Department of Energy
Carlsbad Field Office
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Carlsbad, New Mexico 88221

AUG 15 2019

Mr. John E. Kieling, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Subject: Class 3 Permit Modification Request for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Number NM4890139088-TSDF and Notification of Withdrawal Regarding the December 22, 2017 Determination of Class

Reference: Department of Energy Carlsbad Field Office and Nuclear Waste Partnership LLC (Permittees) correspondence to John E. Kieling, Chief Hazardous Waste Bureau, New Mexico Environment Department, dated December 22, 2017, Subject: Request for a Determination of Class for a Permit Modification Request for the Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Number NM4890139088-TSDF

Dear Mr. Kieling:

Enclosed is a Class 3 Permit Modification Request consisting of the following:

- Excavation of a New Shaft and Associated Connecting Drifts

This modification was previously submitted to the New Mexico Environment Department (NMED) for a Determination of Class in accordance with 20.4.1.900 New Mexico Administrative Code (NMAC) (incorporating 40 Code of Federal Regulations [CFR] 270.42(d)) as indicated in the Reference letter. This letter withdraws the referenced request for a Determination of Class.

We certify under penalty of law that this document and all attachments 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 575-234-7476.

Sincerely,

Signatures on File

Kirk D. Lachman, Acting Manager
Carlsbad Field Office

Bruce C. Covert, Project Manager
Nuclear Waste Partnership LLC

Enclosure

cc: w/enclosure
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CBFO M&RC
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CBFO:OEP:MRB:SA:19-0241:UFC 5486.00

Class 3 Permit Modification Request

Excavation of a New Shaft and Associated Connecting Drifts

Waste Isolation Pilot Plant
Carlsbad, New Mexico

WIPP Permit Number - NM4890139088-TSDF

August 2019

Table of Contents

Acronyms and Abbreviations

AIS	Air Intake Shaft
cfm	cubic feet per minute
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
ES	Exhaust Shaft
IVC	Inlet Vane Control
MOC	Managing and Operating Contractor
NVP	Natural Ventilation Pressure
NFB	New Filter Building
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
Permit	WIPP Hazardous Waste Facility Permit
PMR	Permit Modification Request
PPA	Property Protection Area
PVS	Permanent Ventilation System
RCRA	Resource Conservation & Recovery Act
SHS	Salt Handling Shaft
S#5	Shaft #5
scfm	standard cubic feet per minute
SVS	Supplemental Ventilation System
TRU	transuranic
TSDF	Treatment, Storage and Disposal Facility
UG	underground
US	Utility Shaft
UVS	underground ventilation system
VFD	variable frequency drive
VOC	volatile organic compound
WS	Waste Shaft
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 Managing 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 modification consists of a new shaft, designated as Shaft #5 (**S#5**), along with drifts to connect S#5 to the existing WIPP underground (**UG**) facility. The S#5 design is one of two projects referred to as the Permanent Ventilation System (**PVS**) upgrades. The PVS upgrades consist of S#5 with intake fans on the surface and a New Filter Building (**NFB**) with exhaust fans located on the surface of the facility. The NFB project was submitted as a separate PMR and was previously approved. The design of S#5 assumes that new exhaust fans and the NFB are operational and that the Exhaust Filter Building and associated ventilation fans, the Supplemental Ventilation System (**SVS**), and the Interim Ventilation System will no longer be operated. Shaft #5 will be located nominally 1,200 feet west of the Air Intake Shaft (**AIS**). Shaft #5 will be used as the primary air intake shaft for the underground repository.

The original DOE budget line item name of the project was “15-D-412 Exhaust Shaft.” The terms used to describe the project changed over time as engineering and design work matured. Engineering modeling and design work demonstrated that the best design for the PVS upgrades would be to use the new shaft as an intake shaft. Due to the change in design for S#5, the DOE budget line item name of the project was changed to “15-D-412 Utility Shaft.” As a utility shaft, S#5 can support current needs and is capable of supporting future uses (e.g., hoisting capability for personnel, materials, and salt). Although such future uses are mentioned in the *DOE FY2019 Congressional Budget Justification,* they are not part of the 15-D-412 Utility Shaft (**US**) project and are not part of this PMR.

