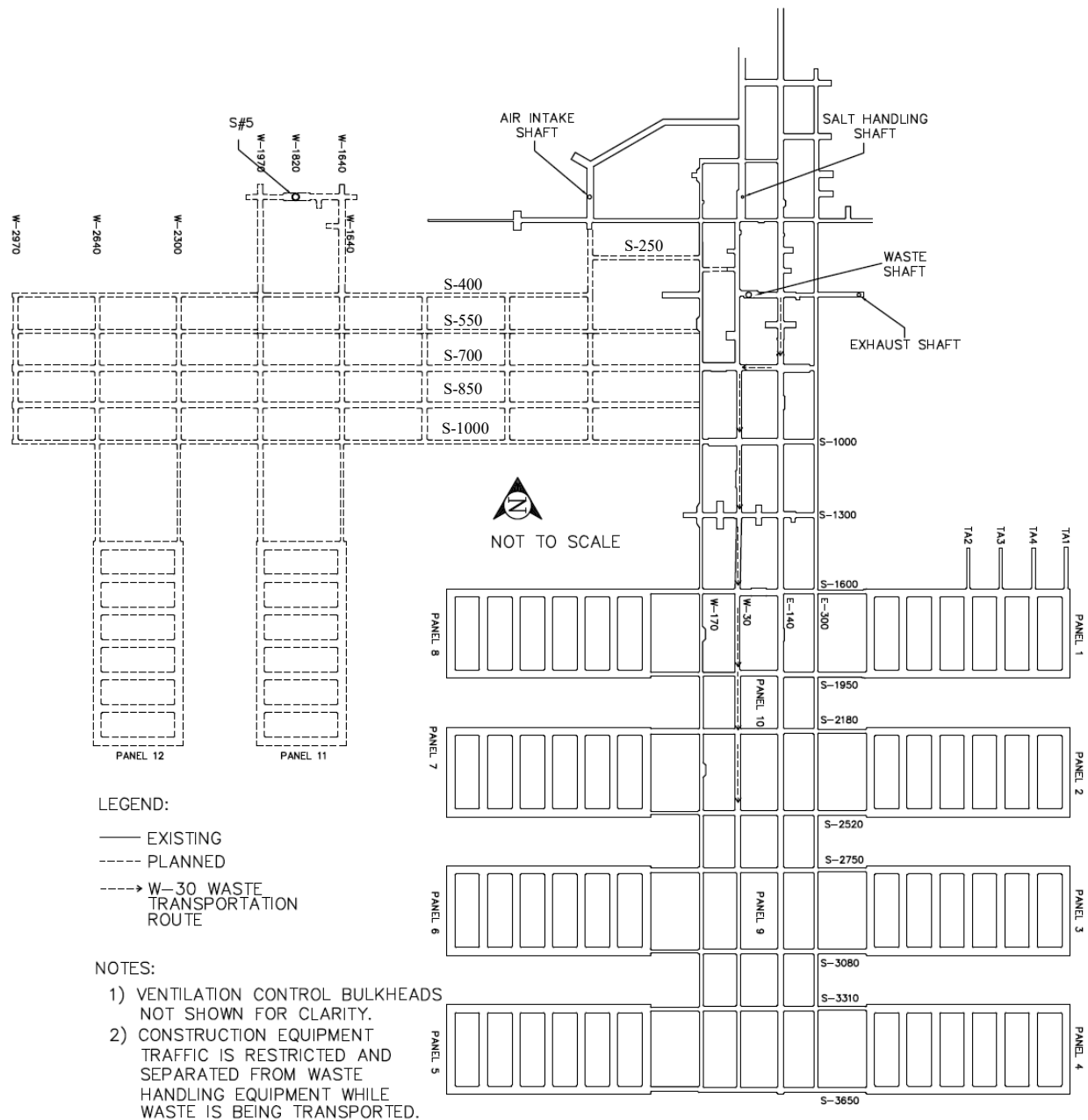


Figure A4-4a
Typical Underground Transport Route Using W-30

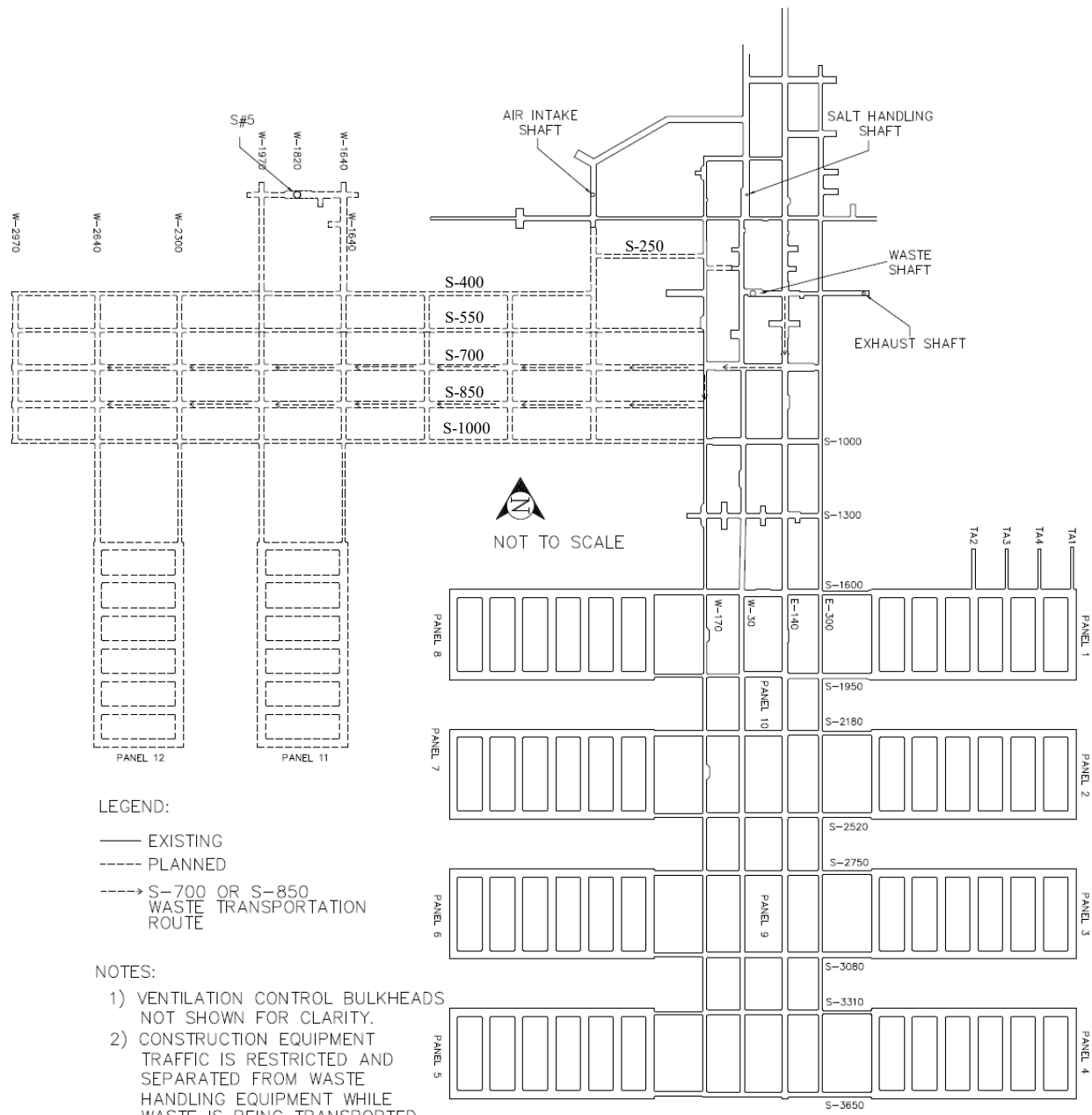


Figure A4-4b
Typical Underground Transport Route Using S-700 or S-850

ATTACHMENT B **HAZARDOUS WASTE PERMIT APPLICATION PART A**

EPA ID Number: NM4890139088

Hazardous Waste Permit Part A Form

6. Process Codes and Design Capacities (continued)

Line Numbers	A. Process Code				B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
					(1) Amount	(2) Unit of Measure		
5	X	0	4		19284.00	C	001	Panel 6
6	X	0	4		19400.00	C	002	Panels 7 and 8
<u>7</u>	<u>X</u>	<u>0</u>	<u>4</u>		<u>19400.00</u>	<u>C</u>	<u>002</u>	<u>Panels 11 and 12</u>
7	S	0	1		194.1	C	001	Waste Handling Building Unit
8	S	0	1		242.0	C	001	Parking Area Unit

Hazardous Waste Permit Part A Form

Narrative to Item 6. Process Codes and Design Capacities

The Waste Isolation Pilot Plant (WIPP) geologic repository is defined as a “miscellaneous unit” under 40 CFR §260.10. “Miscellaneous unit” means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of and that is not a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, containment building, boiler, industrial furnace, or underground injection well with appropriate technical standards under 40 CFR Part 146, corrective action management unit, or unit eligible for research, development, and demonstration permit under 40 CFR §270.65. The WIPP is a geologic repository designed for the disposal of defense-generated transuranic (TRU) waste. Some of the TRU wastes disposed of at the WIPP contain hazardous wastes as co-contaminants. More than half the waste to be disposed of at the WIPP also meets the definition of debris waste. The debris categories include manufactured goods, biological materials, and naturally occurring geological materials. Approximately 70 percent of waste anticipated for disposal in the WIPP repository is categorized as debris waste. The geologic repository has been divided into ten discrete hazardous waste management units (HWMU), ~~eight~~ ten of which are permitted for disposal under 40 CFR Part 264, Subpart X.

For purposes of this application, all TRU waste is managed as though it were mixed. During the Disposal Phase of the facility, which is expected to last 25 years, the emplaced TRU mixed waste volume will not exceed the design capacity specified in Item 6, *Process Codes and Design Capacities*. This volume is calculated based on the gross internal volume of the outermost disposal containers and cannot exceed ~~151,135~~ 189,935 m³ for Panels 1 through 8, 11, and 12. The Land Withdrawal Act (**LWA**) TRU waste volume is tracked and reported by the DOE internally for the purposes of compliance with the WIPP LWA total capacity limit for TRU waste of 6.2 million ft³ (175,564 m³), and is included for informational purposes in Permit Part 4, Table 4.1.1.

The process design capacities for each of the ~~eight~~ ten underground HWMUs in the geologic repository (i.e., miscellaneous unit) are shown in Item 6, *Process Codes and Design Capacities*. In addition, two HWMUs have been designated as container storage units (S01) in Item 6, *Process Codes and Design Capacities*. One is inside the Waste Handling Building (WHB) and consists of the contact-handled (CH) bay, waste shaft conveyance loading room, waste shaft conveyance entry room, RH bay, cask unloading room, hot cell, transfer cell, and facility cask loading room. This HWMU will be used for waste receipt, handling, and storage (including storage of derived waste) prior to emplacement in the underground geologic repository. No treatment or disposal will occur in this S01 HWMU. The capacity of this S01 unit for storage is 194.1 m³, based on 36 ten-drum overpacks on 18 facility pallets, four CH Packages at the TRUDOCKs, one standard waste box of derived waste, two loaded casks and one 55-gallon drum of derived waste in the RH Bay, one loaded cask in the Cask Unloading Room, 13 55-gallon drums in the Hot Cell, one canister in the Transfer Cell and one canister in the Facility Cask Unloading Room. The second S01 HWMU is the parking area outside the WHB where the Contact- and Remote-Handled Package trailers and the road cask trailers will be parked awaiting waste handling operations. The capacity of this unit is 50 Contact-Handled Packages and twelve Remote-Handled Packages with a combined TRU mixed waste volume of 242 m³.

EPA ID Number: NM4890139088

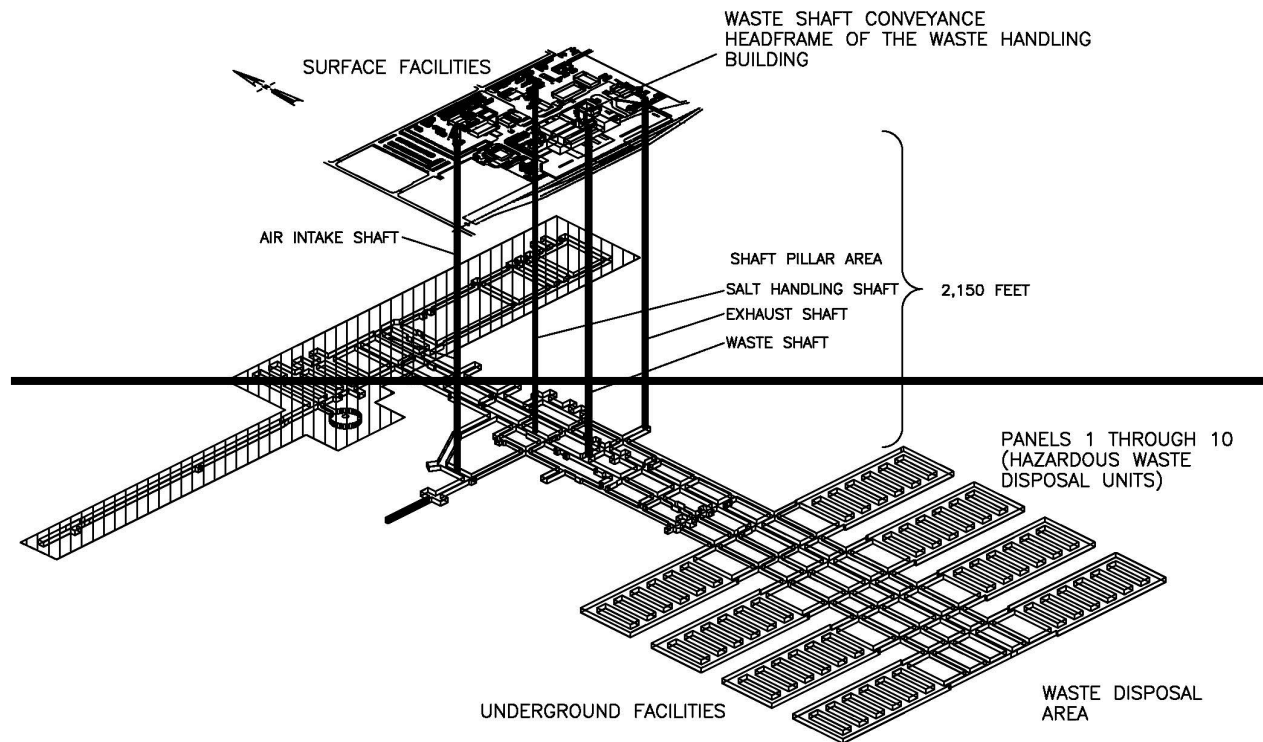
Hazardous Waste Permit Part A Form

Narrative to Item 6. Process Codes and Design Capacities (continued)

The HWMUs are shown in Figures B3-2, B3-3, and B3-4.

During the ten-year period of the permit, a CH TRU mixed waste volume of up to 148,500 m³ could be emplaced in Panels 1 to 8 and an RH TRU mixed waste volume up to 2,635 m³ could be emplaced in Panels 4 to 8 for a total of 151,135 m³, as shown in Item 6, Process Codes and Design Capacities. Panels 9 and 10 will be constructed under the initial term of this permit. These latter areas will not receive waste for disposal under this permit. Panels 11 and 12 will be constructed during the term of this permit. Each panel will be certified for a maximum CH TRU mixed waste volume of up to 18,750 m³ and a maximum RH TRU mixed waste volume of up to 650 m³.

**APPENDIX B3
FACILITIES**



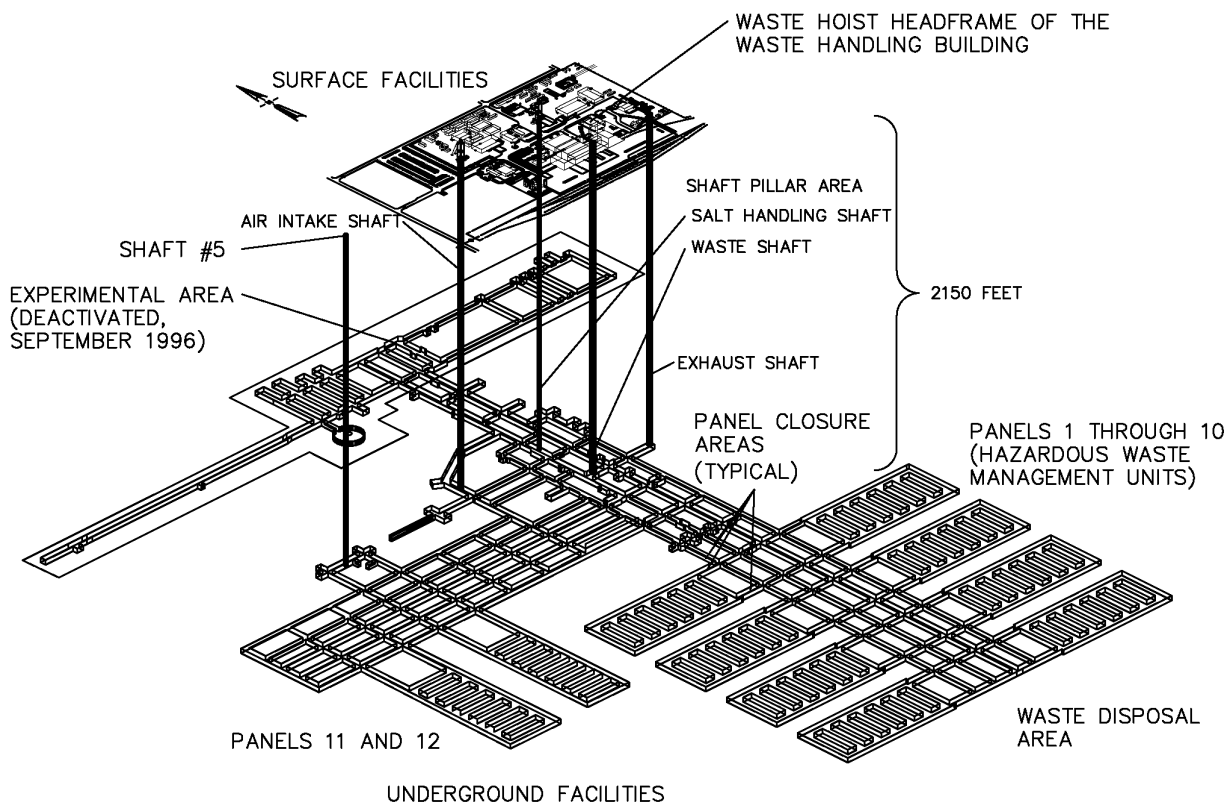
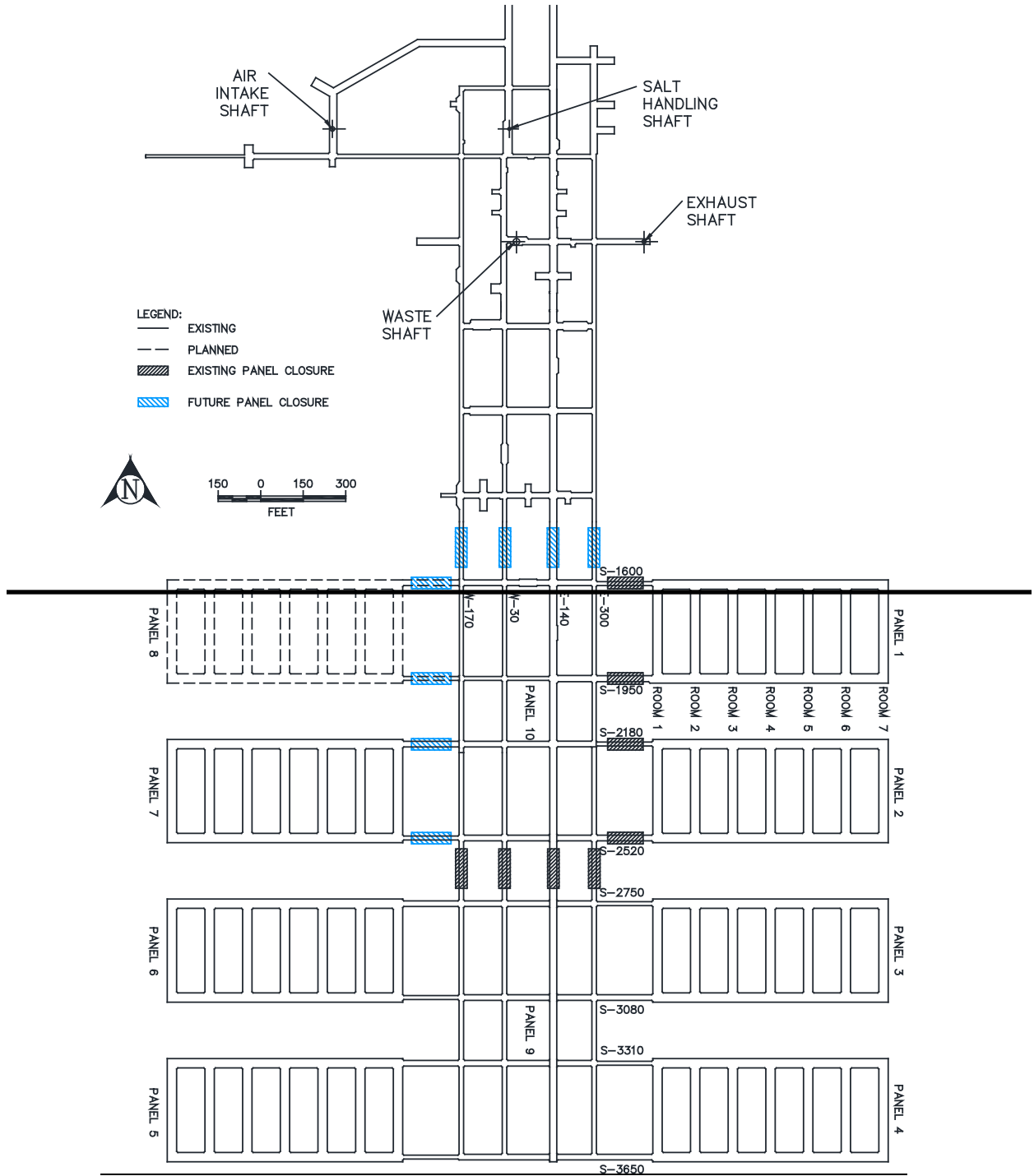