PRINCIPLE DESIGN FEATURES

The S#5 design allows for increased ventilation airflow into the underground and an unfiltered exhaust path through the existing AIS for the Construction Circuit airflow. This design allows for concurrent mining (unfiltered ventilation), maintenance (either unfiltered or filtered ventilation, depending on location), and waste emplacement operations (filtered ventilation) to take place. This design also allows the salt particulate that is generated in the Construction Circuit (generated by mining) to be exhausted through an unfiltered exhaust path while the particulate that is generated in the North, Disposal, and Waste Shaft Station Circuits (generated by travel and maintenance operations) is exhausted through the Salt Reduction Building, then routed through the filters. This design will not only reduce the particulate build-up on the filters, it will reduce the amount of particulate from the Salt Reduction Building that must be disposed of.

The PVS restores the WIPP underground to its pre-2014 condition by providing significantly increased ventilation flow, unfiltered exhaust for the construction activities, and filtered exhaust for the disposal circuit.

Two intake fans, one of which will be operating at any given time, pushing air into the repository through S#5 represent an improvement to the underground ventilation system for the WIPP facility. The improvement includes fans with variable frequency drives (**VFD**) and automatic controls that link the operation of the intake fans (located on surface near S#5) and exhaust fans (located on surface in the NFB) together.

Shaft #5 will be an enclosed shaft. The collar of the shaft will be covered with a steel cover. Surface fans (intake fans) will be connected to S#5 via duct from the fans to an intersection point in the shaft that is approximately 30-50 feet below the surface (See Appendix C, *Design Drawing of New Shaft Collar with Vent Duct*). The intake fans will push air into the UG while the steel cover over the collar will ensure that the air is directed into the UG. While two fans will be connected to the shaft, only one fan will operate at a time while the other fan will be used as a back-up. The sloped inlet ducting diverts the air into the shaft in a manner that reduces shock losses in the ventilation system. The fans will have VFD controllers. The VFDs will be programmed to respond to the flow from the exhaust fans. As an example, if one exhaust fan were to suddenly break down, total exhaust at the Exhaust Shaft (**ES**) would be reduced. The reduced flow rate would be communicated to the intake fan at S#5. The VFD would slow down the intake fan to a desired pre-programmed intake airflow rate to prevent the intake fan from over-pressuring the UG.

The current UG ventilation system (**UVS**) fans work only in the exhaust mode by drawing air through the WIPP facility. The exhaust fans pull air through the underground to the bottom of the ES, then through the ES to the surface where it is released after being filtered. Under the current UVS configuration the fresh air is pulled into the UG through three intake shafts: the Salt Handling Shaft (**SHS**), the Waste Shaft (**WS**), and the AIS. There are no fans or controls on the three intake shafts.

Currently the main exhaust fan motors operate with a fixed frequency and voltage, meaning that the fan flow cannot be controlled by varying the frequency and voltage to the motor. Facility Operations personnel can modify the exhaust fan airflow by manually opening or closing the Inlet Vane Control (**IVC**) located on each surface exhaust fan. The IVC is essentially a set of vanes located in the fan housing that operate similarly to a Venetian blind; the vanes can be opened a little bit for a small amount of flow, or they can be opened completely for the maximum amount of flow.

OPERATIONAL ADVANTAGES

The UG is approximately 2,150 feet below the surface. Due to the difference in elevation between the surface and the underground, there is a difference in air density between the surface air and the underground air. The difference in air density between the surface and the underground creates what is referred to as the Natural Ventilation Pressure (**NVP**) of the UVS. The difference in air density changes with changes in temperature, barometric pressure, and relative humidity.

When the surface temperature is cold (winter conditions), the intake air is more dense (heavier) than the UG air and flows naturally down the open intake shafts (note that the WS is enclosed by the Waste Handling Building and, therefore, experiences less of this effect). In this instance the UVS experiences a positive NVP. The cold air falling down the shaft aids the fans in providing air to the underground. With the IVC completely open, the fans are able to exhaust air at a higher flow rate as the fresh air is being pushed into the UG by the cold air falling down the shafts as well as being pulled out of the UG by the exhaust fans.

If the airflow being exhausted is reduced (*i.e.*, switching from Normal Mode to Minimum Mode), then the air falling down the AIS (being pushed into the UG) is more than the fan can exhaust in Minimum Mode. This scenario causes the airflow to reverse in one of the other shafts (typically the SHS) as the other shaft acts like a relief valve for the UG airflow. To prevent this from happening, the Standard Operating Procedure is for Facility Operations to cover or partially cover the AIS.