Figure B3-1
Spatial View of the WIPP Facility



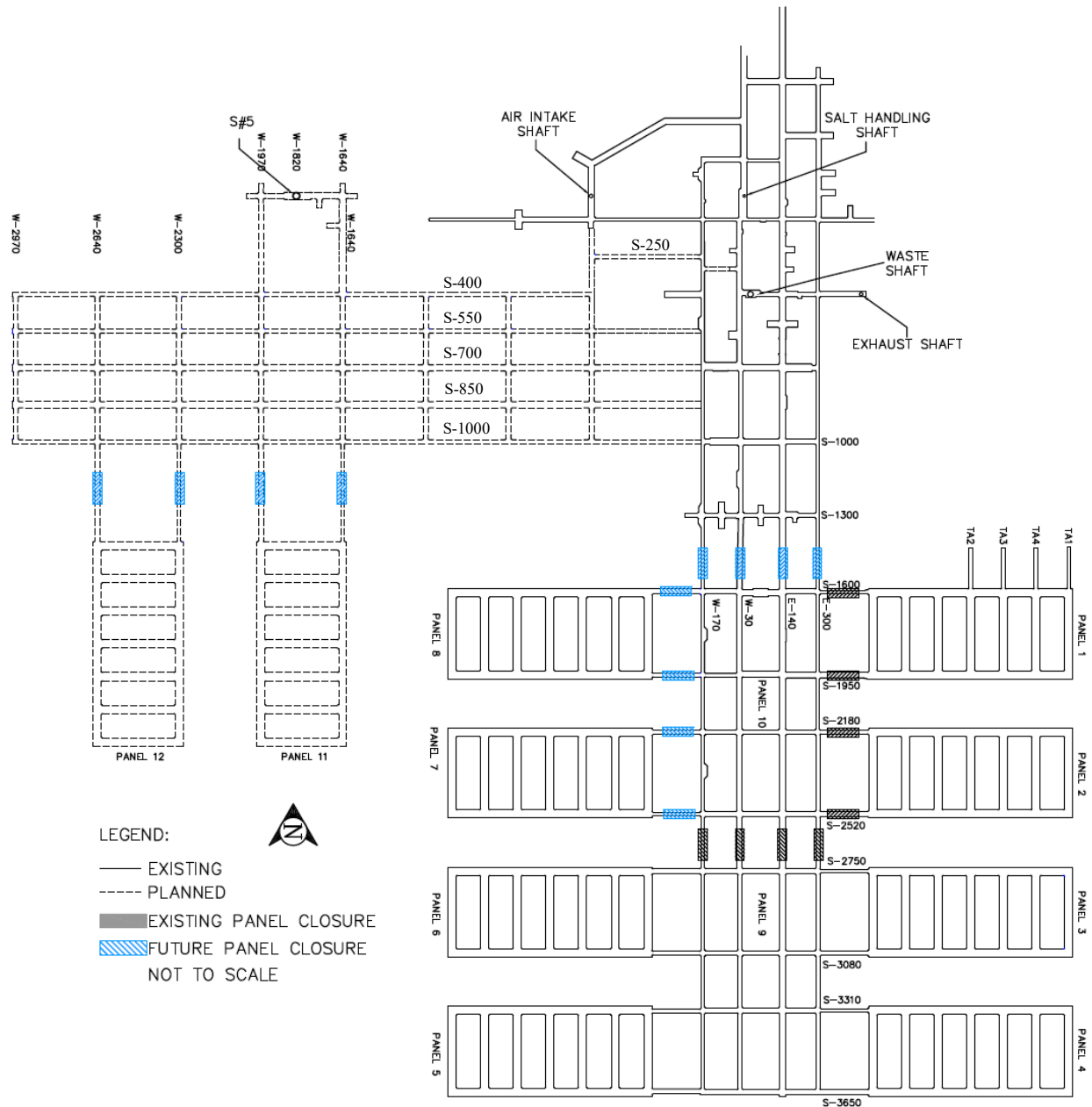
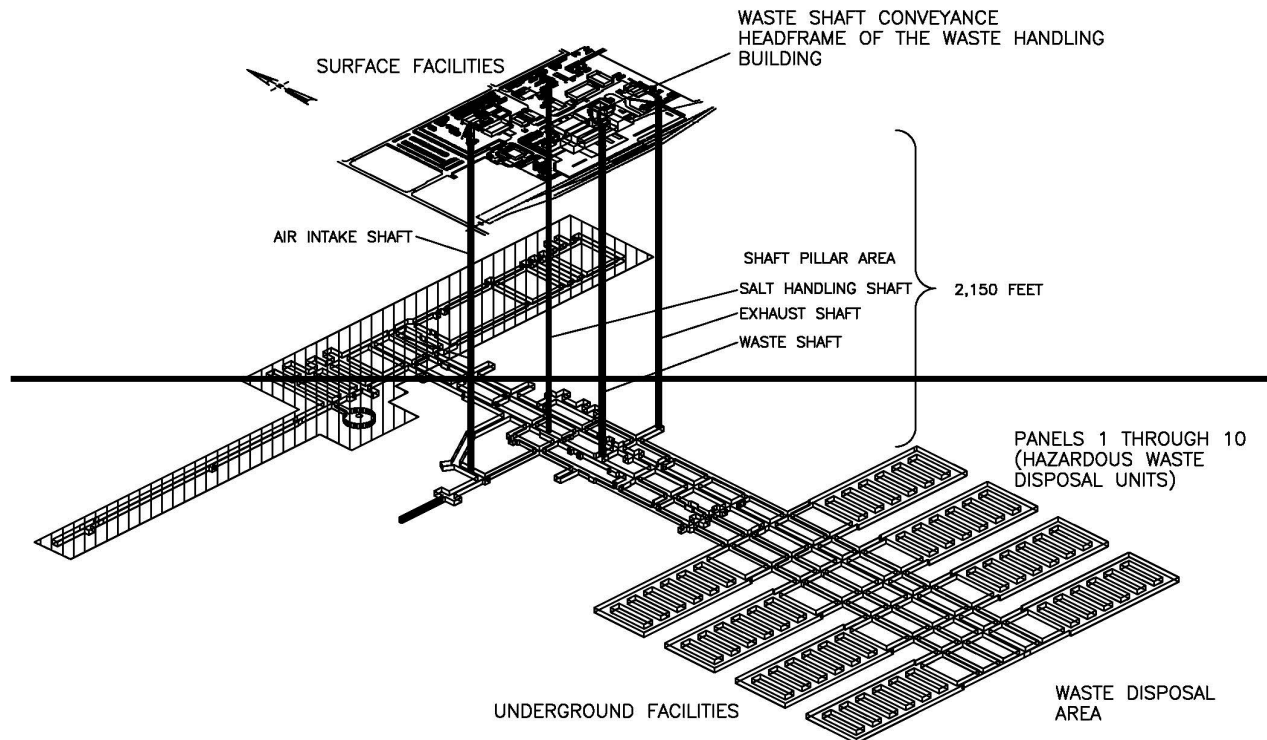


Figure B3-2
Repository Horizon

ATTACHMENT D
RCRA CONTINGENCY PLAN

FIGURES



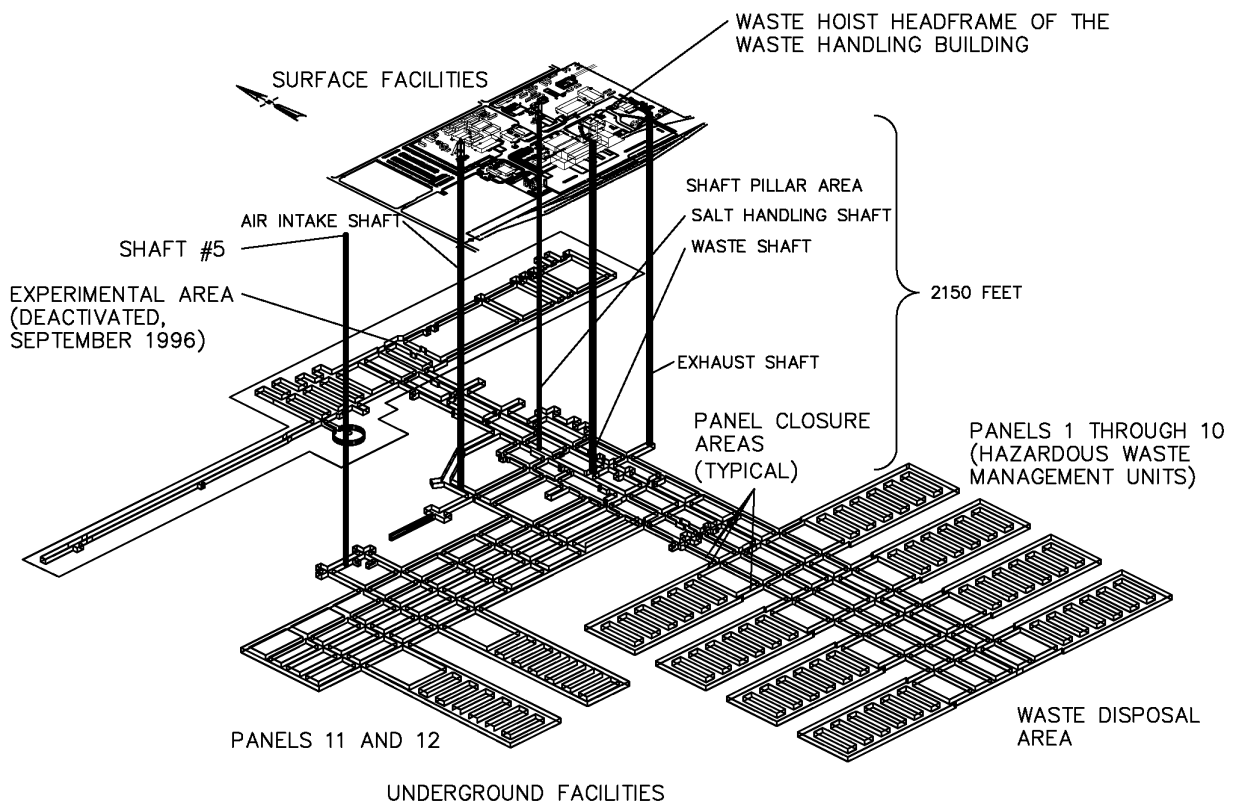
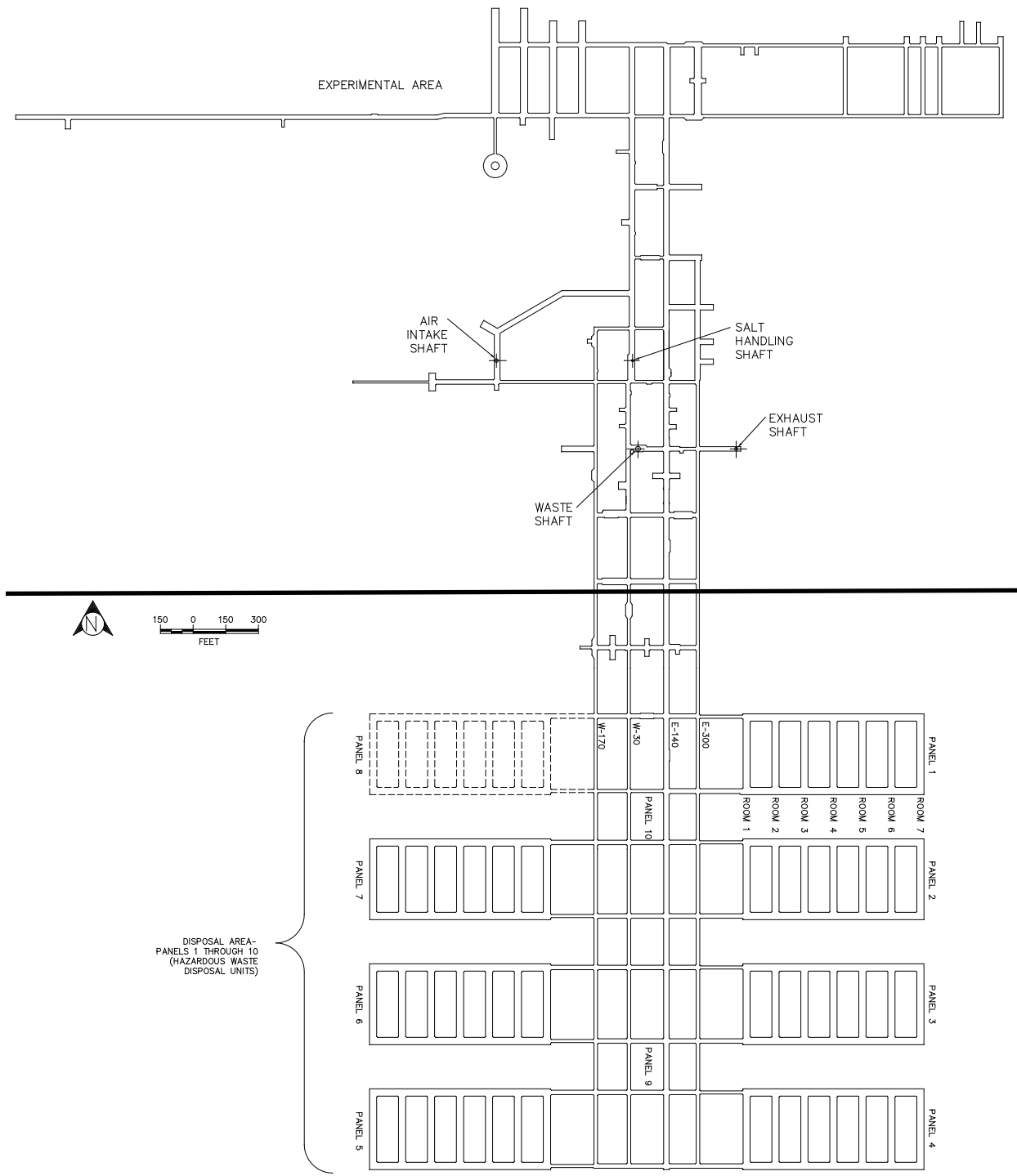


Figure D-2
Spatial View of the WIPP Facility



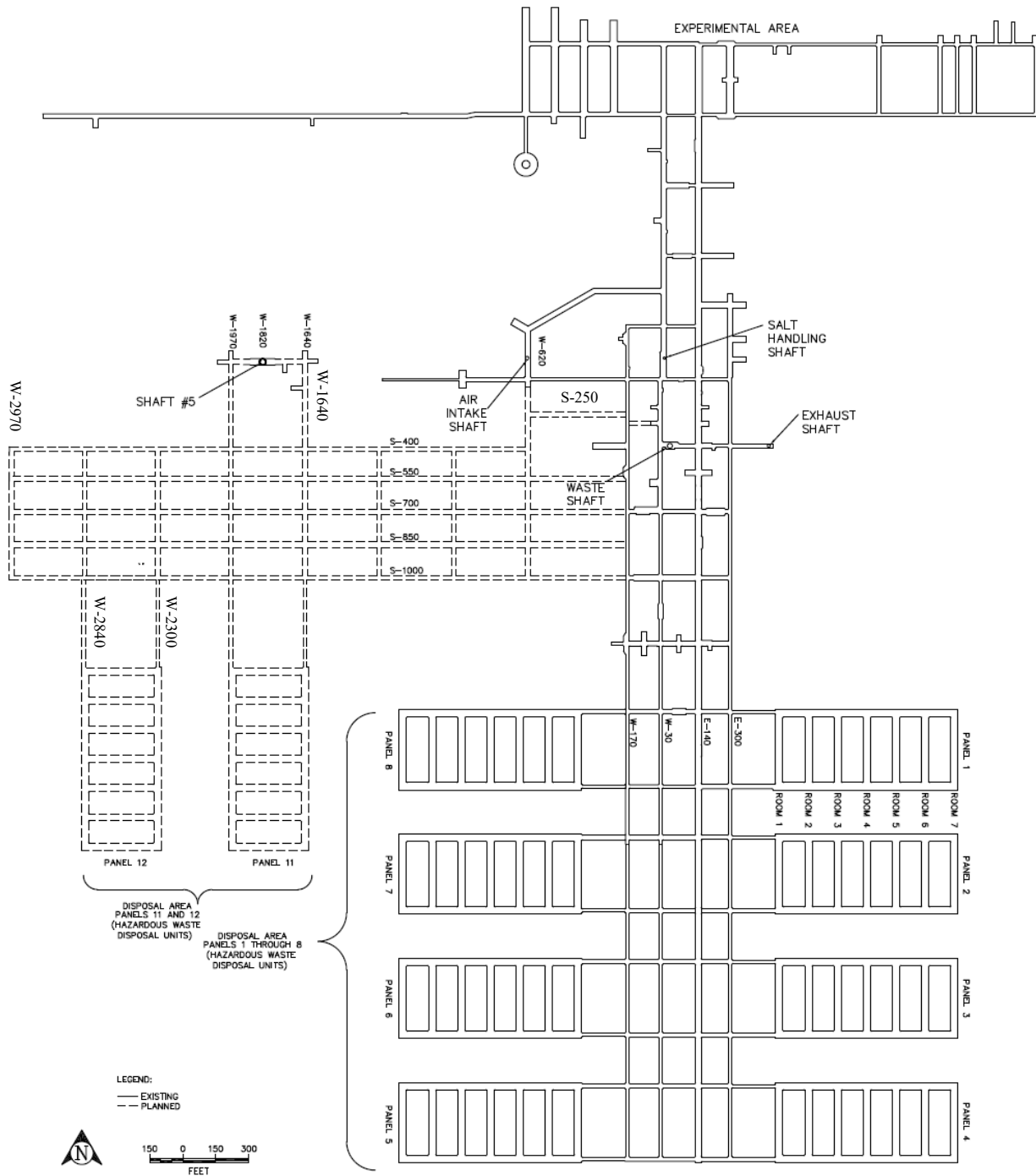
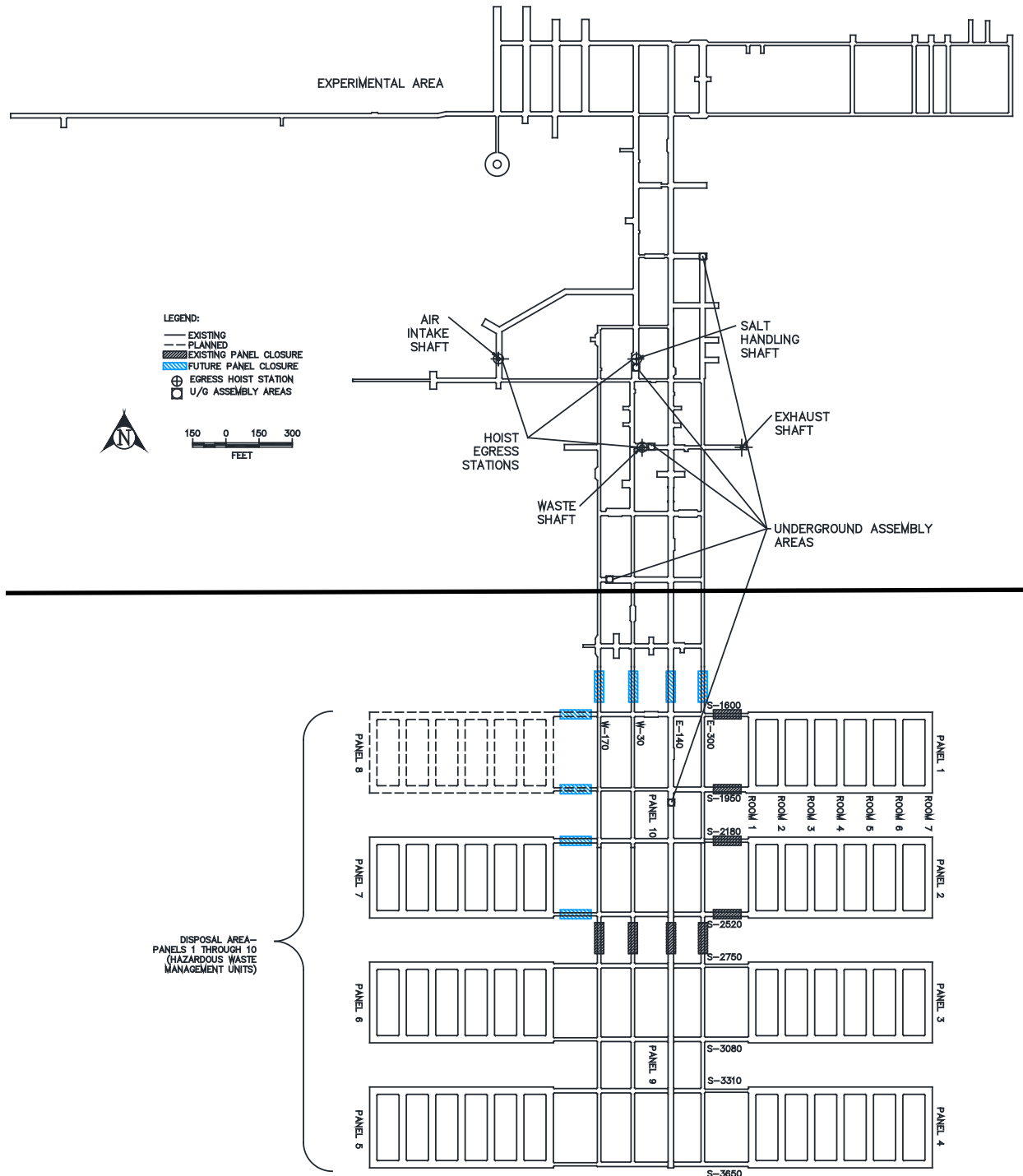


Figure D-3
WIPP Underground Facilities



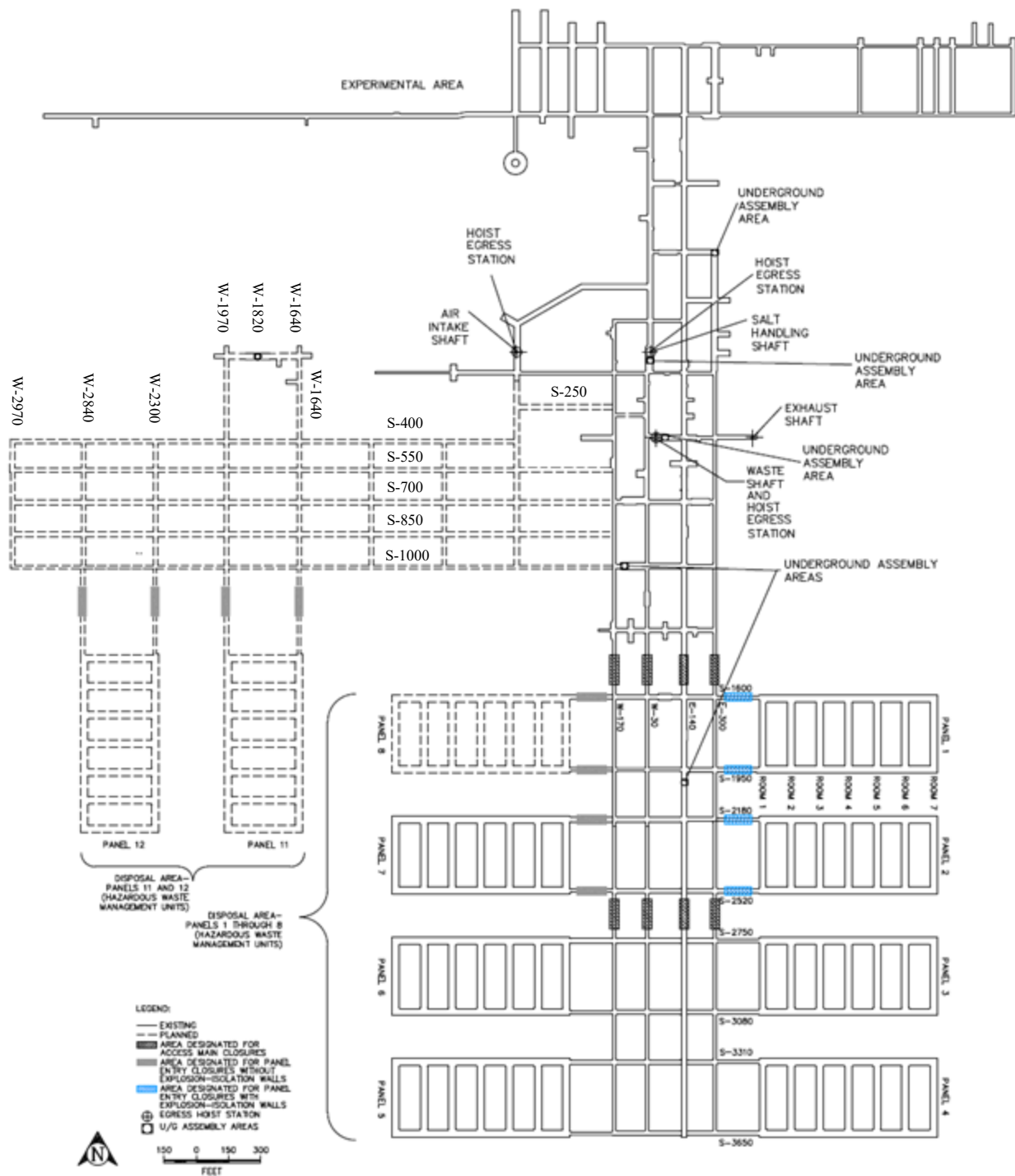


Figure D-7
Designated Underground Assembly Areas

ATTACHMENT G

CLOSURE PLAN

Introduction

The hazardous waste management units (**HWMUs**) addressed in this Closure Plan include the aboveground HWMU in the WHB, the parking area HWMU, and Panels 1 through 8, Panel 11, and Panel 12, each consisting of seven rooms. In addition, this Closure Plan includes closures for Panels 9 and 10.