When the surface air temperature is hot (summer conditions), the intake air is less dense than the UG air and resists being pulled into the UG (hot air rises). This condition creates a negative NVP, meaning the exhaust fans must work harder (operate at a higher fan pressure) to pull the same amount of air into the UG. If the IVC is wide open and the fan pressure cannot be increased (in part due to the fixed frequency and voltage applied to the motor), then the UVS experiences a reduction in total airflow.

As explained above, the current UVS does not have the capability of automatically adjusting to changes in temperature, barometric pressure, and relative humidity. This inability to automatically adjust increases the susceptibility of the UVS to changes in airflow quantity. The PVS upgrades, consisting of both the NFB and S#5, will provide a technologically advanced capability to automatically adjust the intake fan and exhaust fan flow, thereby enhancing operational control of the ventilation system.

The automatic integrated control system for both the intake and exhaust fans is a technological advancement for the operation of the ventilation system at the WIPP facility for the following reasons:

- It will reduce the impacts of NVP on the UVS by controlling both intake and exhaust flow.

- It will provide an automated ventilation system that is more responsive to changes in conditions such as NVP by eliminating the need to manually adjust airflow.

- A more responsive UVS ensures the continuity of adequate airflow in the underground, thereby maintaining a safe environment for the underground workers.

- The technologically advanced system will provide efficiency by eliminating the manual manipulation that was needed on the surface with the old system.

This improvement will also increase the differential pressure between the Construction and Disposal Circuits. The differential pressure assures ventilation leakage flows from the Construction Circuit into the Disposal Circuit (Permit Attachment A2, Section A2-2a(3), *Subsurface Structures*).

SUMMARY

The following summarizes the changes that are being proposed to the Permit text and figures:

- Drifts will be excavated to connect S#5 to the existing WIPP underground facility for access and ventilation purposes. The WIPP underground facility footprint and location of S#5, along with planned connecting drifts, are shown in proposed revisions to figures in Permit Attachments A2, A4, B, D, and G.

- Intake fans will be located on the surface of the facility and connected via ducting and a plenum to S#5. A single fan will operate at any one time with the second fan available as a back-up fan. The collar of S#5 will be covered to allow the surface fan to drive air into the underground repository. With S#5 acting as an intake shaft, the AIS will become an exhaust shaft for the Construction Circuit exhaust air. A plenum, ventilation ducting, and an exhaust stack will be added to the AIS to disperse salt particulate away from site structures. The North, Disposal, and Waste Shaft Station Circuits will continue to exhaust through the Exhaust Shaft and the filtration system. The four existing shafts and UVS are described in text and figures throughout the Permit in Attachments A, A2, and A4. Descriptions and figures in the aforementioned attachments are being modified to incorporate S#5, the planned connecting drifts, and changes to the description of the UVS.

- A nominal 22-acre Property Protection Area (**PPA**) encompassing the area around S#5 will be added to the property description in Permit Attachment A. Permit Attachment B, Figure B2-2, *Planimetric Map-WIPP Facility Boundaries* and Figure B2-2a, *Legend to Figure B2-2* are being replaced to show the additional PPA, estimated acreage around S#5, and to make corrections and editorial changes.

- One additional figure is being added to Permit Attachment D. Figure D-5-S#5*, Fire-Water Distribution System (with S#5),* shows the fire-water loop and fire hydrants servicing S#5.

- Permit Attachment D, Figure D-8, *WIPP Site Evacuation Routes,* is being modified to show the evacuation route from the S#5 area on the west side of the North Access Road.

The *Introduction* to Permit Attachment G, *Closure Plan,* is being modified to indicate that construction of the shaft seals will apply to all shafts, not just the existing four shafts. The Permittees are planning to modify the Final Facility Closure Plan in Permit Attachment G2, *Waste Isolation Pilot Plant Shaft Sealing System Compliance Submittal Design Report,* in a future submittal.

PROPOSED CHANGES

The Permittees are proposing changes to the following Permit Attachments:

- Attachment A, *General Facility Description and Process Information*, Section A-3, *Property Description*

- 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(2), *Shafts*

- Attachment A2, *Geologic Repository*, Section A2-2a(3), *Subsurface Structures, Underground Facilities Ventilation System*

- Attachment A2, *Geologic Repository*, Section A2-2a(3), *Subsurface Structures, Underground Ventilation System Description*

- Attachment A2, *Geologic Repository*, Section A2-2a(3), *Subsurface Structures, Underground Ventilation Modes of Operation*

- Attachment A2, *Geologic Repository*, Figure A2-1, *Repository Horizon*

- Attachment A2, *Geologic Repository*, Figure A2-2-S#5, *Spatial View of the Miscellaneous Unit and Waste Handling Facility (with S#5)*

- Attachment A2, *Geologic Repository*, Figure A2-9c, *Underground Ventilation System Airflow (with S#5)*

- 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*, Appendix B2, *Maps*, Figure B2-2, *Planimetric Map-WIPP Facility Boundaries*

- Attachment B, *Hazardous Waste Permit Application Part A*, Appendix B2, *Maps*, Figure B2-2a, *Legend to Figure B2-2*

- Attachment B, *Hazardous Waste Permit Application Part A*, Appendix B3, *Facilities*, Addition of Figure B3-1-S#5, *Spatial View of the WIPP Facility (with S#5)*

- Attachment B, *Hazardous Waste Permit Application Part A*, Appendix B3, *Facilities*, Figure B3-2, *Repository Horizon*

- Attachment D, *RCRA Contingency Plan*, Figure D-2-S#5, *Spatial View of the WIPP Facility (with S#5)*

- Attachment D, *RCRA Contingency Plan*, Figure D-3, *WIPP Underground Facilities*

- Attachment D, *RCRA Contingency Plan,* Figure D-5-NFB, *Fire-Water Distribution System with Building 416*

- Attachment D, *RCRA Contingency Plan*, Figure D-5-S#5, *Fire-Water Distribution System* (with S#5)

- Attachment D, *RCRA Contingency Plan*, Figure D-7, *Designated Underground Assembly Areas*

- Attachment D, *RCRA Contingency Plan*, Figure D-8, *WIPP Site Evacuation Routes*

- Attachment G, *Closure Plan*, *Introduction*

- Attachment G, *Closure Plan*, Figure G-1, *Location of Underground HWDUs and Anticipated Closure Locations*

- Attachment G, Closure Plan, Figure G-6, *Approximate Locations of Boreholes in Relation to the WIPP Underground*

These changes do not modify the Permit requirement listed in Permit Part 4, Section 4.5.3.2., *Ventilation*, to maintain a minimum active room ventilation rate of 35,000 standard cubic feet per minute (**scfm**) nor do they reduce the ability of the Permittees to provide continued protection to human health and the environment. Likewise, the changes do not impede the Permittees' ability to maintain a negative pressure within the disposal circuit as required by Permit Attachment A2, Section A2-2a(3), *Subsurface Structures*.

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 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.

No changes will be made to the ventilation-related Permit conditions in Part 4. The Permittees are proposing modifications that change the descriptive text in the Permit attachments to incorporate PVS upgrades to the WIPP facility UVS. These upgrades include S#5, associated intake fans with VFDs and electronic connections to the exhaust fans, associated underground connecting drifts, and an unfiltered exhaust stack on the AIS.

This section of the PMR provides a description of the proposed ventilation upgrades and identifies the impacts to the Permit as a result of these changes. These upgrades are necessary for the UVS to produce an airflow rate sufficient for simultaneous mining, maintenance, and disposal operations, and to enhance the unfiltered exhaust path for the Construction Circuit airflow. A Notification of Planned Change was submitted to the New Mexico Environment Department (**NMED**) on July 13, 2017[1], describing S#5 and associated connecting drifts.

Shaft #5 will be located nominally 1,200 feet west of the existing AIS. A series of drifts and cross-cuts, to be used for ventilation and access, will be excavated from S#5 to the existing WIPP underground facility.

Two intake fans will be located on the surface and connected to S#5 via ducting and a plenum. One fan will operate while the second fan will be available for back-up. The fans are intake fans and will drive air into the repository through S#5. Shaft #5 will be covered with a steel cover bolted to the collar to keep the intake air in the shaft moving toward the underground.

[1] Notification of Planned Change to the Permitted Facility Regarding the Excavation and Construction of Shaft and Associated Drifts, Hazardous Waste Facility Permit, Number: NM4890319088-TSDF. Letter to Mr. John E. Kieling, Chief, Hazardous Waste Bureau, New Mexico Environment Department. July 13, 2017.

Shaft #5 will be the primary source of intake air for the underground facility. The intake air from S#5 will be used to ventilate the North, Construction, and Disposal Circuits. The ventilation circuits are described in Permit Attachment A2, Section A-2a(3), *Underground Facilities Ventilation System*. The SHS will downcast and will supplement the intake air from S#5 that is used to ventilate the north area of the underground. The WS will continue to provide the intake air for the Waste Shaft Station Circuit.