G-1c Maximum Waste Inventory

The maximum extent of operations during the term of this permit is expected to be Panels 1 through ~~4-8 and Panels 10-12~~ as shown on Figure G-1, the WHB Container Storage Unit, and the Parking Area Container Storage Unit. Note that Panel 9 ~~panels 9 and~~ will not be used for TRU mixed waste disposal and Panel 10 ~~are~~ is not authorized for waste emplacement under this permit. If other waste management units are permitted during the Disposal Phase, this Closure Plan will be revised to include the additional waste management units. At any given time during disposal operations, it is possible that multiple rooms may be receiving TRU mixed waste for disposal at the same time. Underground HWDUs in which disposal has been completed (i.e., in which CH and RH TRU mixed waste emplacement activities have ceased) will undergo panel closure.

G-1e(1) Panel Closure

Following completion of waste emplacement in each underground HWDU, the HWDU will be closed. A WIPP Panel Closure (**WPC**) will be emplaced in the panel access drifts, in accordance with the design in Permit Attachment G1 and the schedule in Figure G-2 and Table G-1. Alternatively, panels may be closed simultaneously by placing panel closures in the north-south mains (E-300, E-140, W-30, and W-170), as shown in Figure G-1. ~~If this alternative is used to close Panels 3, 4, 5, and 6, then Panel 9 will not be used for TRU mixed waste disposal.~~ The panel closure system is designed to meet the following requirements that were established by the DOE for the design to comply with 20.4.1.500 NMAC (incorporating 40 CFR §264.601(a)):

**Table G-1
Anticipated Earliest Closure Dates for the Underground HWDUs**

HWDU	OPERATIONS START	OPERATIONS END	CLOSURE START ^a	CLOSURE END ^b
PANEL 1	3/99*	3/03*	3/03*	5/20*
PANEL 2	3/03*	10/05*	10/05*	5/20*
PANEL 3	4/05*	2/07*	2/07*	8/19*
PANEL 4	1/07*	5/09*	5/09*	8/19*
PANEL 5	3/09*	7/11*	7/11*	8/19*
PANEL 6	3/11*	1/14*	1/14*	8/19*
PANEL 7	9/13*	7/21 <u>5/22</u>	8/21 <u>6/22</u>	4/22 <u>12/22</u>
PANEL 8	7/21 <u>5/22</u>	8/24 <u>8/25</u>	9/24 <u>9/25</u>	2/25 <u>3/26</u>
PANEL 9**	N/A	N/A	N/A	N/A
PANEL 10	1/28	9/30	10/30	SEE NOTE 1
<u>Panel 11</u>	<u>8/25</u>	<u>7/28</u>	<u>8/28</u>	<u>2/29</u>
<u>Panel 12</u>	<u>7/28</u>	<u>6/31</u>	<u>7/31</u>	<u>1/32</u>

* Actual month and year

**Panel 9 was not used for TRU mixed waste disposal. Closures for Panels 3, 4, 5 and 6 were placed in the north-south mains (E-300, E-140, W-30 and W-170), as shown in Figure G-1, pursuant to Section G-1e(1).

^a The point of closure start is defined as 60 days following notification to the NMED of closure.

^b The point of closure end is defined as 180 days following placement of final waste in the panel.

NOTE 1: The time to close these areas may be extended depending on the nature and extent of the disturbed rock zone. The excavations that constitute these panels will have been opened for as many as 40 years so that the preparation for closure may take longer than the time allotted in Figure G-2. If this extension is needed, it will be requested as an amendment to the Closure Plan.

N/A--Not Applicable

Table G-2
Anticipated Overall Schedule for Final Facility Closure Activities

ACTIVITY	FINAL FACILITY CLOSURE <u>DURATIONS</u>	
	START <u>MONTH</u>	STOP <u>DURATION</u>
Notify NMED of Intent to Close WIPP (or to Implement Contingency Closure)	October 2030 <u>Month -2</u>	N/A
Perform Contamination Surveys in both Surface Storage Areas	October 2030 <u>Month 0</u>	April 2031 <u>6 Months</u>
Sample Analysis	December 2030 <u>Month 2</u>	July 2031 <u>8 Months</u>
Decontamination as Necessary of both Surface Storage Areas	June 2031 <u>Month 8</u>	January 2032 <u>8 Months</u>
Final Contamination Surveys of both Surface Storage Areas	February 2032 <u>Month 16</u>	September 2032 <u>8 Months</u>
Sample Analysis	June 2032 <u>Month 20</u>	January 2033 <u>8 Months</u>
Prepare and Submit Container Management Unit Closure Certification	February 2033 <u>Month 28</u>	May 2033 <u>4 Months</u>
Dispose of Closure-Derived Waste	November 2030 <u>Month 2</u>	January 2032 <u>14 Months</u>
Closure of Open Underground HWDU panel	February 2032 [*] <u>Month 16</u>	September 2032 <u>8 Months</u>
Install Borehole Seals	October 2032 <u>Month 24</u>	September 2033 <u>12 Months</u>
Install Repository Seals	June 2033 <u>Month 32</u>	September 2037 <u>52 Months</u>
Recontour and Revegetate	October 2037 <u>Month 84</u>	May 2038 <u>8 Months</u>
Prepare and Submit Final (Contingency) Closure Certification	October 2037 <u>Month 84</u>	May 2038 <u>2 Months</u>
Post-closure Monitoring	July 2038 <u>Month 86</u>	N/A <u>Up to 30 Years</u>

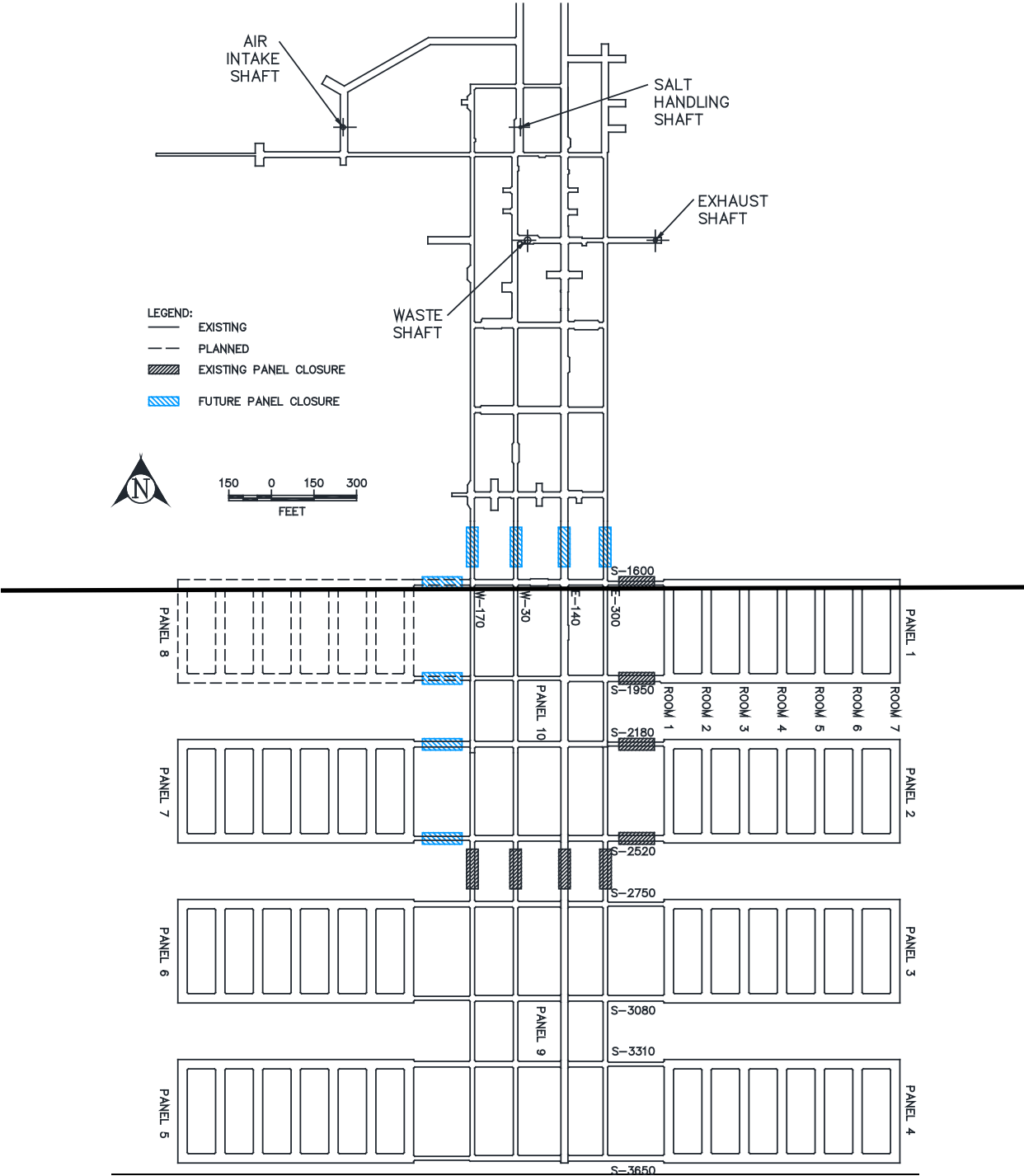
ACTIVITY	FINAL FACILITY CLOSURE <u>DURATIONS</u>	
	START <u>MONTH</u>	STOP <u>DURATION</u>

N/A--Not Applicable

Refer to Figures G-3 and G-4 for precise activity titles.

~~*This assumes the final waste is placed in this unit in January 2032 and notification of closure for this HWDU is submitted to the NMED in December 2031.~~

FIGURES



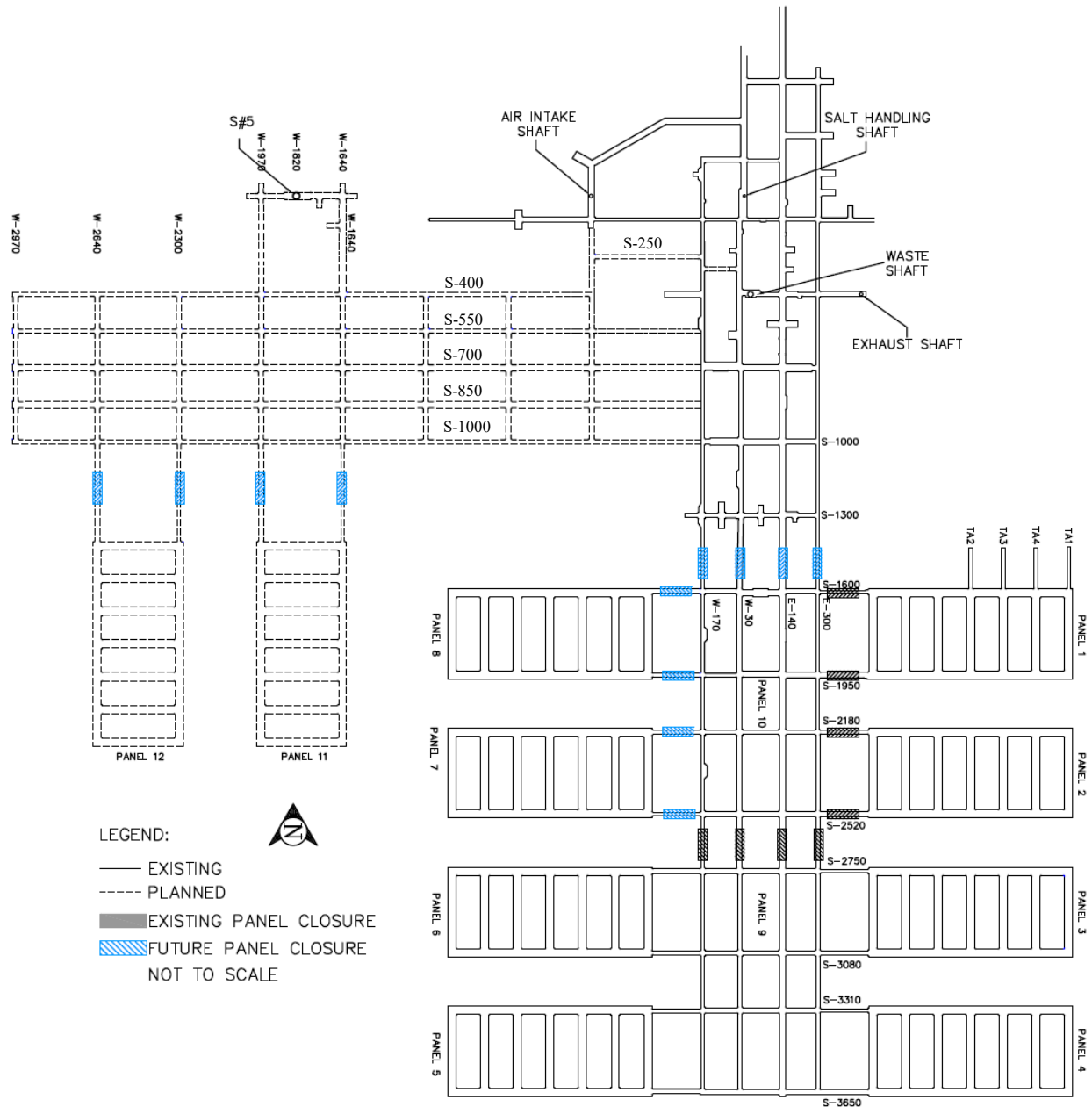
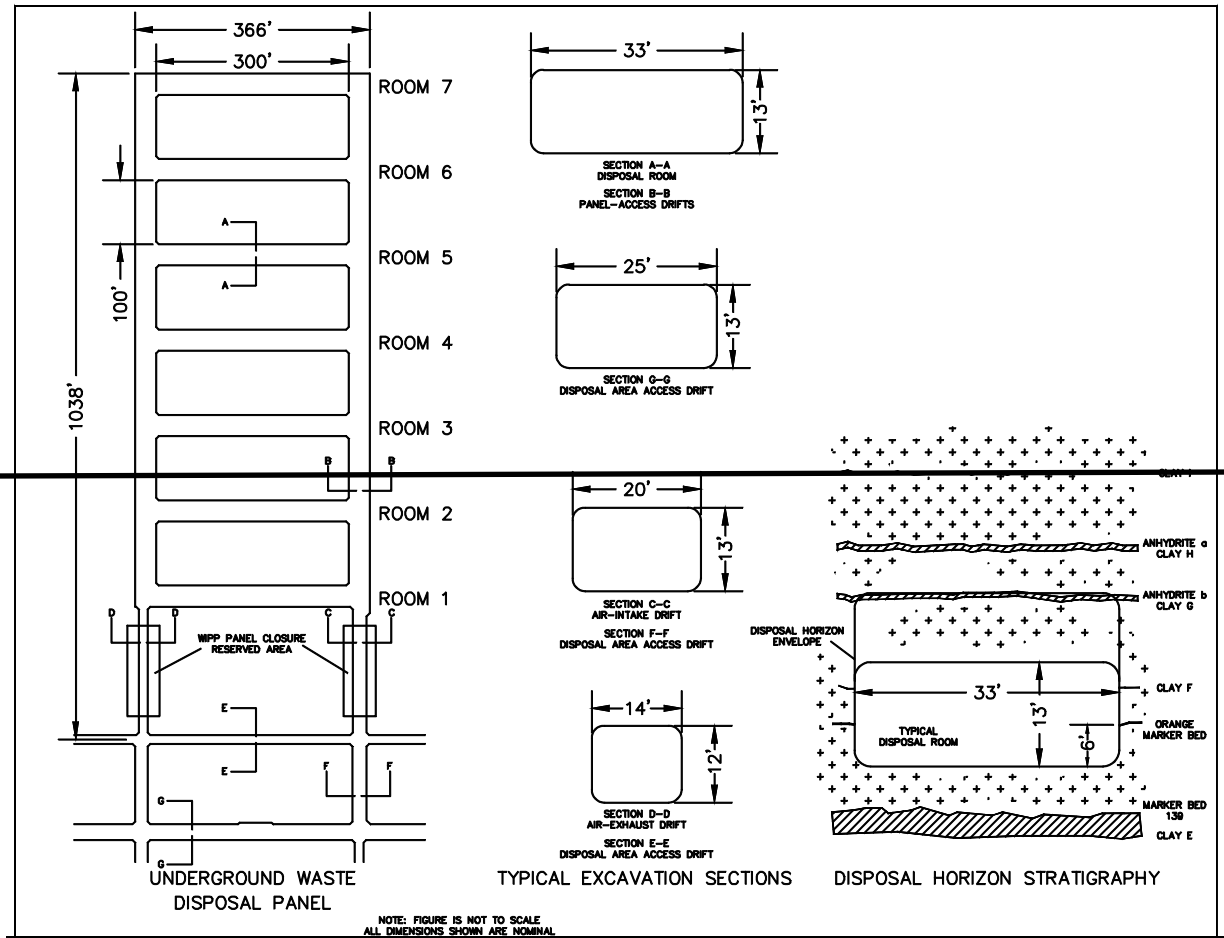
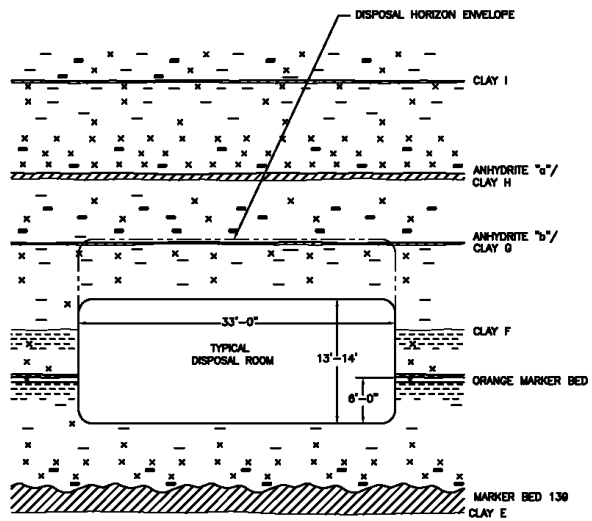
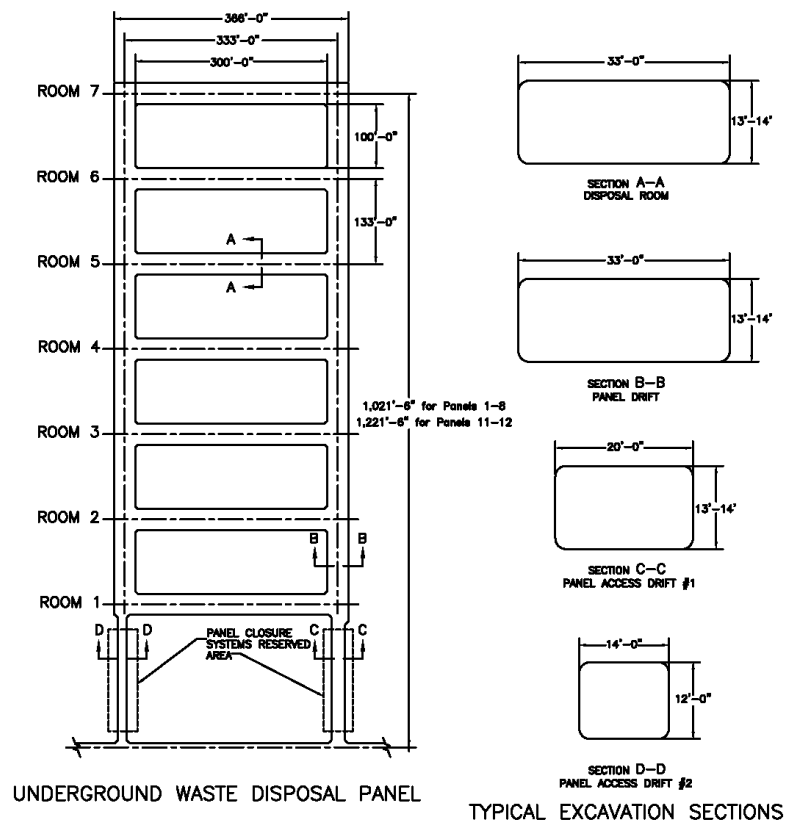


Figure G-1
Location of Underground HWDUs and WPC Locations



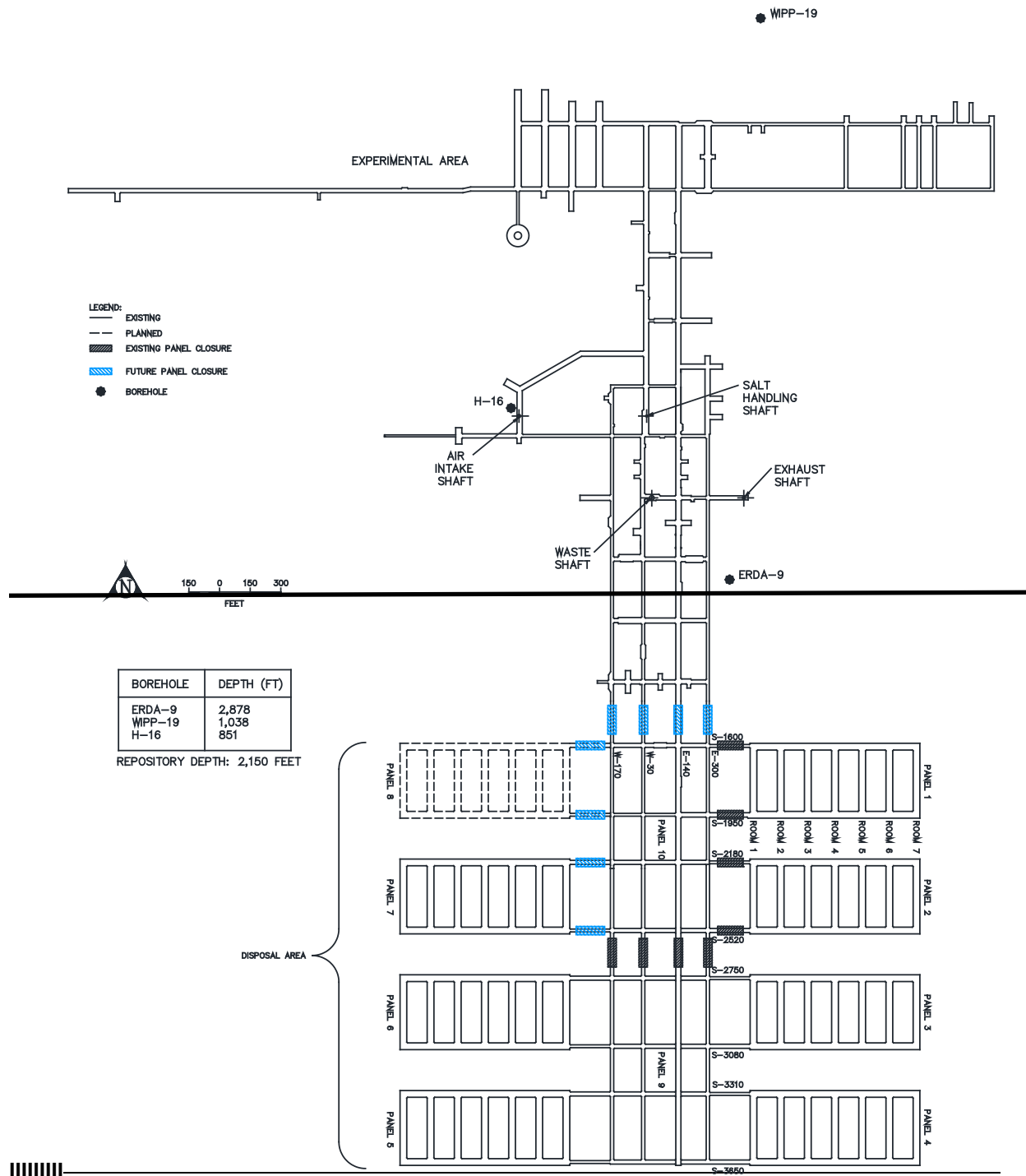


DISPOSAL HORIZON



NOTE: FIGURE IS NOT TO SCALE
ALL DIMENSIONS SHOWN ARE NOMINAL

Figure G-5
Typical Disposal Panel



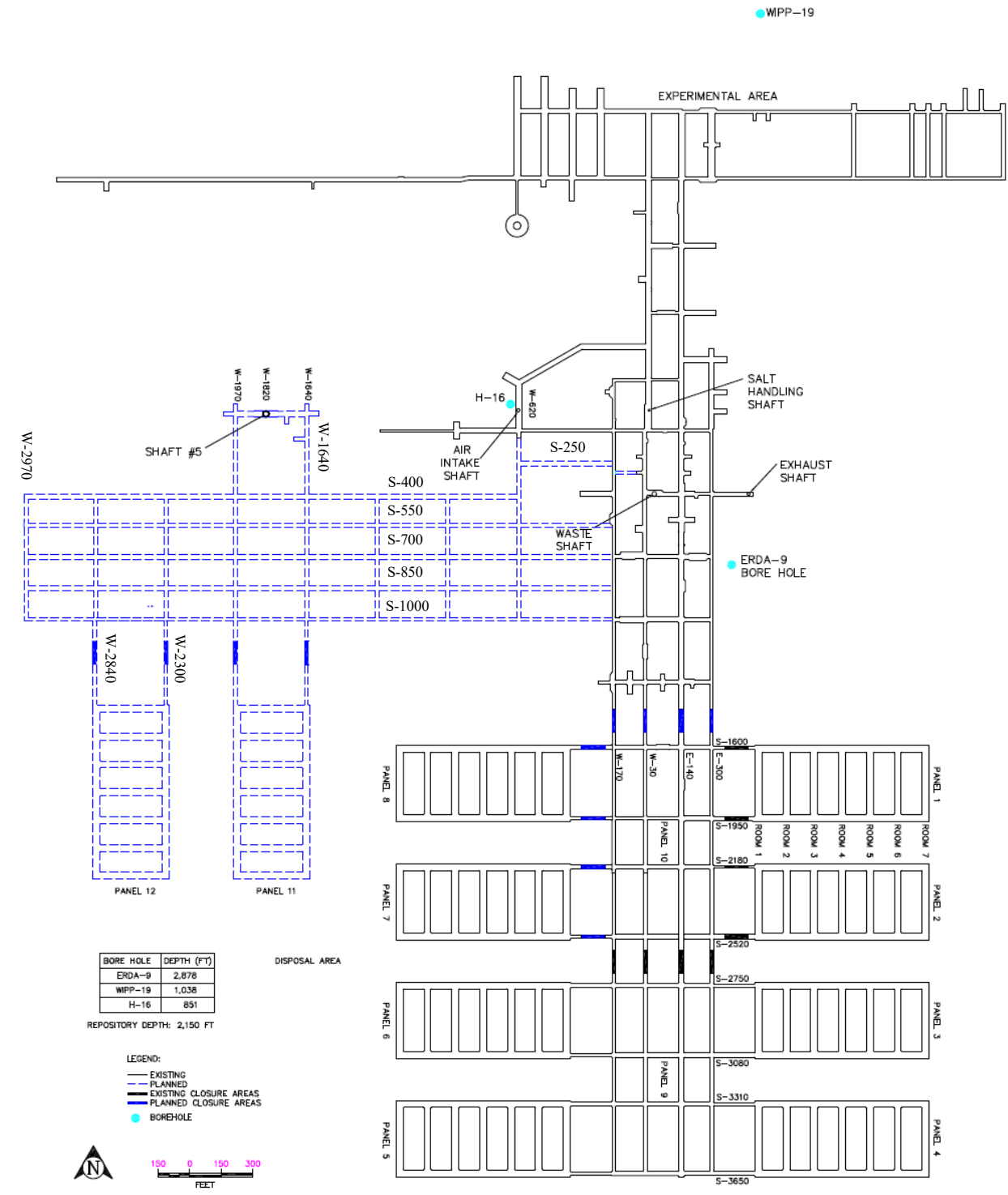


Figure G-6
Approximate Locations of Boreholes in Relation to the WIPP Underground

ATTACHMENT G1

WIPP PANEL CLOSURE DESIGN DESCRIPTION AND SPECIFICATIONS

G1-1 Introduction

An important aspect of repository operations at the Waste Isolation Pilot Plant (**WIPP**) facility is the closure of waste disposal panels, also referred to as Hazardous Waste Disposal Units (**HWDUs**), under the Resource Conservation and Recovery Act (**RCRA**). Each of Panels 1 through 8, 11, and 12 consists of a panel air-intake drift, a panel air-exhaust drift, and seven rooms. Panels ~~9 and 10~~ consist of the main entries (North to South) and cross entries (East to West). The closure of individual panels shall meet the closure requirements described in Attachment G and shall be built in accordance with the specifications in this attachment. This attachment describes the panel closure design and presents the applicable specifications and requirements for fabrication, installation, and maintenance of the WIPP Panel Closure (**WPC**).

G1-2 WPC Description

The WPC consists of WPC-A and WPC-B. The WPC-A is the design for Panels 1 through 8, 11, and 12. They shall be closed using out-bye bulkheads in the panel intake and exhaust drifts. The WPC-A is also installed in Panel 9 in the main entries between S-2750 and S-2520. The WPC-B is the closure design for Panel 10. It consists of a combination of in-bye and out-bye bulkheads and a length of ROM salt placed in the main entries north of S-1600. The WPC locations are depicted in Figure G1-1.

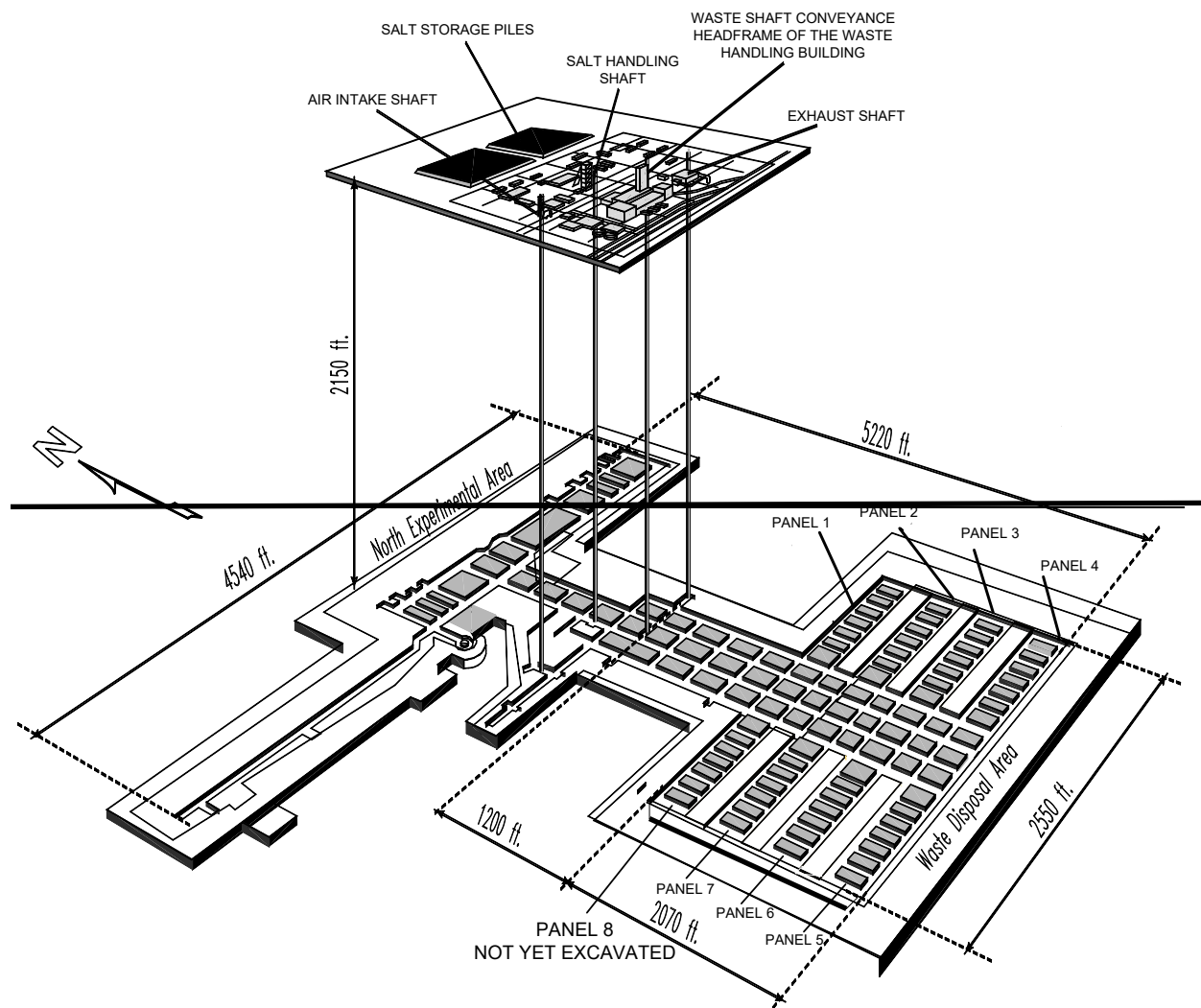
G1-2b Design Component Descriptions

The WPC-A consists of a standard steel bulkhead in the panel access drifts for Panels 1 through 8, 11, and 12, near the intersection with the main entries or relocated to the main north-south drifts as determined by the geotechnical engineer. This bulkhead is referred to as the closure/out-bye bulkhead and it will be maintained for as long as it is accessible. Additional ventilation barriers may remain in the panels as part of the operational controls prior to WPC installation. These ventilation barriers include steel bulkheads, brattice cloth and chain link, as well as concrete block walls in Panels 1, 2, and 5. These ventilation barriers are not part of the WPC design and will not impact the WPC-A bulkheads nor will they impede construction and maintenance of closure bulkheads. WPC-A will also be emplaced in the main entries between Panels 9 and 10 (between S-2520 and S-2750).

ATTACHMENT G2

**WASTE ISOLATION PILOT PLANT
SHAFT SEALING SYSTEM COMPLIANCE
SUBMITTAL DESIGN REPORT**

FIGURES



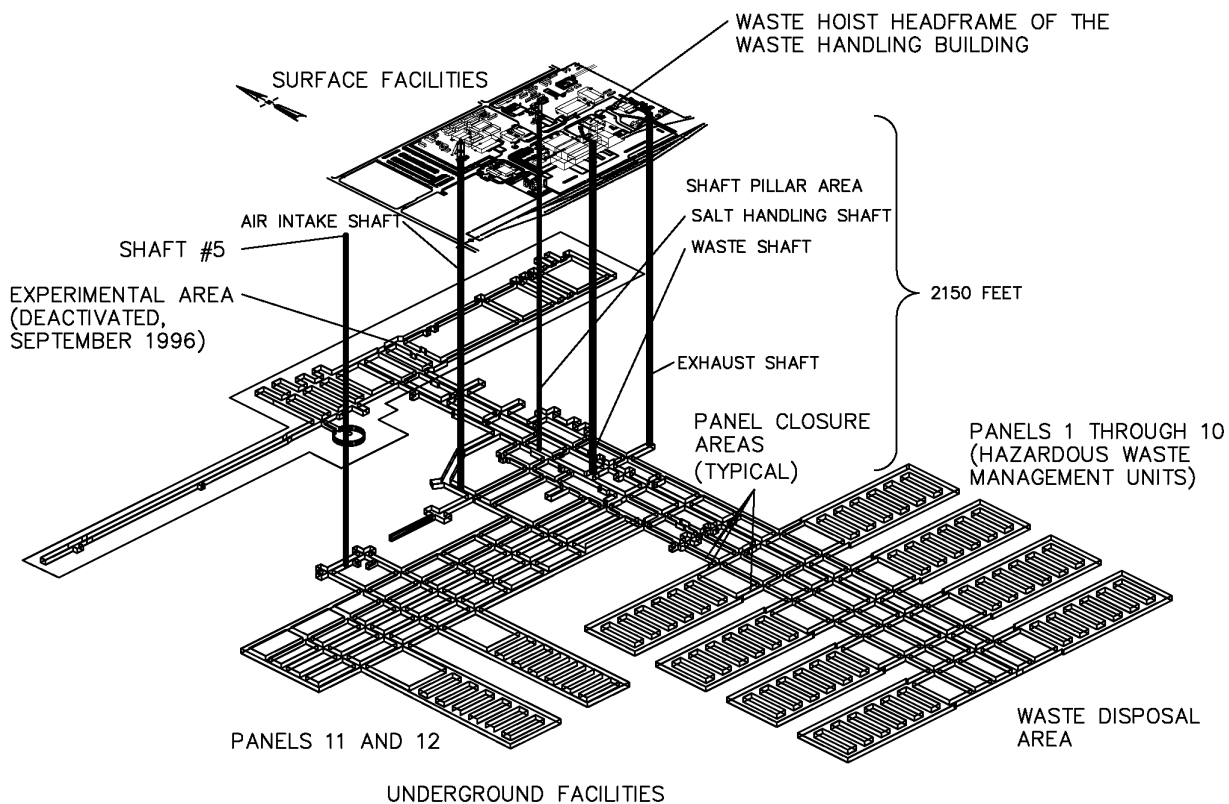


Figure G2-1
View of the WIPP Underground Facility

ATTACHMENT H1

ACTIVE INSTITUTIONAL CONTROLS DURING POST-CLOSURE

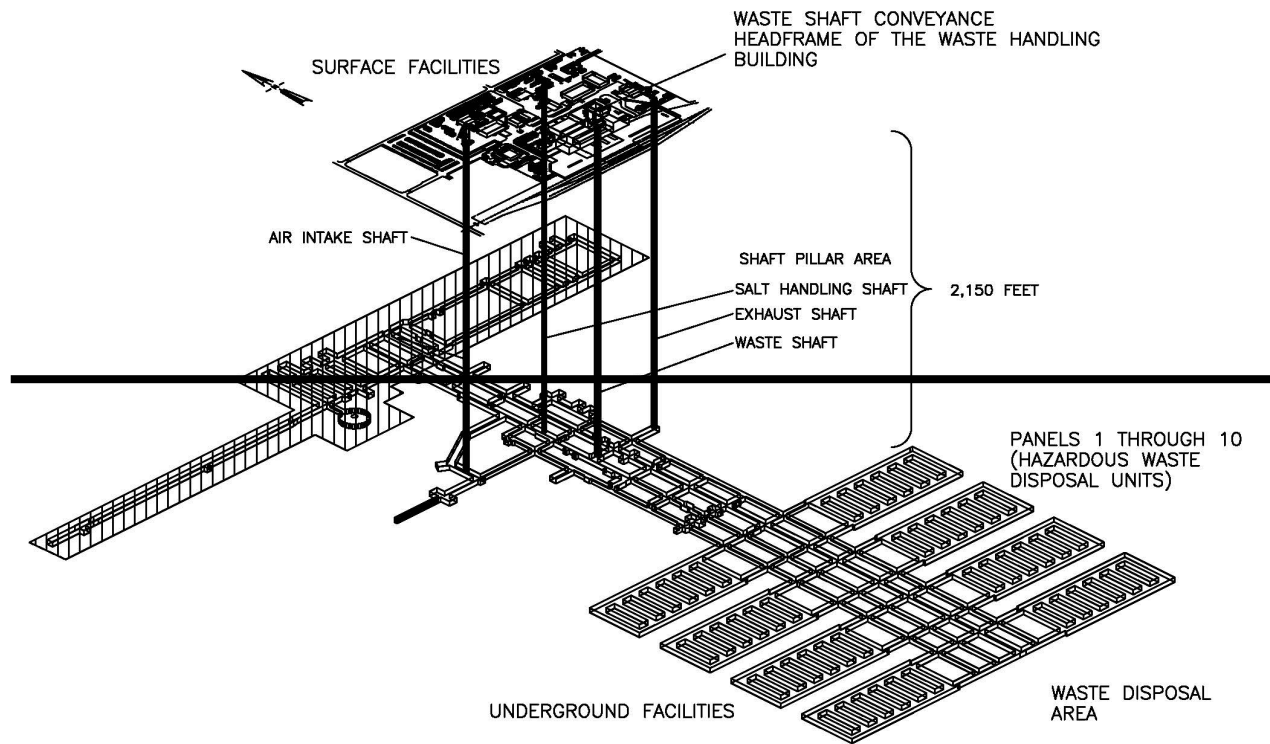
H1.1 Active Institutional Controls

The Permittees shall maintain the access controls. This requirement includes the maintenance and corrective actions necessary to ensure that the fence and patrol requirements (surveillance) are met. The active institutional controls to be implemented by the Permittees after final closure are the following:

1. A fence line will be established to control access to the repository footprint area on the surface. A standard four-strand (three barbed and one unbarbed, in accordance with the Bureau of Land Management specifications) wire fence will be erected along the perimeter of the repository surface footprint. To provide access to the repository footprint during construction of the berm (which may be built in multiple sections simultaneously), the fence will have gates placed approximately midway along ~~each of the four sides~~ selected legs of the fenced areas. ~~these~~ These gates will remain locked with access controlled by the Permittees. The ~~western gates~~ s will be 20 feet (6 meters) wide. ~~The remaining three gates will each be 16 feet (4.9 meters) wide.~~ wide enough to accommodate the equipment that will be used to build the berm. Additional fencing will be constructed where appropriate for remote locations that are used for disposal system monitoring. Such fences will meet the same construction specifications as the repository footprint perimeter fence.

H1.1.1 Repository Footprint Fencing

~~Access to an area~~ The fenced area will be composed of two adjoining rectangular areas (See Figure H1-4). One rectangular area will be approximately 2,780 feet by 2,360 feet (875 meters by 720 meters), covering the area over Panels 1-8. The second (adjoining) rectangular area will be approximately 1,040 feet by 1,210 feet (317 meters by 369 meters) covering the area over Panels 11 and 12. The fenced area will be controlled by a four-strand barbed wire fence. A ~~single gate~~ Gates will be included as needed along ~~each~~ the ~~sides~~ s of the fence for access. These gates will remain locked with access controlled by the Permittees. Around the perimeter of the fence, an unpaved roadway 16 feet (4.9 meters) wide will be cut to allow for patrolling of the perimeter. Figure H1-4 is an illustration of the fence line in relation to the repository footprint. Patrolling of the perimeter is based upon the need to ensure that no mining or well drilling activity is initiated that could threaten the integrity of the repository.



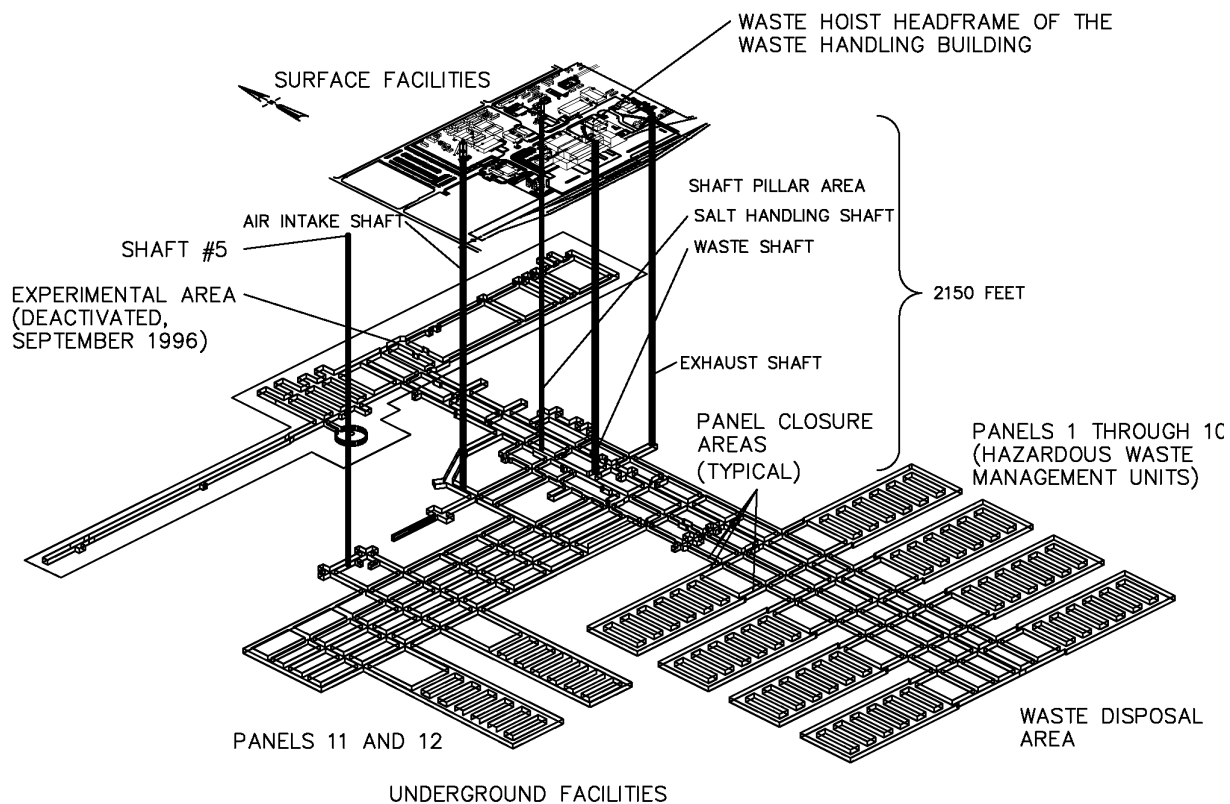
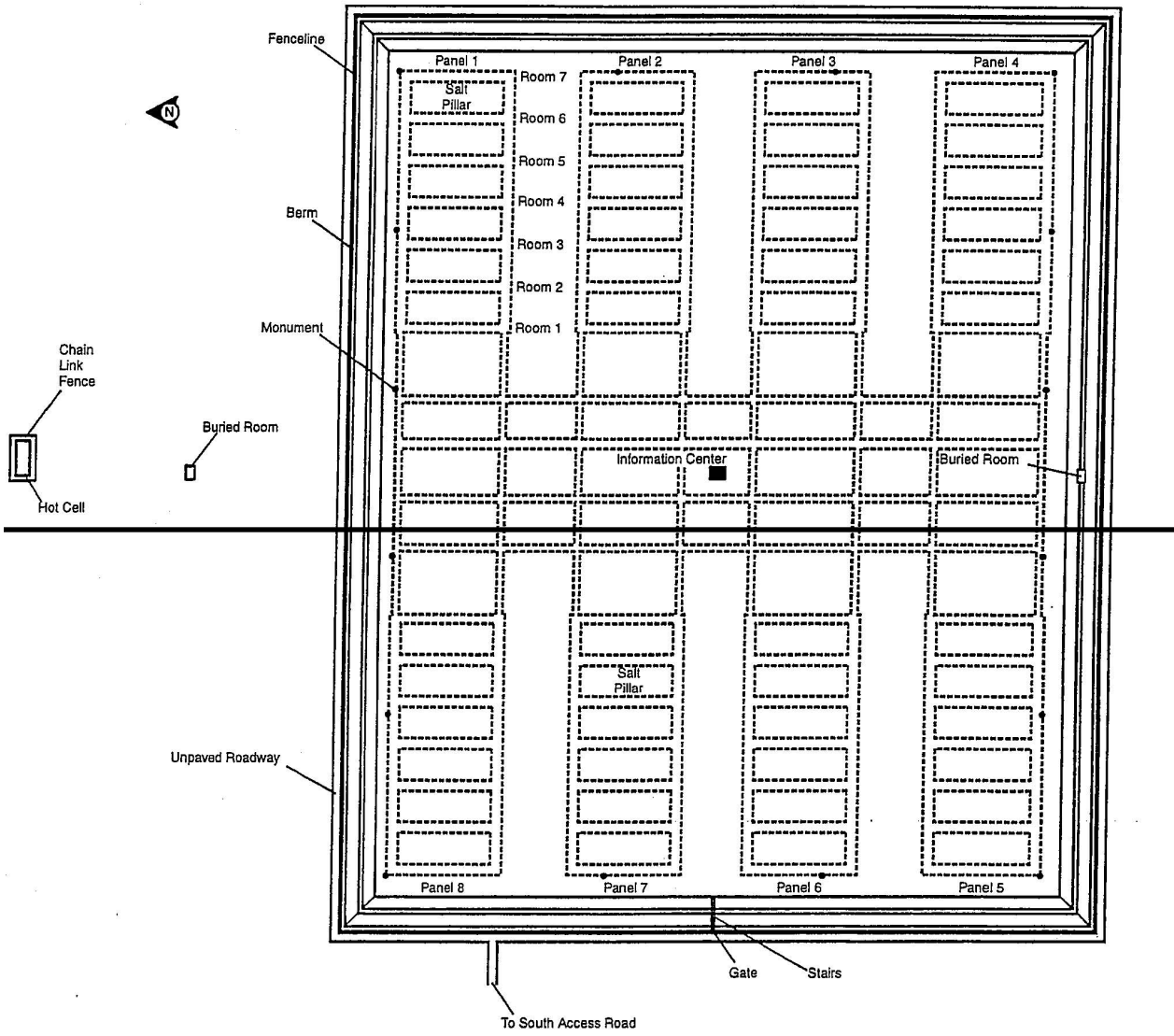


Figure H1-1
Spatial View of WIPP Surface and Underground Facilities



CCA-AIC307-0

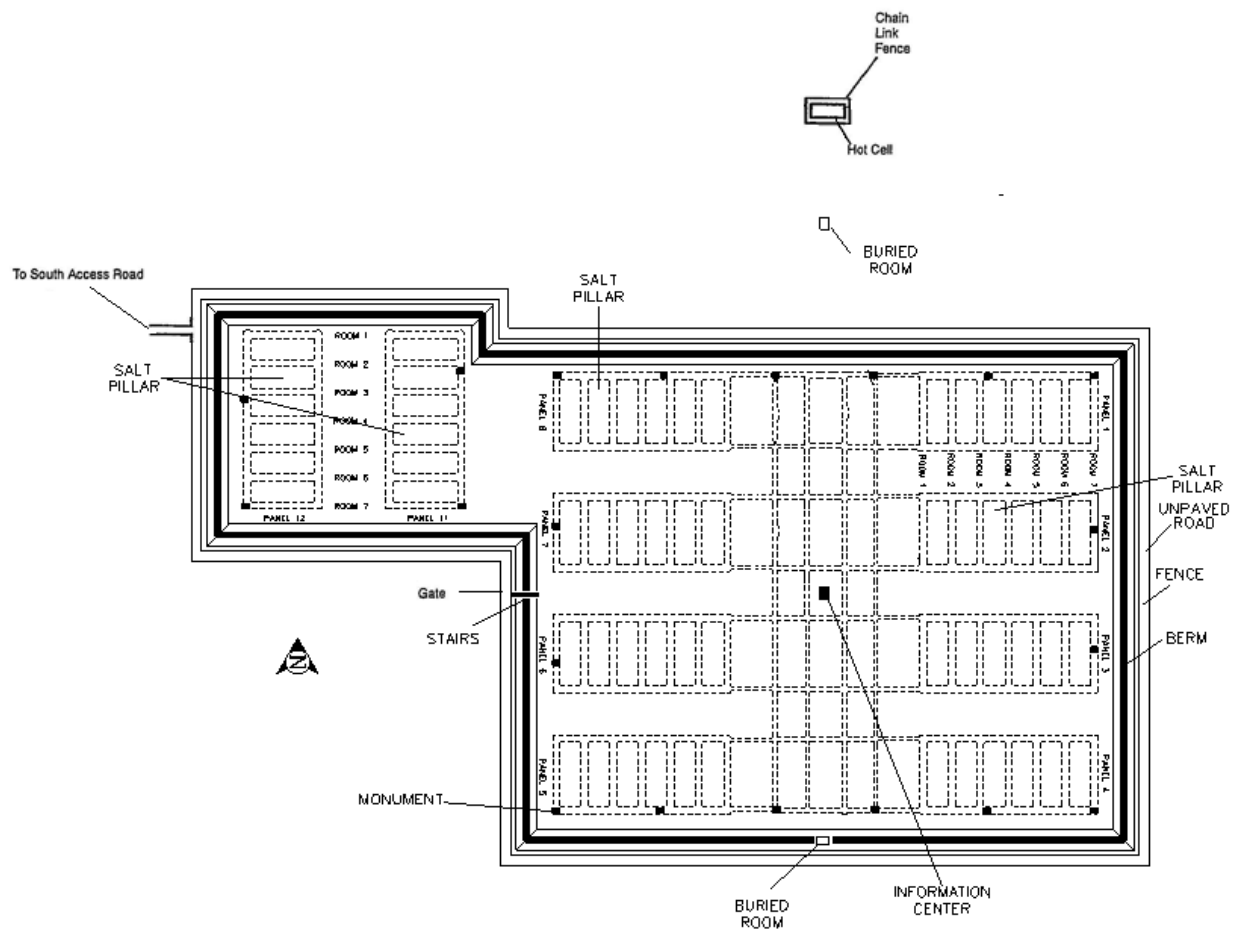


Figure H1-4
Perimeter Fenceline and Roadway

ATTACHMENT J

HAZARDOUS WASTE MANAGEMENT UNIT TABLES

Table J-3
Underground Hazardous Waste Disposal Units

Description ¹	Waste Type	Maximum Capacity ²	Container Equivalent
Panel 1	CH TRU	636,000ft ³ (18,000 m ³)	86,500 55-Gallon Drums
Panel 2	CH TRU	636,000ft ³ (18,000 m ³)	86,500 55-Gallon Drums
Panel 3	CH TRU	662,150 ft ³ (18,750 m ³)	90,150 55-Gallon Drums
Panel 4	CH TRU	662,150 ft ³ (18,750 m ³)	90,150 55-Gallon Drums
	RH TRU	12,570 ft ³ (356 m ³)	400 RH TRU Canisters
Panel 5	CH TRU	662,150 ft ³ (18,750 m ³)	90,150 55-Gallon Drums
	RH TRU	15,720 ft ³ (445 m ³)	500 RH TRU Canisters
Panel 6	CH TRU	662,150 ft ³ (18,750 m ³)	90,150 55-Gallon Drums
	RH TRU	18,860 ft ³ (534 m ³)	600 RH TRU Canisters
Panel 7	CH TRU	662,150 ft ³ (18,750 m ³)	90,150 55-Gallon Drums
	RH TRU	22,950 ft ³ (650 m ³)	730 RH TRU Canisters
Panel 8	CH TRU	662,150 ft ³ (18,750 m ³)	90,150 55-Gallon Drums
	RH TRU	22,950 ft ³ (650 m ³)	730 RH TRU Canisters
<u>Panel 11</u>	<u>CH TRU</u>	<u>662,150 ft³</u> <u>(18,750 m³)</u>	<u>90,150 55-Gallon Drums</u>
	<u>RH TRU</u>	<u>22,950 ft³</u> <u>(650 m³)</u>	<u>730 RH TRU Canisters</u>
<u>Panel 12</u>	<u>CH TRU</u>	<u>662,150 ft³</u> <u>(18,750 m³)</u>	<u>90,150 55-Gallon Drums</u>
	<u>RH TRU</u>	<u>22,950 ft³</u> <u>(650 m³)</u>	<u>730 RH TRU Canisters</u>
Total	CH TRU	5,244,900 6,569,200 ft ³ (148,500) 186,000 m ³)	713,900 894,200 55-Gallon Drums
	RH TRU	93,050 138,950 ft ³ (2,635) 3,935 m ³)	2960 4,420 RH TRU Canisters

-
- ¹ The area of each panel is approximately 124,150 ft² (11,533 m²).
- ² "Maximum Capacity" is the maximum volume of TRU mixed waste that may be emplaced in each panel. The maximum repository capacity of "6.2 million cubic feet of transuranic waste" is specified in the WIPP Land Withdrawal Act (Pub. L. 102-579, as amended) and is tracked and reported by the DOE internally as the LWA TRU Waste Volume. The LWA TRU Waste Volume is included for informational purposes in Permit Part 4, Table 4.1.1.

ATTACHMENT N

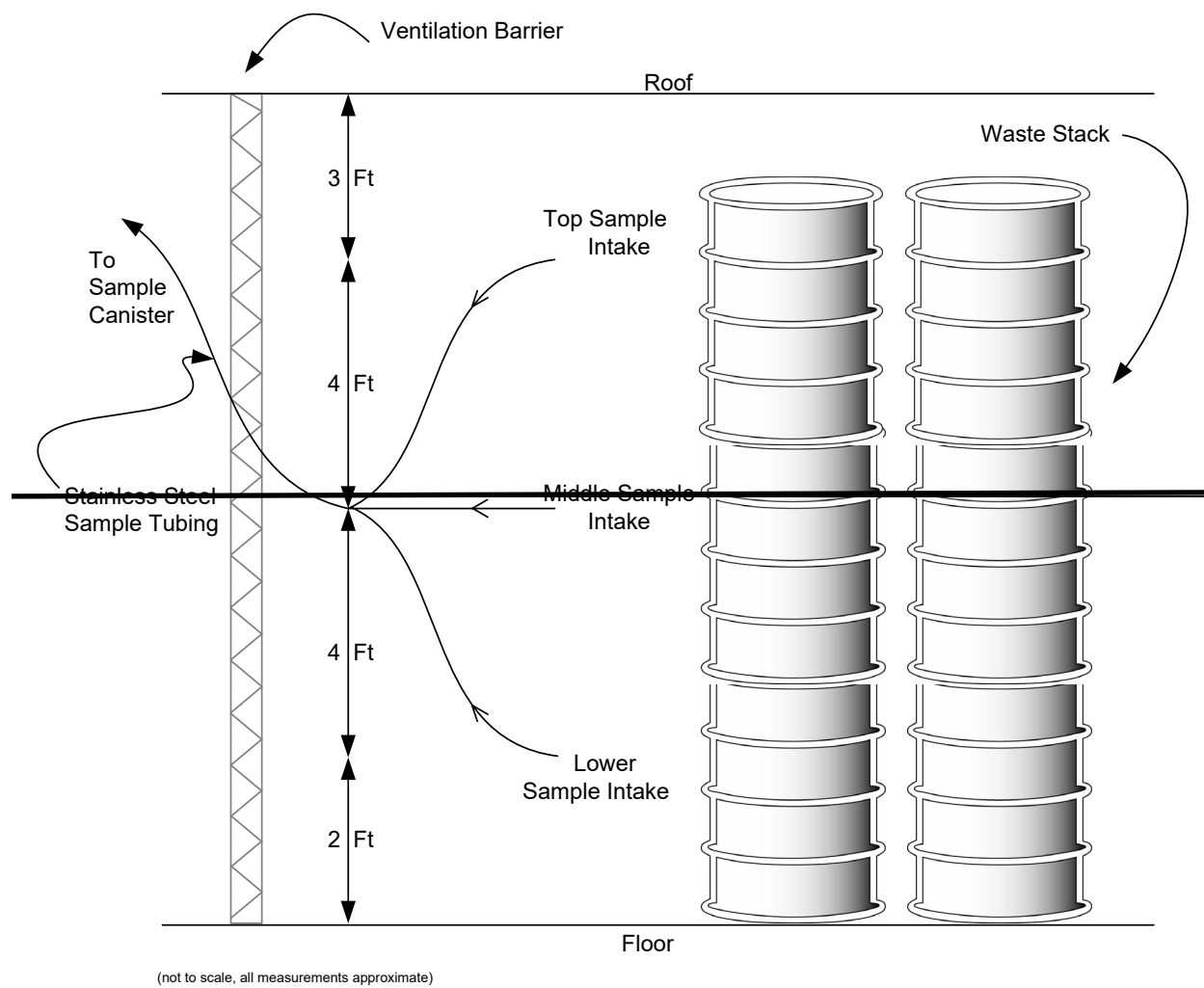
VOLATILE ORGANIC COMPOUND MONITORING PLAN

N-1a Background

The Underground HWDUs are located 2,150 feet (ft) (655 meters [m]) below ground surface, in the WIPP underground. As defined for this Permit, an Underground HWDU is a single excavated panel consisting of seven rooms and two access drifts designated for disposal of contact-handled (**CH**) and remote-handled (**RH**) transuranic (**TRU**) mixed waste. Each room is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 13 ft (4 m) or 14 ft (4.3 m) high. Access drifts connect the rooms and have the same cross section. The Permittees shall dispose of TRU mixed waste in Underground HWDUs designated as Panels 1 through 8, 11, and 12.

N-3a(1) Sampling Locations for Repository VOC Monitoring

Mine ventilation air, which could potentially be impacted by VOC emissions from the Underground HWDUs identified as Panels 1 through 8, 11, and 12, will exit the underground through the Exhaust Shaft. Building 489 has been identified as the location of the maximum non-waste surface worker exposure. Air samples will be collected from Station VOC-C located at the west air intake for Building 489 (Figure N-1) to quantify VOCs in the ambient air. Background VOCs will be measured by sampling from Station VOC-D located at groundwater pad WQSP-4 (Figure N-1). This pad is located approximately one mile southeast (upwind based on the predominant wind direction) of the Exhaust Shaft within the WIPP facility boundary.



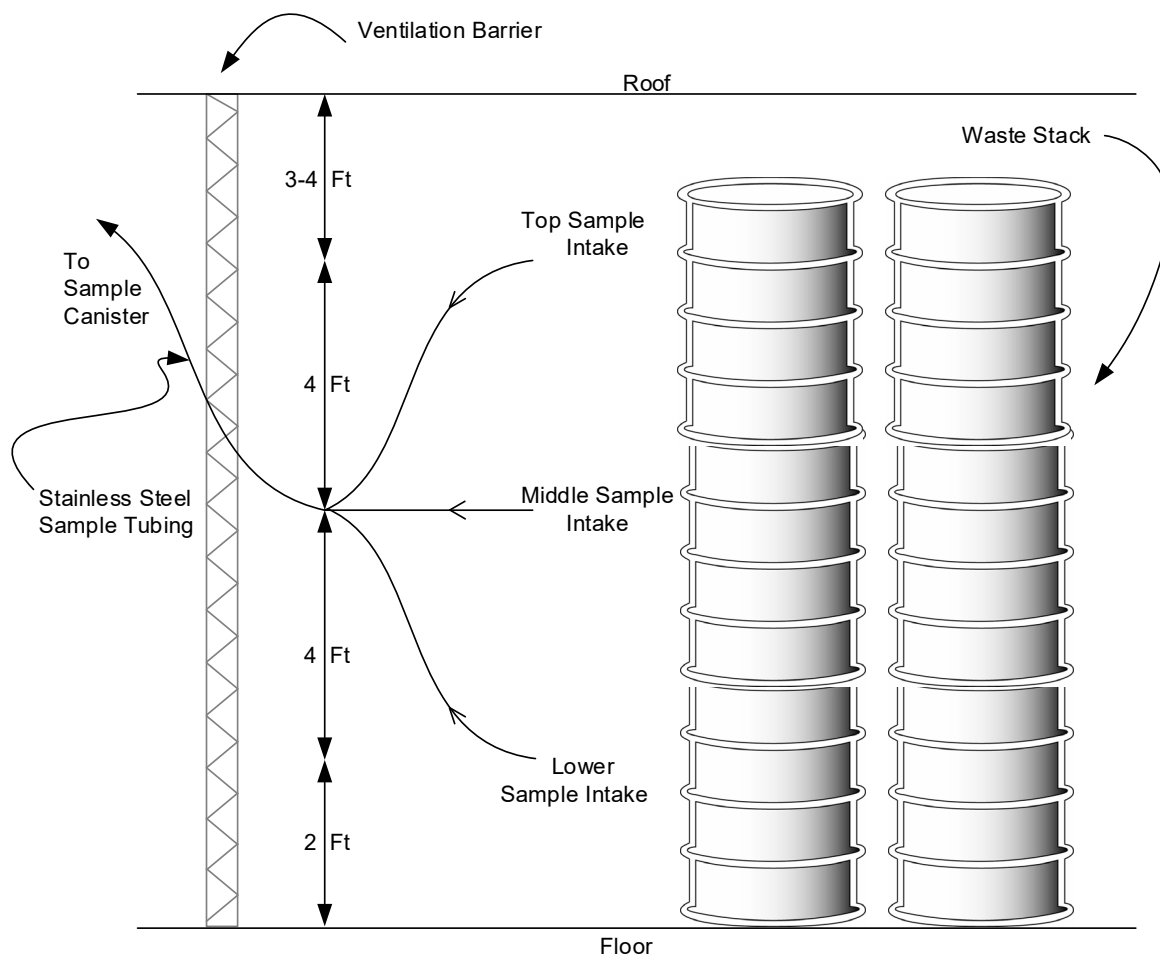


Figure N-4
Typical Disposal Room Sample Head Arrangement

Appendix C
Figures 1 and 2

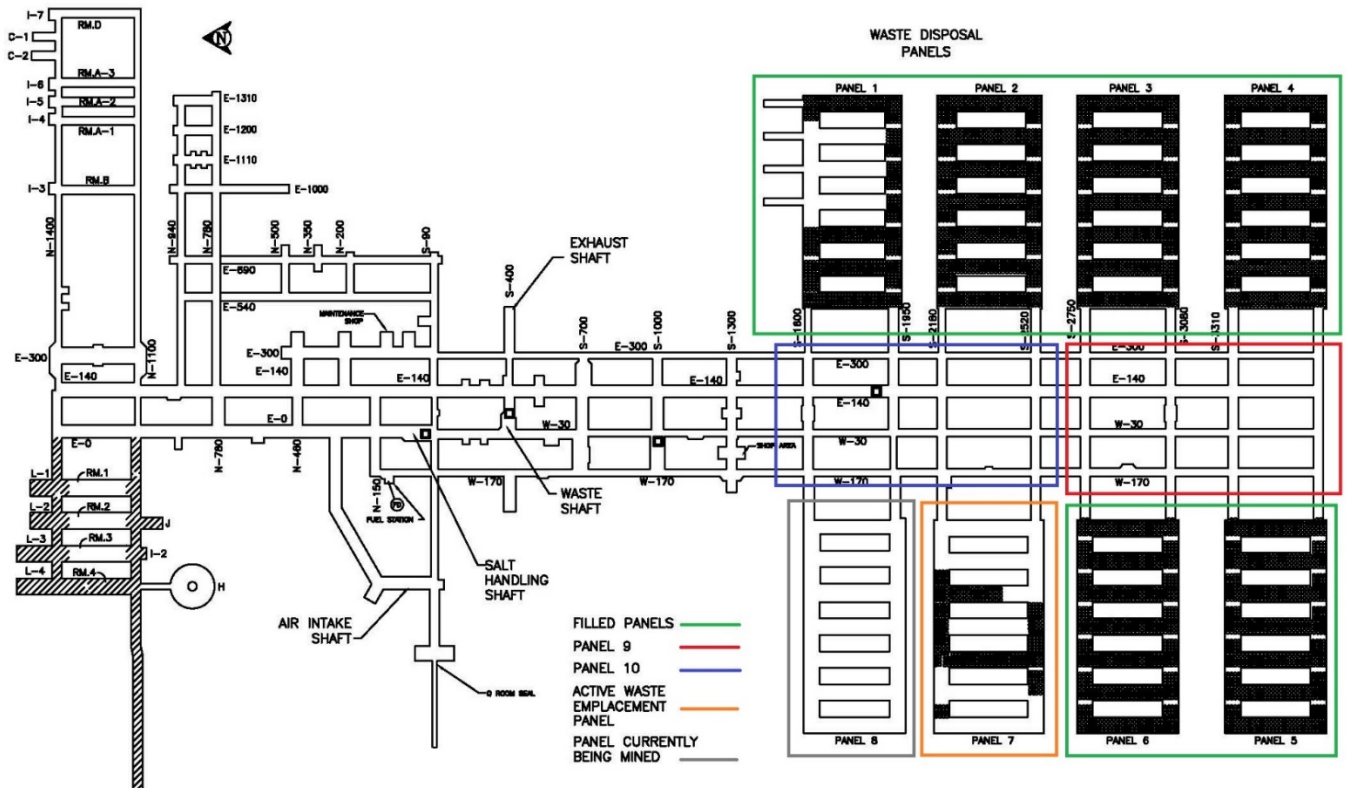


Figure 1: Status of Panels at the WIPP Facility

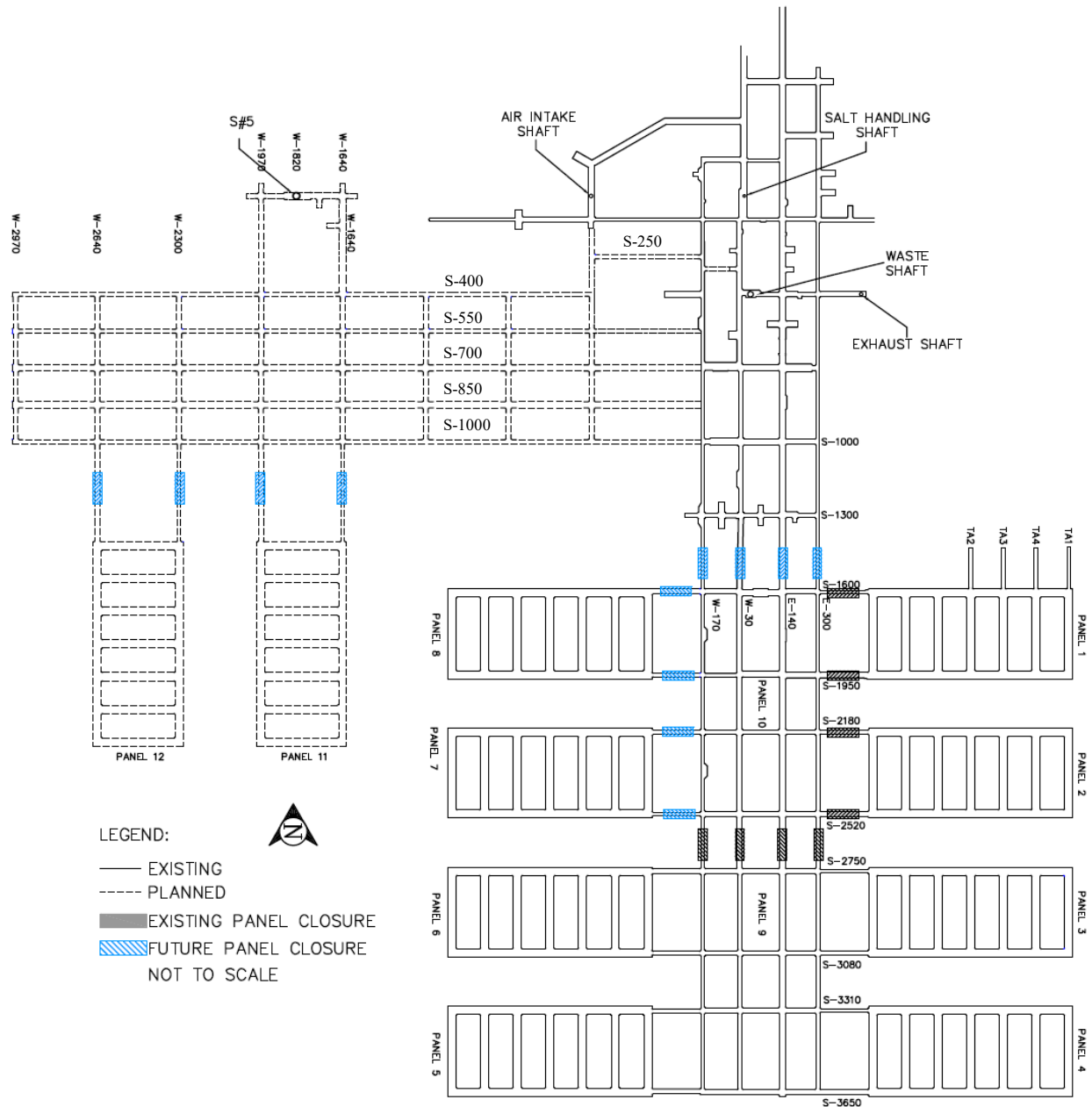


Figure 2: Proposed Location Panels 11 and 12 at the WIPP Facility

Appendix D
2020 Permit Renewal Part B Application, Addendum G1, Need for Additional Panels for
the Ten-year Hazardous Waste Facility Permit Renewal

ADDENDUM G1
NEED FOR ADDITIONAL PANELS FOR THE TEN-YEAR HAZARDOUS
WASTE FACILITY PERMIT RENEWAL

ADDENDUM G1

NEED FOR ADDITIONAL PANELS FOR THE TEN-YEAR HAZARDOUS WASTE FACILITY PERMIT RENEWAL

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Table	Title
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Table 2	Lost TRU Mixed Waste Volume Capacity in Equivalent Panels

LIST OF FIGURES

Figure	Title
Figure 1	Status of Panels at the WIPP Facility
Figure 2	Panel 1 Showing Waste Emplacement and Abandoned Rooms
Figure 3	Panel 7 Showing Waste Emplacement and Abandoned Rooms (as of 3/1/2020)

13 **ACRONYMS, ABBREVIATIONS, AND UNITS**

14	CH	contact-handled
15	ft ³	cubic feet
16	HWDUs	Hazardous Waste Disposal Units
17	LWA	Land Withdrawal Act
18	MgO	magnesium oxide
19	m ³	cubic meter(s)
20	NMED	New Mexico Environment Department
21	Permit	Hazardous Waste Facility Permit
22	PMR	Permit Modification Request
23	PPE	personal protective equipment
24	RH	remote-handled
25	Salado	Salado Formation
26	TID	Technical Incompleteness Determination
27	TRU	transuranic
28	WIPP	Waste Isolation Pilot Plant
29		

ADDENDUM G1

NEED FOR ADDITIONAL PANELS FOR THE TEN-YEAR HAZARDOUS WASTE FACILITY PERMIT RENEWAL

G1-1 Purpose

The purpose of this paper is to discuss the need for additional underground panels at the Waste Isolation Pilot Plant (WIPP) facility during the period covered by this Ten-Year Permit Renewal Application. First, the Permittees will demonstrate that additional panels are needed to address lost disposal capacity that has been realized over the operating life of the facility. Second, the Permittees will demonstrate that more panels than are currently permitted will be needed over the next ten years. Transuranic (TRU) mixed waste is disposed in underground hazardous waste disposal units (HWDUs). The underground HWDUs are located at the WIPP facility approximately 2,150 feet (665 meters) below the ground surface within the Salado Formation (Salado). An underground HWDU consists of seven rooms and two access drifts excavated in the Salado and designated for disposal of containers of TRU mixed waste. Each underground HWDU, when filled, has been designed to accommodate a contact-handled (CH) TRU mixed waste volume of 662,150 ft³ (18,750 m³) (based on the gross container volume of 89,286 55-gallon drums). This is referred to as the "disposal capacity" in this paper. The underground HWDUs are designed to dispose both CH-TRU mixed and remote-handled (RH) TRU mixed waste. The focus of this paper is on CH-TRU mixed waste since RH-TRU mixed waste is a small fraction of the total TRU mixed waste inventory.

G1-2 Background

The WIPP facility is located in Eddy County in southeast New Mexico, 26 miles east of Carlsbad, New Mexico. The WIPP facility is a mined geologic repository for the disposal of defense-generated TRU waste and TRU mixed waste from various United States defense facilities.

The WIPP project was authorized by the U.S. Congress as Public Law 96-164. Subsequently, Congress enacted Public Law 102-579 as amended by Public Law 104-201, known as the Land Withdrawal Act (LWA), to designate the area to be used for the WIPP facility. As written in Section 7(a)(3) of the LWA, the total capacity of the WIPP facility by volume is 6.2 million cubic feet (ft³) (175,564 cubic meters (m³)) of TRU waste.

G1-3 Description

The WIPP facility is divided into surface structures, shafts, and underground structures. The surface structures accommodate the personnel, equipment, and support services required for the receipt, preparation, and transfer of waste from the surface to the underground.

The Permittees dispose of TRU mixed waste at the WIPP facility in rooms mined out of a salt formation approximately 2,150 feet (655 meters) below the surface. Waste is emplaced in Resource Conservation and Recovery Act permitted HWDUs commonly referred to as panels. The current design of the WIPP repository consists of 10 panels. Panels 1-8 consist of seven disposal rooms with an intake and an exhaust drift. Panels 9 and 10 are made up of a portion of

the main access drifts in the underground and have not been permitted for waste emplacement (See Figure 1).

The first shipment of TRU waste disposed of at the WIPP facility was received in March 1999. The Permittees have been emplacing waste at the WIPP facility on an on-going basis since the receipt and emplacement of the first shipment with the exception of an approximately 3-year interruption from 2014-2017. Panels 1-8 have been permitted for waste emplacement. Regarding these panels, the Permittees have completed emplacement operations in Panels 1-6, the Permittees are currently emplacing waste in Panel 7, and the Permittees are mining Panel 8 and preparing it for future waste emplacement (See Figure 1). Panels 3-6 have been permanently closed pursuant to the requirements of the WIPP Hazardous Waste Facility Permit (Permit) and the October 2014 Environmental Protection Agency final rule approving implementation of the Run-of-Mine Salt Panel Closure System.

G1-4 Lost Disposal Capacity:

Design of waste throughputs at the WIPP facility anticipated opening new panels for waste emplacement approximately every 30 months. Therefore, panels were designed with a lifetime of approximately 60 months, with the time split evenly between construction and emplacement. The inability to use mined areas in any panel (i.e., the loss of disposal capacity) is, primarily due to deterioration of the condition of the excavations (referred to as "ground conditions"). As is common with most underground mined excavations, ground conditions deteriorate over time. This notwithstanding, ground conditions can be maintained and kept safe for personnel for an extended period of time using an active ground control maintenance program.

In order to reduce the effects of time on underground structures, the Permittees employ a "just-in-time" philosophy to panel mining. Mining of a panel is planned to ensure that the panel will be ready and certified just before it is needed for waste emplacement (i.e., during the 30 months that the Permittees are filling a panel, the Permittees are also mining the next panel). The amount of active maintenance needed to keep the panel safe for workers emplacing waste is reduced with the "just-in-time mining" approach.

G1-4.1 Panel 1

Mining of Panel 1 began in May 1986. The panel was completed in 1988, anticipating that the WIPP facility would be authorized to receive and emplace waste in 1988. However, the first waste was not emplaced in Panel 1 until March 1999. This was far in excess of the anticipated 30-month emplacement period with the result that the Permittees had to perform extensive maintenance of the ground in Panel 1 before waste emplacement was started. Even with this effort, the Permittees made the decision to abandon rooms 6, 5, and 4 in Panel 1 due to the deteriorating ground conditions (See Figure 2). The permitted maximum TRU mixed waste disposal capacity of Panel 1 was 636,000 ft³ (18,000 m³); however, the final TRU mixed waste volume emplaced in Panel 1 was 370,685.70 ft³ (10,496.65 m³), resulting in a loss of 265,314.30 ft³ (7,503.35 m³) of TRU mixed waste disposal capacity. Based on EQ1 below, the lost disposal capacity in Panel 1 is the equivalent of 0.4 panels.

EQ1: # of Panels in Lost Disposal Capacity = Total Lost Disposal Capacity ÷ Total Maximum Panel Disposal Capacity

1 # of Panels in Lost Disposal Capacity (Panel 1) = $265,314.30 \text{ ft}^3 (7,503.35 \text{ m}^3) \div 636,000 \text{ ft}^3$
2 (18,000 m³)

3 # of Panels in Lost Disposal Capacity (Panel 1) = 0.4 panels

4 G1-4.2 Panels 3, 4, 5 and 6.

5 Table 1, *Permitted, Actual, and Lost CH-TRU Mixed Waste Volume*, shows the permitted
6 Maximum TRU mixed waste capacity for Panels 3-6 along with the final TRU mixed waste
7 volume and the TRU mixed waste lost disposal capacity volume in the aforementioned panels.
8 Panel 2 is not included in Table 1 as the final TRU mixed waste volume is 99.9% of the
9 permitted maximum TRU mixed waste capacity.

10 Panels 3-6 were permitted for a CH-TRU mixed waste capacity of 662,150 ft³ (18,750 m³) each.
11 The total CH-TRU mixed waste capacity lost in Panels 3-6 was 468,145.05 ft³ (13,256.08 m³).
12 The number of panels in lost disposal capacity is calculated using EQ1 as follows:

13 # of Panels in Lost Disposal Capacity (Panels 3-6) = $468,145.05 \text{ ft}^3 (13,256.08 \text{ m}^3) \div 662,150 \text{ ft}^3$
14 (18,750 m³)

15 # of Panels in Lost Disposal Capacity (Panels 3-6) = 0.7 panels

16 The loss of disposal capacity in Panels 3 – 6 is not related to ground control. Instead it is the
17 result of using a different mix of container sizes than anticipated when the permitted volumes
18 were determined and the placement of backfill (magnesium oxide sacks (MgO)) in racks on the
19 floor. The placement of MgO on the floor reduced the amount of available floor space for CH-
20 TRU mixed waste emplacement.

21 G1-4.3 Panel 7

22 The Permittees began waste emplacement operations in Panel 7 in September 2013.
23 Subsequent to a February 14, 2014, radiological release, the Permittees suspended waste
24 emplacement in Panel 7. The Permittees placed the underground ventilation system in
25 Filtration Mode as a result of the 2014 event, initially reducing the underground airflow to
26 approximately 13% of pre-event airflow. Additional filtration capacity was added by the
27 Permittees to the ventilation system in the form of the Interim Ventilation System which allowed
28 the Permittees to increase the underground airflow to 25% of the pre-event airflow.

29 One impact of reduced airflow is a reduction in the amount of diesel equipment that can be
30 operated. As the Permittees stated in the *November 2016 Response to the Technical*
31 *Incompleteness Determination (TID) for the Class 3 Permit Modification Request (PMR) for*
32 *Modifications to the WIPP Panel Closure Plan:*

33 *Due to the February 2014 events, the Permittees were not able to resume normal*
34 *underground maintenance until November 2014, at which time ground control,*
35 *including roof-bolting, was reinitiated...Currently, catch-up bolting in normally*
36 *occupied uncontaminated areas is complete. Catch-up bolting continues in*
37 *contaminated areas. This has been made more challenging since personnel now*
38 *must wear additional PPE to protect against contamination and recover areas*
39 *that could not be maintained by performing routine bolting.*

The inability to perform routine bolting has led the Permittees to place access restrictions on some areas in the underground. These areas are not considered safe for normal access. Some of these restricted access areas are barricaded and access is prohibited due to ground conditions.

The TID response provides an example of the consequences of not being able to perform ground control maintenance operations for an extended period of time. The Permittees were unable to perform ground control maintenance in the WIPP repository for approximately eight months after the 2014 incident. Although the Permittees restarted ground control maintenance in Panel 7 prior to allowing waste emplacement to begin, the low ventilation flow and the requirement for the workers to wear additional personal protective equipment (PPE) has slowed the ground control maintenance efforts. Because of the ground conditions in Panel 7 Room 4, the Permittees prohibited the use of the room thereby creating a loss of emplacement capacity. (See Figure 3).

In addition, Panel 7 Room 7 and Panel 7 Room 6 were lost for waste emplacement as a direct result of radiological contamination.

The abandonment of portions of Panel 7 in Rooms 7, 6, and 4 resulted in an estimated loss of 189,221 ft³ (5,358 m³) of TRU mixed waste volume capacity. Using EQ1, the loss is equivalent to 0.3 panels.

of Panels in Lost Capacity (Panel 7) = $189,221 \text{ ft}^3 (5,358 \text{ m}^3) \div 662,150 \text{ ft}^3 (18,750 \text{ m}^3)$

of Panels in Lost Capacity (Panel 7) = 0.3 panels

G1-4.4 Panels 9 and 10

Panels 9 and 10 consist of the main entries and cross-cuts from S-1600 to S-3650 (See Figure 1). The areas designated as Panels 9 and 10 were mined to be used for the operation of the underground facility (i.e., ventilation, access, mining transportation, transportation of TRU waste to Panels 1-8, etc.) with the intent that they would remain open for 25 to 30 years. Panels 9 and 10 were also available as waste disposal panels should they be needed in the original configuration of the repository.

Engineering judgements of Panels 9 and 10 concluded that the relocation of Panels 9 and 10 was preferred over widening the main entries of Panels 9 and 10 to accommodate both CH-TRU and RH-TRU waste. Subsequently, the Permittees submitted a Class 3 PMR in March 2013 to develop two additional panels south of Panels 4 and 5 for waste emplacement in lieu of using Panels 9 and 10. The two additional panels would have been named 9A and 10A and would have had the same design dimensions as Panels 1-8. The New Mexico Environment Department (NMED) issued a draft permit on February 14, 2014; however, the draft permit was withdrawn due to the radioactive material release that occurred on the same day.

The preceding discussion illustrates the fact that the need for additional panels is not new, and has been documented previously.

The radiological event of 2014 had an impact on the potential use of Panels 9, 9A, 10, and 10A. Panels 9 and 10 both experienced radiological contamination in portions of the panels. Ground control efforts in Panel 9 after February 2014 could not be performed quickly enough in order to

1 make the ground safe throughout the panel. Based on the ground conditions and contamination
2 in portions of the Panel 9 area, a decision was made to abandon the potential use of Panel 9 for
3 waste emplacement and to withdraw the Class 3 PMR, Repository Reconfiguration, associated
4 with adding Panels 9A and 10A south of the existing panels. This PMR was withdrawn by the
5 Permittees on November 10, 2016. Panel closures were installed in the north-south mains (E-
6 300, E-140, W-30, and W-170) between S2520 and S2750 to simultaneously close Panels 3-6,
7 remove Panel 9 from the ventilation system, and barricade entry to Panel 9. As stated in Permit
8 Attachment G, Section G-1e(1), if installing panel closures in the north-south mains is used,
9 then Panel 9 will not be used for TRU mixed waste disposal.

10 The Class 3 PMR, *Repository Reconfiguration*, submitted by the Permittees on March 18, 2013,
11 proposed the additional CH-TRU mixed waste volume of 662,150 ft³ (18,750 m³) for each
12 respective panel. This loss of the planned CH-TRU mixed disposal capacity is equivalent to an
13 emplacement volume of two panels.

14 Portions of Panel 10 were also contaminated during the 2014 radiological event. The reduction
15 in ventilation flow in the underground has reduced the amount of ground control work that can
16 be performed simultaneously, which has impacted portions of Panel 10. However, the
17 Permittees are maintaining the option to seek a permit modification use all or portions of Panel
18 10 for TRU mixed waste disposal, should it be determined to be needed and deemed practical.
19 The decision to use Panel 10 would be made based the following considerations:

- 20 • Ground conditions in Panel 10 and associated remediation efforts
- 21 • Radiological contamination in Panel 10
- 22 • Availability of additional disposal capacity (i.e., additional panel)

23 G1-5 Equivalent Panels of Lost Capacity

24 Table 2 presents the TRU mixed waste volume capacity lost from Panels 1, 3, 4, 5, 6, 7, 9, and
25 10 (9A and 10A equivalent volume as proposed in the March 2013 Class 3 PMR) in equivalent
26 panels. Data are based on the information and calculations presented above.

27 G1-6 Disposal Capacity Needed in the Next 10-year Permit Term

28 Panel 7 is currently the active waste emplacement panel and Panel 8 is currently being mined.
29 Pursuant to the 2020 Permit Renewal Part B Application, Attachment G, Table G-1, Panel 7 is
30 anticipated to be filled by September 2021 and Panel 8 is anticipated to be filled by May 2025.
31 Note 3 to Table G-1 of the 2020 Permit Renewal Part B Application states that it takes
32 approximately 30 months to fill a panel with waste. Based on the nominal time it takes to fill a
33 panel with TRU mixed waste, the current emplacement schedule, and the need to replace lost
34 waste volume capacity, a minimum of two additional panels will be needed during the next 10-
35 year term of the Permit.

36 The Permittees are currently working on a design and the regulatory documentation needed for
37 additional panels. The Permittees are planning to submit a Class 3 PMR to add additional
38 panels to the Permit in 2021.

1 G1-7 Conclusion

2 Waste emplacement capacity lost in Panels 1, 3, 4, 5, 6, 7, 9, and 10, is the equivalent of 3.4
3 typical panels used at the WIPP facility. This conclusion is based on the assumption that the
4 Class 3 PMR adding Panels 9A and 10A would have been approved. Since partially mined
5 panels are not part of the approved design, the 3.4 additional panels needed for CH-TRU
6 emplacement is adjusted to four panels. The WIPP facility will need four additional HWDUs
7 merely to regain the lost TRU mixed waste volume capacity.

8 Renewal Application Attachment G, Table G-1, indicates that a minimum of two additional
9 panels will be needed during the next Permit renewal period.

10

TABLES

Waste Isolation Pilot Plant
Hazardous Waste Facility Permit
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1
2

Table 1
Permitted, Actual, and Lost CH-TRU Mixed Waste Volume

Panel	Maximum CH-TRU Mixed Waste Capacity (ft ³)	Final CH-TRU Mixed Waste Volume (ft ³)	Lost CH-TRU mixed waste capacity by volume (ft ³)
3	662,150 (18,750 m ³)	603,600.40 (17,092.06 m ³)	58,549.60 (1,657.94 m ³)
4	662,150 (18,750 m ³)	503,500.27 (14,257.54 m ³)	158,649.73 (4,492.46 m ³)
5	662,150 (18,750 m ³)	562,454.22 (15,926.93 m ³)	99,695.78 (2,823.07 m ³)
6	662,150 (18,750 m ³)	510,911.06 (14,467.39 m ³)	151,238.94 (4,282.61 m ³)
Total	2,648,600 (75,000 m ³)	2,180,454.95 (61,743.92 m ³)	468,145.05 (13,256.08 m ³)

NOTE: values in columns 2 and 3 are taken from Table 4.1.1 of the Permit for CH TRU Waste

3
4

1
2

Table 2
Lost TRU Mixed Waste Volume Capacity in Equivalent Panels

Panel	Equivalent Panel Lost
1	0.4
3, 4, 5, and 6	0.7
7	0.3
Proposed 9A and 10A	2
TOTAL	3.4

3

Waste Isolation Pilot Plant
Hazardous Waste Facility Permit
Renewal Application
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FIGURES

13

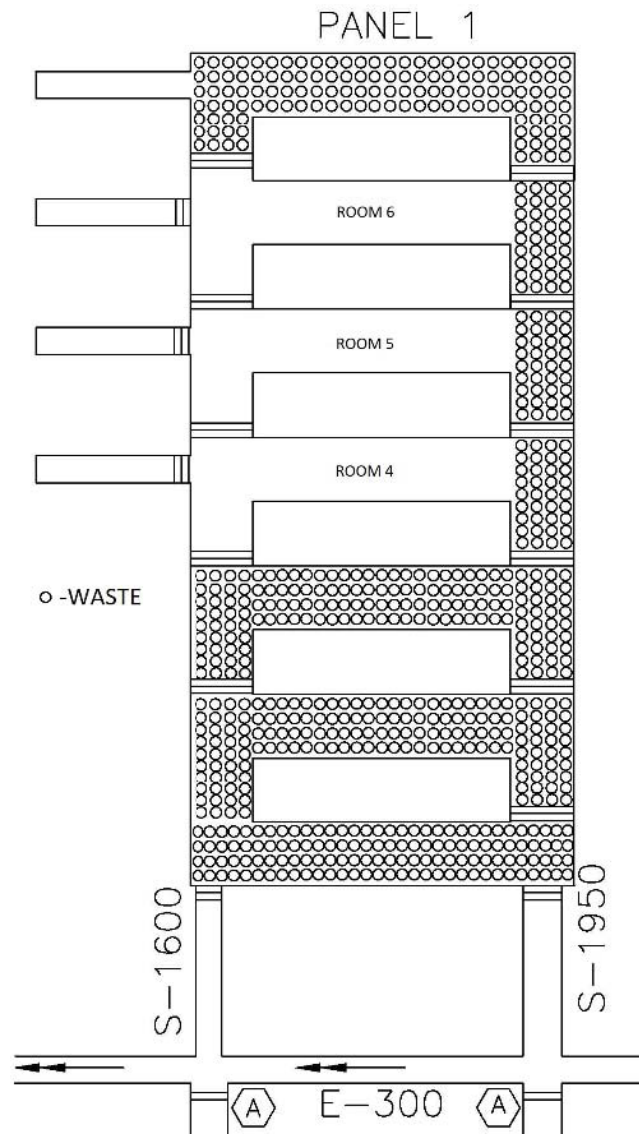


Figure 2
Panel 1 Showing Waste Emplacement and Abandoned Rooms

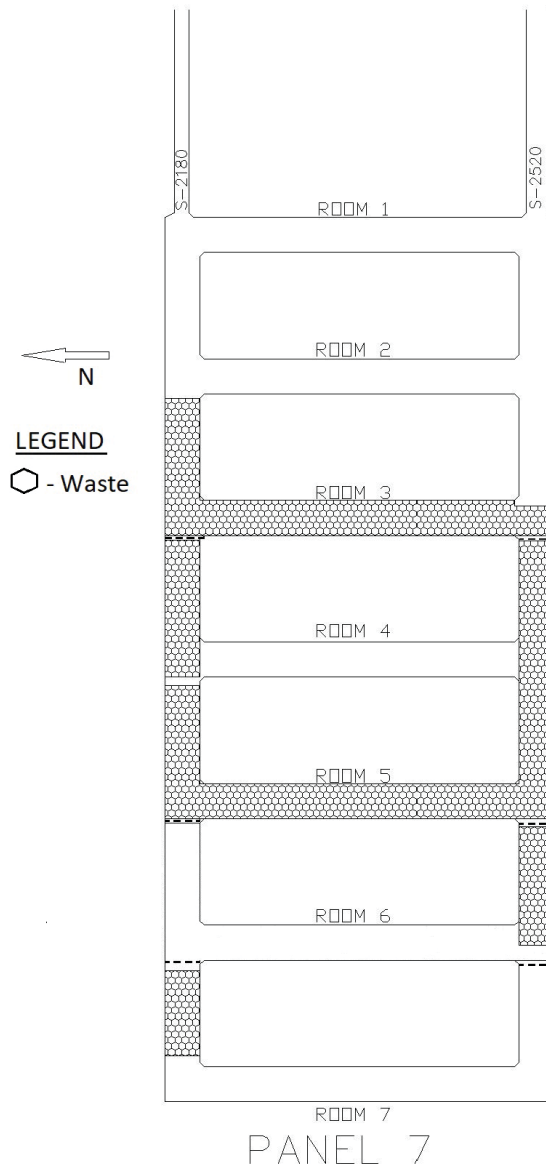


Figure 3
Panel 7 Showing Waste Emplacement and Abandoned Rooms (as of 3/1/2020)

1

Appendix E
Design Layout

Appendix F
Basis for Replacement Panels Volatile Organic Compound Room-Based Limits Update

APPENDIX F – Basis for Replacement Panels VOC Room-Based Limits Update

1. Introduction

The hypothetical roof fall scenario in the closed room adjacent to the active disposal room is the basis for the volatile organic compound (VOC) room-based limits listed in Permit Part 4.4, Table 4.4.1 – VOC Room-Based Limits. The purpose of this appendix is to use the RCRA Part B Application Appendix D9 Attachment 1 methodology (DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997) to calculate VOC room-based limits for the replacement panels (Panels 11 and 12) due to a change in room height. For Panels 11 and 12, the nominal room height (*i.e.*, room height at the time of waste emplacement) will be 14 ft. The current VOC room-based limits were determined using a room height of 13 ft. Considering the change in room height for the replacement panels, a change to VOC room-based limits is required.

2. Background

The Permittees are required to evaluate the potential risk to human health and the environment due to the emission of hazardous constituents. Specifically, the emission of VOCs to the air from a miscellaneous unit. The miscellaneous unit environmental performance standards pursuant to 20 NMAC 4.1.500 (incorporating 40 CFR §264.601) state the following:

A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit. . . Protection of human health and the environment includes, but is not limited to . . .

(c) Prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air.

In addition, 20 NMAC 4.1.500 (incorporating 40 CFR §264.602) further states:

Monitoring, testing, analytical data, inspections, response, and reporting procedures and frequencies must ensure compliance with §§264.601 . . . as well as meet any additional requirements needed to protect human health and the environment as specified in the permit.

To ensure compliance with the stated environmental performance standards, the Permittees have implemented the Confirmatory Volatile Organic Compound Monitoring Program (*i.e.*, VOC Monitoring Program). The purpose of this program is to confirm that the concentrations of VOCs entrained in the air emissions from the Waste Isolation Pilot Plant (**WIPP**) underground Hazardous Waste Disposal Units (**HWDU**) do not exceed the environmental performance standard under 20 NMAC 4.1.500 (incorporating 40 CFR §264.601(c)). Specifically, the measured concentrations of VOCs in any open (active) room and in each closed room in active panels within an underground HWDU shall not exceed the limits specified in Permit Part 4.4, Table 4.4.1. If the limits are exceeded, remedial actions are required pursuant to Permit condition 4.6.3.3.

The Permittees developed room-based VOC limits to ensure that operation, maintenance, and closure of individual HWDUs would be protective of underground waste handlers. Because VOC concentrations do not reach equilibrium in an open room due to continuous use of repository ventilation, the concentrations are based on the adjacent closed room hypothetical roof fall scenario, which drives the greatest risk. The hypothetical scenario is described in the Resource Conservation and Recovery Act (**RCRA**) Part B Application (Appendix D9, Attachment 1 [DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997]). The current room-based VOC limits listed in Permit Part 4.4, Table 4.4.1 are based on the adjacent closed room hypothetical roof fall methodology. These limits are repeated in Table F-1.

Table F-1: Current Permit VOC Room-Based Limits

VOC Room-Based Limits	
Compound	VOC Room-Based Limit parts per million by volume (ppmv)
Carbon Tetrachloride	9,625
Chlorobenzene	13,000
Chloroform	9,930
1,1-Dichloroethylene	5,490
1,2-Dichloroethane	2,400
Methylene Chloride	100,000
1,1,2,2-Tetrachloroethane	2,960
Toluene	11,000
1,1,1-Trichloroethane	33,700
Trichloroethylene	48,000

3. Methodology to Determine Current Permit VOC Room-Based Limits

Because a closed disposal room is essentially isolated from the mine ventilation air, the VOCs diffuse through emplaced transuranic (TRU) waste container filters and collect in the closed room headspace, whereas, the VOCs in an active room are swept away by the mine ventilation system. The VOC room-based limits in Permit Part 4.4, Table 4.4.1 were established based on the closed room hypothetical roof fall scenario described in the RCRA Part B Application (Appendix D9, *Exposure Assessment for Protection of the Atmosphere*, Attachment 1, *Examination of Roof Collapse Scenario* [DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997]).

Original RCRA Part B Appendix D9 Assumptions

- 1) Room dimensions are 300 ft x 33 ft x 13 ft
- 2) The room is backfilled to 1.5 ft from the ceiling
- 3) [Adjacent Closed] Room Headspace Volume \equiv RHV
- 4) $(RHV) = (300 \text{ ft}) \times (33 \text{ ft}) \times (1.5 \text{ ft}) = 14,850 \text{ cubic feet}$
- 5) The volume that is released to an access drift/open/active room, due to a hypothetical roof fall, is 10% of the RHV
- 6) The fraction, f , available for worker exposure is 0.05 (5% of the RHV)
- 7) After the roof collapse in the closed adjacent room, the worker in the open active room is exposed to VOCs from the closed adjacent room for 1 minute.
- 8) The active room ventilation flowrate (Q) is a minimum of 35,000 standard cubic feet per minute (**scfm**)

Figures F-1 through F-6 illustrate the application of the Appendix D9 assumptions.

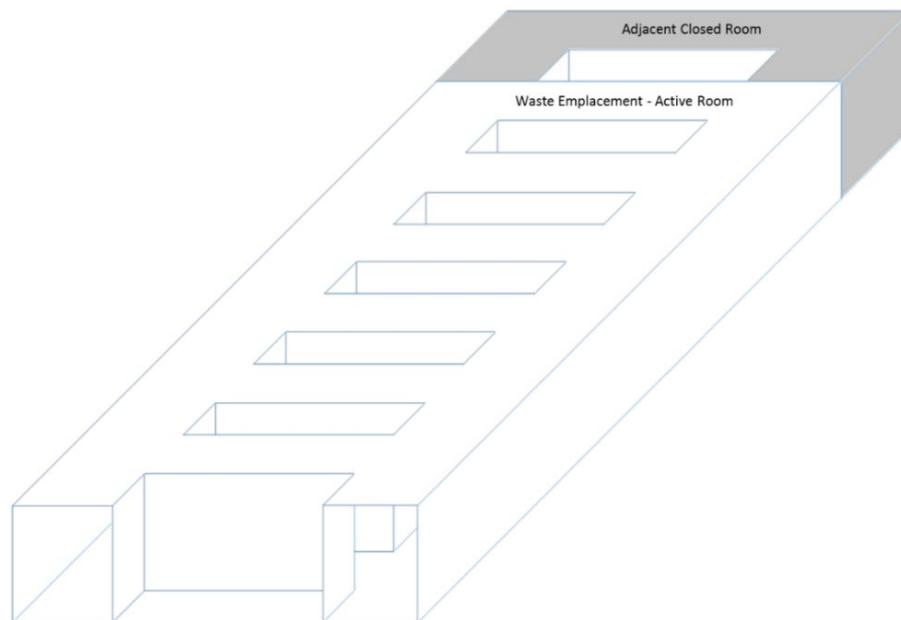


Figure F-1: TRU Waste Disposal Panel with Seven Rooms

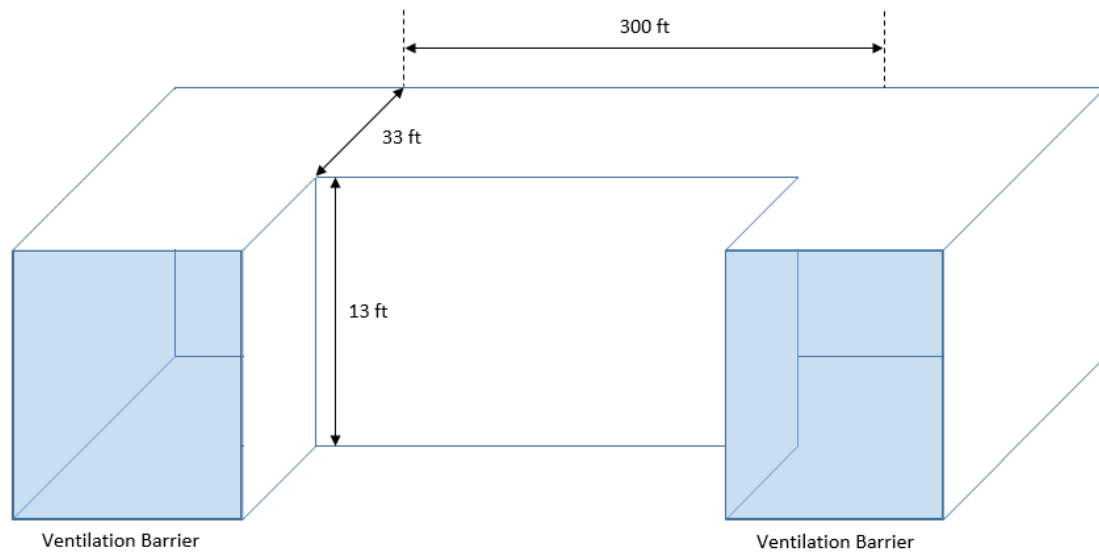


Figure F-2: Adjacent Closed Room with Ventilation Barriers

Figure F-3 illustrates the hypothetical roof fall scenario in the adjacent closed room. This event initiates a pressure wave, which displaces 10% of the room headspace volume. The displaced volume, which contains VOCs, migrates through the ventilation barriers into the active room. The ventilation barriers used to isolate filled rooms from the mine ventilation system are described in Permit Attachment A2, Section A2-2a(3).

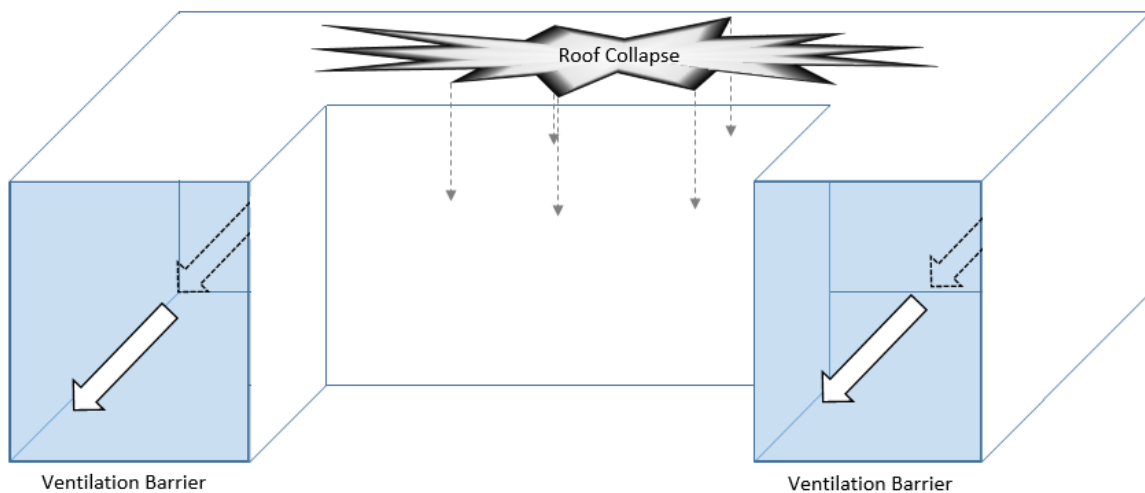


Figure F-3: Roof Fall in Adjacent Closed Room

Figures F-4a through F-4c show the propagation stages. Figure F-4a illustrates the first stage of the hypothetical roof fall scenario, which is the initiating event (*i.e.*, the roof collapse).

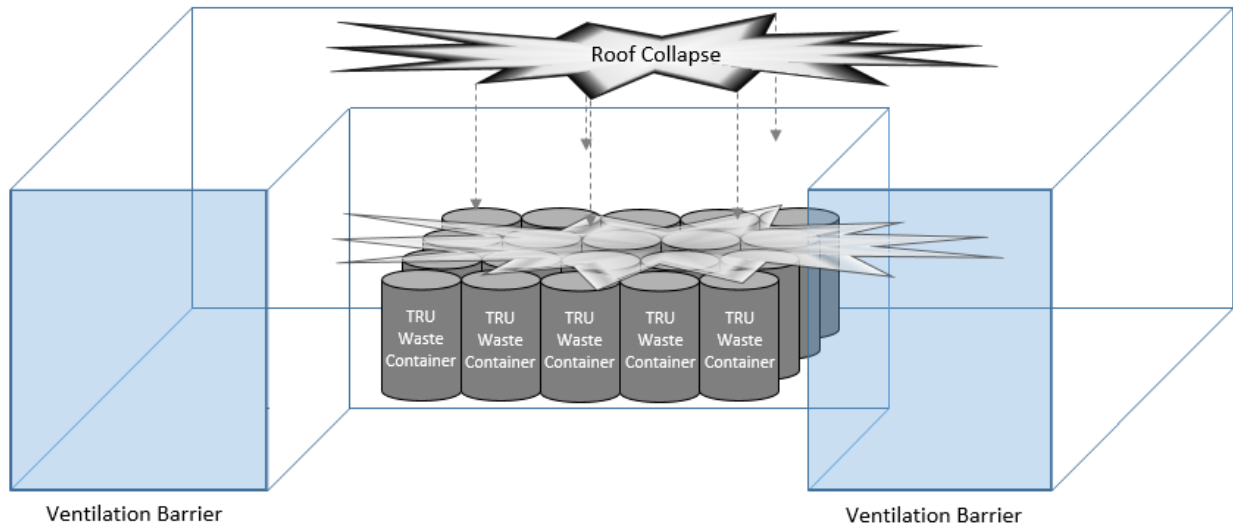


Figure F-4a: Roof Fall Scenario Propagation – Initiating Event

The roof fall causes a pressure wave to emanate from the center of the room above the emplaced TRU waste containers. The pressure wave displaces 10% of the room headspace volume, which contains VOCs. This is illustrated in Figure F-4b.

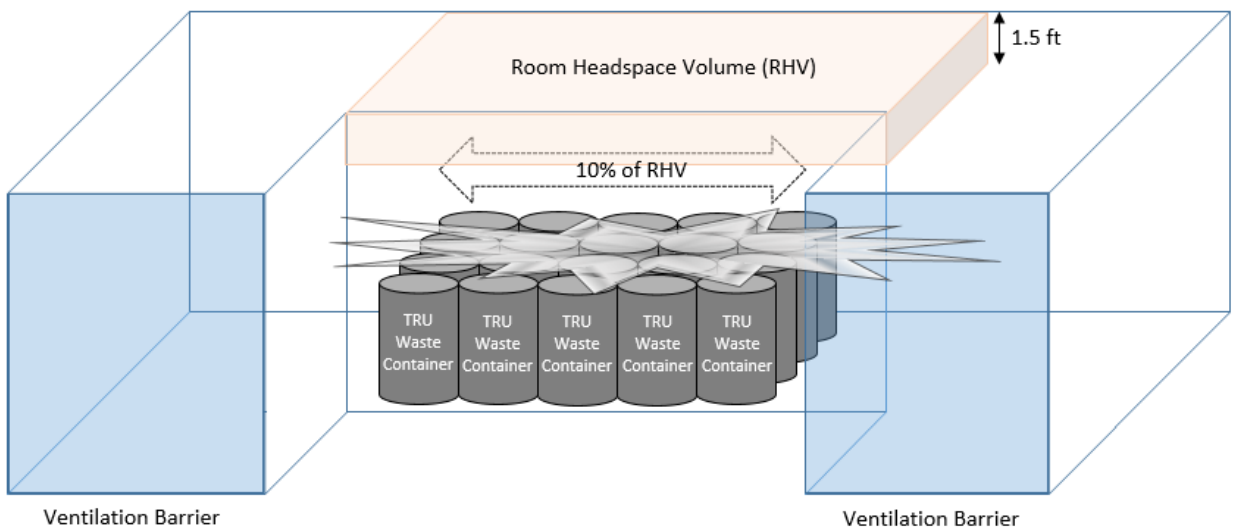


Figure F-4b: Roof Fall Scenario Propagation – Displaced Volume Migration

Figure F-4c shows the migration of the displaced volume from the adjacent closed room into the active room where workers may be present.

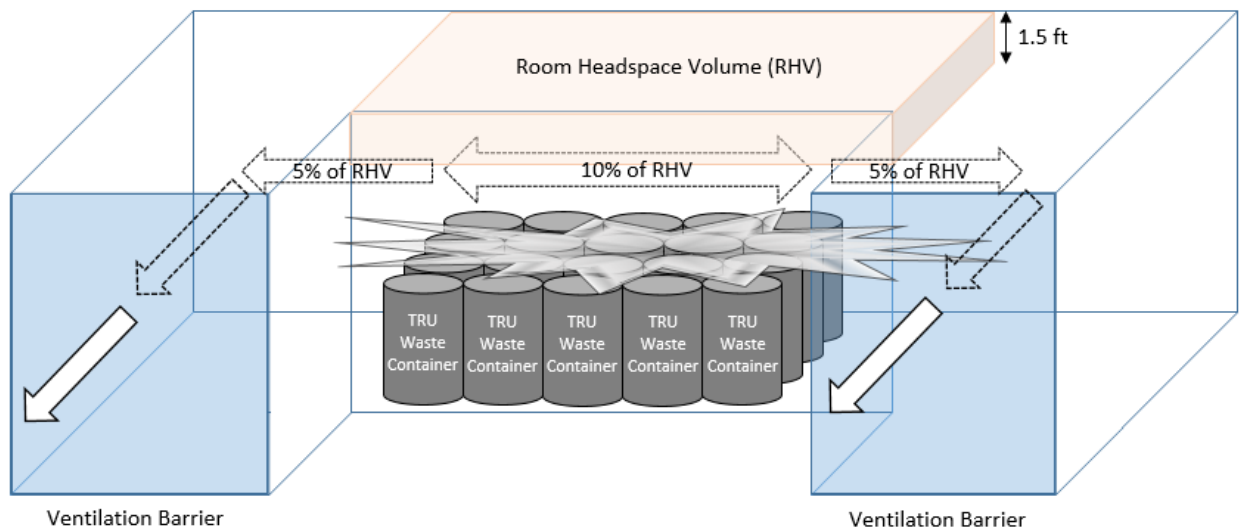


Figure F-4c: Roof Fall Scenario Propagation – VOCs Enter Active Room

The displaced volume from the adjacent closed room mixes with the active room volume. The active room volume of 35,000 standard cubic feet is changed out every minute by the active room ventilation flowrate, which is defined as Q .

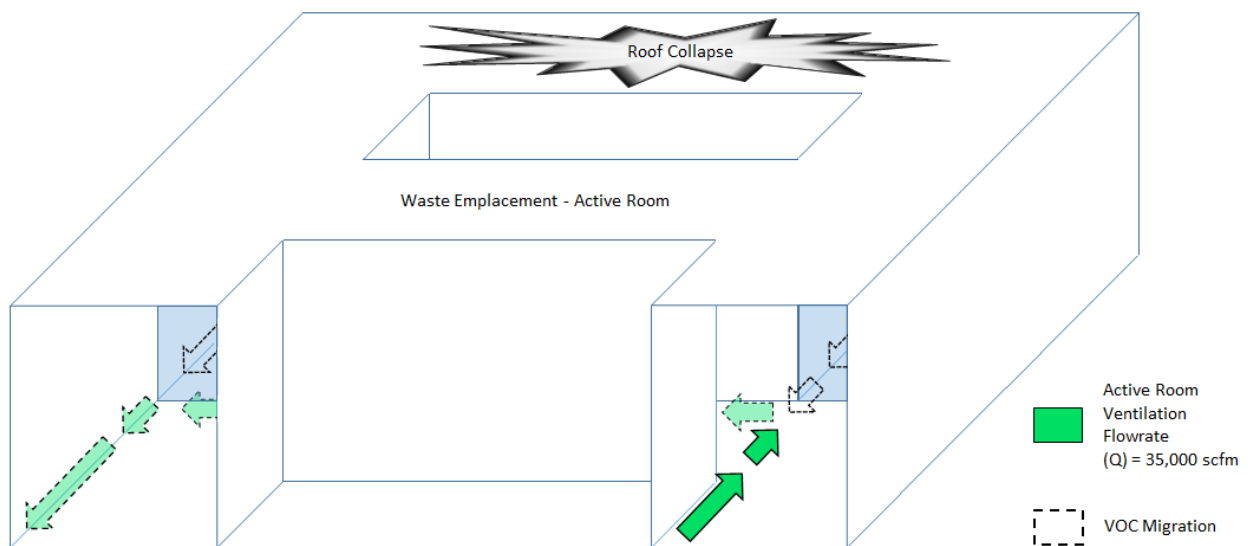


Figure F-5: Waste Emplacement in Active Room with Roof Fall in Adjacent Closed Room

The 1-minute worker exposure from VOCs due to a roof fall in the adjacent closed room is illustrated in Figure F-6.

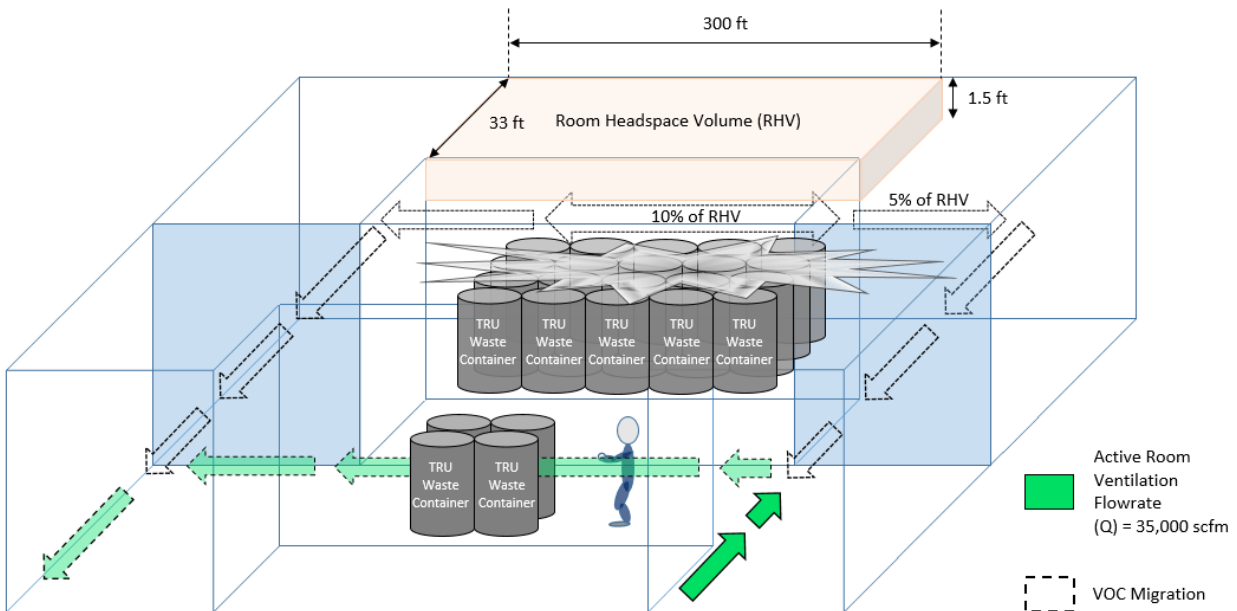


Figure F-6: Potential WIPP Worker Exposure from Roof Fall in Adjacent Closed Room

The concentration of each VOC in the adjacent closed room is first determined by limiting worker exposure in the active room to the National Institute of Occupational Safety and Health (NIOSH) VOC Immediately Dangerous to Life or Health (IDLH) concentration (C_2) after the hypothetical roof fall.

C_1 \equiv concentration in the adjacent closed room {this parameter is calculated}

C_2 \equiv VOC IDLH concentration in the active room {this value is set by NIOSH}

V_1 \equiv the displaced volume from the roof fall event in the adjacent closed room that the worker is exposed to.

$$V_1 = 5\% \text{ of the RHV} = [(f) \times (\text{RHV})] = [(0.05) \times (300) \times (33) \times (1.5)]$$

$$V_1 = 742.5 \text{ cubic feet}$$

$$V_2 \equiv \text{1-minute active room ventilation volume plus } V_1 = [(Q) \times (1 \text{ min}) + V_1]$$

$$V_2 = [(35,000 \text{ scfm}) \times (1 \text{ minute}) + 742.5 \text{ cubic feet}]$$

$$V_2 = 35,742.5 \text{ cubic feet}$$

4. Calculation Methodology

The health-based COC in the closed adjacent room for each VOC is calculated by using the Dilution Rule:

$$C_1V_1 = C_2V_2$$

$$(\text{COC}) \times [(f) \times (\text{RHV})] = (\text{IDLH}) \times [(Q) \times (1 \text{ minute}) + (f) \times (\text{RHV})]$$

$$\text{MAXC} = \text{IDLH of Active Room} = \frac{(\text{COC})(f)(\text{RHV})}{((Q)(1 \text{ min}) + (f)(\text{RHV}))}$$

Solve for the COC:

$$\text{COC} = \frac{(\text{IDLH})((Q)(1 \text{ min}) + (f)(\text{RHV}))}{(f)(\text{RHV})}$$

In summary, the IDLH health-based VOC COCs are dependent upon volumes.

Figure F-7 illustrates the health-based COC calculation methodology.

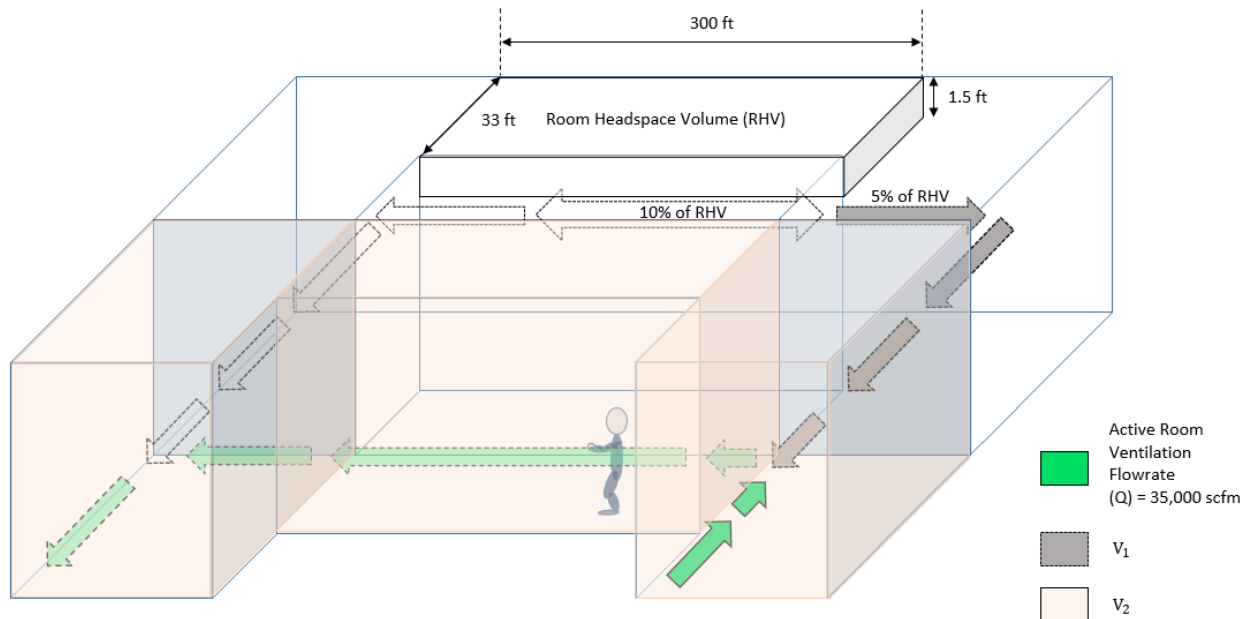


Figure F-7: Illustration of Health-Based COC Calculation Methodology

In addition to the health-based protection, the Agency regulations pursuant to 20 NMAC 4.1.500 (incorporating 40 CFR §264.31) also require the following:

Facilities must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or . . . which could threaten human health or the environment.

Seven of the 10 regulated VOCs are flammable and have a specific lower explosive limit (LELs), which is the percentage by volume of the VOC that is explosive in air. These include chlorobenzene, 1,1-dichloroethylene, 1,2-dichloroethane, methylene chloride, toluene, 1,1,1-trichloroethane, and trichloroethylene. The hypothetical roof fall scenario in a closed disposal room could potentially produce friction (and sparks) resulting in gas ignition and explosion if the VOC concentration exceeds its LEL. Therefore, the combustible VOC concentration LEL limits must be compared to their health-based IDLH COCs.

Table F-2: LEL Analysis

Compound	COC Based on LEL	10% LEL Value [ppmv] (from NIOSH)	LEL Value [ppmv] (calculated)	Permit Value [ppmv]
Carbon Tetrachloride	No	{not combustible}	-	9,625
Chlorobenzene	Yes	1,300	13,000	13,000
Chloroform	No	{not combustible}	-	9,930
1,1-Dichloroethylene	No	6,500	65,000	5,490
1,2-Dichloroethane	No	6,200	62,000	2,400
Methylene Chloride	No	13,000	130,000	100,000
1,1,2,2-Tetrachloride	No	{not combustible}	-	2,960
Toluene	Yes	1,100	11,000	11,000
1,1,1-Trichloroethane	No	7,500	75,000	33,700
Trichloroethylene	No	8,000	80,000	48,000

Verify that the LEL limits for chlorobenzene and toluene are still bounding by applying the health-based risk methodology from the RCRA Part B Application Appendix D9, Attachment 1 (DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997). The IDLH value listed in NIOSH for chlorobenzene is 1,000 ppmv and for toluene is 500 ppmv.

$$COC = \frac{(IDLH)((Q)(1 \text{ min}) + (f)(RHV))}{(f)(RHV)}$$

$$COC \text{ chlorobenzene} = \frac{(1,000)(35,000 + (0.05)(14,850))}{(0.05)(14,850)} = 48,138 \text{ ppmv}$$

$$COC \text{ toluene} = \frac{(500)(35,000 + (0.05)(14,850))}{(0.05)(14,850)} = 24,069 \text{ ppmv}$$

The LEL limit for both analytes is more stringent than the health-based methodology. Therefore, the VOC concentrations listed in Permit Part 4.4, Table 4.4.1 for chlorobenzene and toluene are based on their LEL limits.

5. VOC Room-Based Limit Adjustments for Replacement Panels 11 and 12

The same hypothetical adjacent closed room scenario and calculation methodology is used to determine the VOC room-based limits for the two replacement panels. The parameters previously discussed remain the same with the exception of the disposal room height. For the replacement panels, the room height will be 14 ft instead of 13 ft, as in the original design. To provide an equivalent level of protection to the worker in the active room, the VOC room-based limits for the replacement panels are updated accordingly.

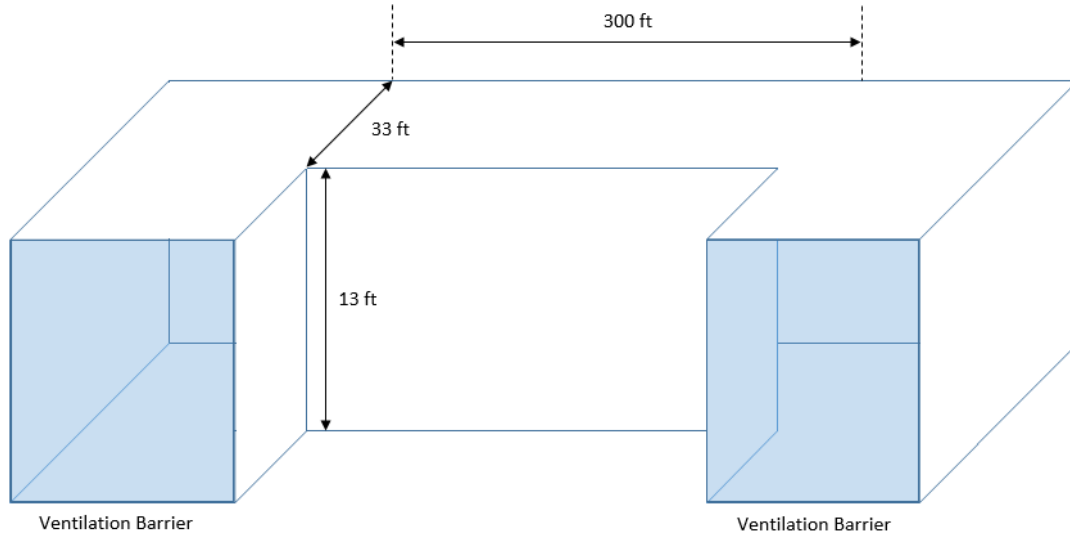


Figure F-8: Original Room Dimensions

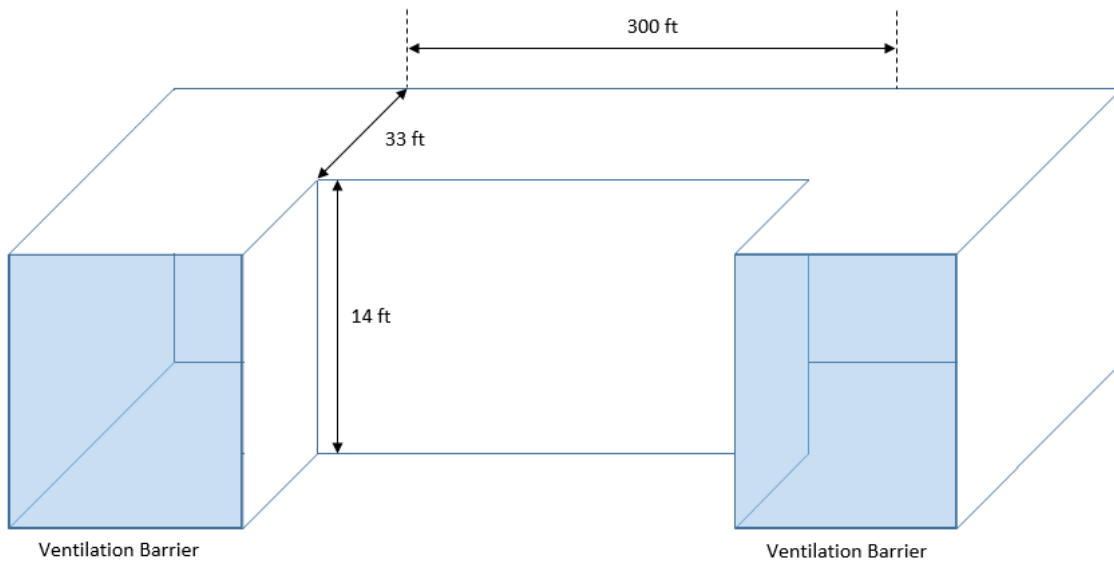


Figure F-9: Replacement Panels Room Dimensions

Because the replacement panels room height dimension is larger than the original panel design, the room headspace volume (RHV) in the adjacent closed room increases from 1.5 feet to 2.5 feet. This increases the RHV, which will change the health-based VOC COCs for the replacement panels. Figure F-10 illustrates the modified scenario.

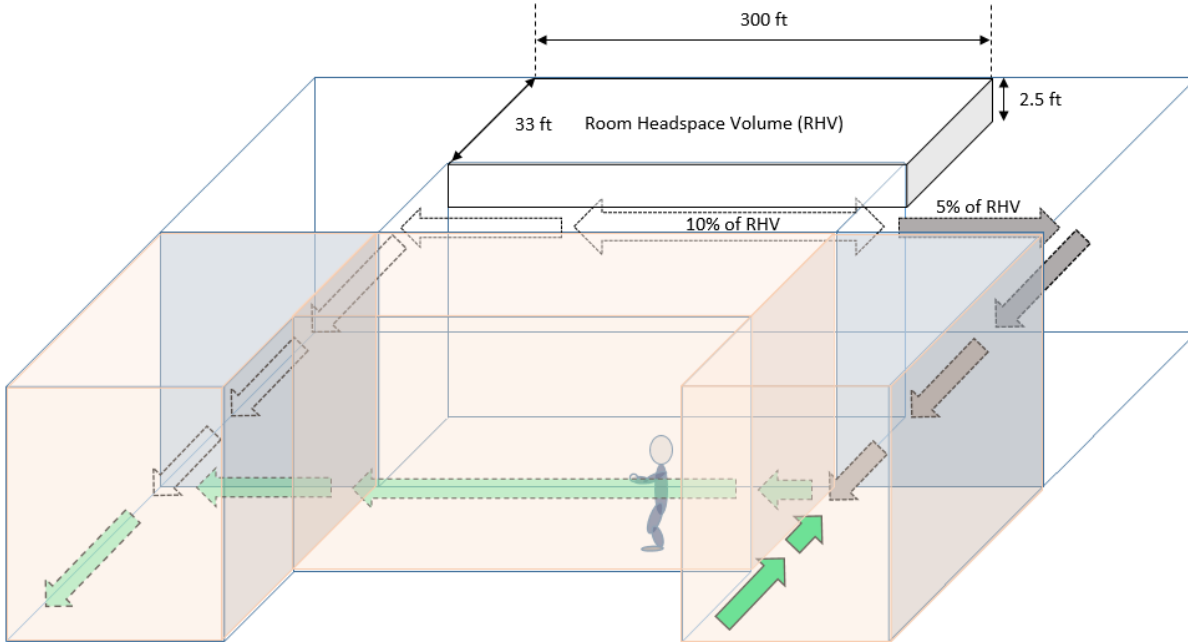


Figure F-10: Replacement Panels WIPP Worker Exposure Scenario

Using the dilution rule, we can calculate the adjusted VOC concentrations for the eight health-based analytes for the replacement panels as follows:

$$(C_{old}) \times (V_{RHV_old}) = (C_{new}) \times (V_{RHV_new})$$

C_{old} \equiv health-based COCs listed in Permit Part 4.4, Table 4.4.1

C_{new} \equiv health-based COCs for replacement panels

V_{RHV_old} = 742.5 cubic feet

V_{RHV_new} = 5% of RHV new = $[(f) \times (RHV \text{ new})] = [(0.05) \times (300) \times (33) \times (2.5)]$

V_{RHV_new} = 1,237.5 cubic feet

$$C_{new} = \frac{(C_{old})(V_{RHV_old})}{(V_{RHV_new})}$$

The eight health-based analytes are carbon tetrachloride, chloroform, 1,1-dichloroethylene, 1,2-dichloroethane, methylene chloride, 1,1,2,2-tetrachloroethane, 1,1,1-trichloroethane, and trichloroethylene. The new health-based VOC room-based limits are calculated as follows:

$$\text{COC carbon tetrachloride} = \frac{(9,625 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 5,775 \text{ ppmv}$$

$$\text{COC chloroform} = \frac{(9,930 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 5,958 \text{ ppmv}$$

$$\text{COC 1,1-dichloroethylene} = \frac{(5,490 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 3,294 \text{ ppmv}$$

$$\text{COC 1,2-dichloroethane} = \frac{(2,400 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 1,440 \text{ ppmv}$$

$$\text{COC methylene chloride} = \frac{(100,000 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 60,000 \text{ ppmv}$$

$$\text{COC 1,1,2,2-tetrachloroethane} = \frac{(2,960 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 1,776 \text{ ppmv}$$

$$\text{COC 1,1,1-trichloroethane} = \frac{(33,700 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 20,220 \text{ ppmv}$$

$$\text{COC trichloroethylene} = \frac{(48,000 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 28,800 \text{ ppmv}$$

For the LEL based VOC COCs, the health-based IDLH must be evaluated to determine if the LEL limit is still bounding. The health-based VOC COCs for chlorobenzene and toluene are first calculated using the RCRA Part B Application Appendix D9, Attachment 1 methodology (DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997).

The IDLH listed in NIOSH for chlorobenzene is 1,000 ppmv and toluene is 500 ppmv.

$$COC = \frac{(IDLH)((Q)(1 \text{ min}) + (f)(RHV))}{(f)(RHV)}$$

$$COC \text{ chlorobenzene} = \frac{(1,000)(35,000 + (0.05)(14,850))}{(0.05)(14,850)} = 48,138 \text{ ppmv}$$

$$COC \text{ toluene} = \frac{(500)(35,000 + (0.05)(14,850))}{(0.05)(14,850)} = 24,069 \text{ ppmv}$$

Now these health-based COCs are adjusted for the new replacement panel room dimensions.

$$C_{\text{new}} = \frac{(C_{\text{old}})(V_{\text{RHV}_{\text{old}}})}{(V_{\text{RHV}_{\text{new}}})}$$

$$COC \text{ chlorobenzene} = \frac{(48,138 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 28,882 \text{ ppmv}$$

$$COC \text{ toluene} = \frac{(24,069 \text{ ppmv})(742.5 \text{ cubic feet})}{(1,237.5 \text{ cubic feet})} = 14,441 \text{ ppmv}$$

Table F-3: LEL Analysis for Replacement Panels

Compound	COC Based on LEL	10% LEL Value [ppmv] (from NIOSH)	LEL Value [ppmv] (calculated)	Permit Value [ppmv]
Chlorobenzene	Yes	1,300	13,000	13,000
Toluene	Yes	1,100	11,000	11,000

For Chlorobenzene: The LEL of 13,000 is still less than 28,882 ppmv; therefore, continue to use the LEL for this analyte.

For Toluene: The LEL of 11,000 is still less than 14,441 ppmv, therefore, continue to use the LEL for this analyte.

6. Conclusions

The equivalent VOC room-based limits for the replacement panels 11 and 12, based on the nominal 14-foot room height are listed as follows:

Table F-4: Recommended VOC Room-Based Limits for Replacement Panels

VOC Room-Based Limits for Panels 11 and 12	
Compound	VOC Room-Based Concentration Limit (PPMV)
Carbon Tetrachloride	5,775
Chlorobenzene	13,000
Chloroform	5,958
1,1-Dichloroethylene	3,294
1,2-Dichloroethane	1,440
Methylene Chloride	60,000
1,1,2,2-Tetrachloroethane	1,776
Toluene	11,000
1,1,1-Trichloroethane	20,220
Trichloroethylene	28,800