The North, Disposal, and Waste Shaft Station Circuits will exhaust through the existing ES. The salt particulate that is generated in the North, Disposal and Waste Shaft Station Circuits (generated by maintenance work and transportation) will be removed from the exhaust air by the Salt Reduction Building prior to routing the air through the filtration system. This will reduce the particulate build-up on the roughing filters. The exhaust air from the Construction Circuit (mining) will be routed through the AIS, reducing the amount of particulate that is harvested by the Salt Reduction Building. This will reduce the amount of particulate that must be characterized and disposed of. The AIS will be outfitted with a plenum, ducting, and an unfiltered exhaust stack. The AIS will be covered so that the exhaust air travels through the newly installed plenum, ducting, and exhaust stack. The exhaust stack at the AIS will protect existing surface structures by dissipating the salt particulate being exhausted from the construction area of the underground. Because the AIS will only exhaust air from the Construction Circuit, which does not contain volatile organic compounds (**VOCs**) from the waste and does not exhaust air from the Disposal and Waste Station Circuits, no VOC monitoring will be necessary. The air in the Construction Circuit is separated from the Disposal Circuit in all modes by the use and placement of bulkheads and regulators, which assist in maintaining the differential pressures necessary to maintain separate air circuits.

Because the facility will have both intake and exhaust fans capable of providing the needed ventilation, the fans will be interconnected to assure synchronization of the S#5 intake fan with the exhaust fans. Variable frequency drives on the fans allow the fan speeds to be continuously varied to improve system performance. Synchronization of the fans will be accomplished with control logic interconnections and interlocks. This represents a new technology for the WIPP facility since previously, interconnections and interlocks did not allow for continuous adjustment of fan speed to control the ventilation flow rates. The result will be greater control of the airflow and resultant pressure differentials as underground and surface conditions change (e.g., large barometric pressure or temperature changes).

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

- Descriptive text in Attachment A is being changed to include a second PPA around S#5 and to describe the location of S#5.

- Descriptive text in Attachment A2 is being changed to describe the configuration of the five shafts for ventilation (e.g., intake or exhaust air) when S#5 is in use; describe the physical characteristics of S#5 and the AIS; and describe how the S#5 surface fans will operate with the ventilation modes of operation.

- Figures in Attachments A2 and A4 are being modified or added to show the location of S#5 and the planned connecting drifts, where applicable.

- Figures in Attachment B, Appendix B2 and B3 are being modified or added to show the location of S#5 and the planned connecting drifts.

    - Figure B2-2 and Note 2 in Figure B2-2a is being replaced to address the addition of a second PPA encompassing the area around S#5.

    - Note that revised pages to Form OMB#: 2050-0024 (*RCRA Hazardous Waste Part A Application* forms) are not included. These will be provided as a Class 1 Permit Modification Notification once directed by the NMED.

- Figures in Attachment D are being modified or added to show the location of S#5 and the planned connecting drifts.

- One figure in Attachment D is being modified to show updates to the fire-water loop. An additional figure is being added to show the fire-water loop around the S#5 area.

- One figure in Attachment D is being modified to show the surface evacuation route from the S#5 area.

- Descriptive text in the *Introduction* of Attachment G, *Closure Plan,* is being modified to indicate that the shaft seal systems apply to all shafts.

- Figures in Attachment G are being modified to show the location of S#5 along with the planned connecting drifts.

Proposed text changes are included 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 language. 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 proposed.

- Appendix B, *Proposed Revised Permit Text*, identifies the proposed changes to the permit text in redline strikeout.

- Appendix C, *WIPP New Shaft and Connecting Drifts Illustrations,* identifies the surface location, the proposed connecting drifts, and the duct from the fans to S#5.

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 proposed modification, construction of an additional shaft and connecting drifts, the Permittees have chosen to submit the proposed modification as a Class 3 modification request. Submittal of this PMR as a Class 3 will facilitate additional public participation.

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 regarding S#5 and connecting drifts into the Permit. As a result of the 2014 radiological event, portions of the WIPP underground facility and the existing surface-mounted ventilation and exhaust systems became radiologically contaminated. Since the 2014 event the Permittees have operated the facility using continuous filtration of the underground Disposal and Waste Shaft Station Circuits exhaust air (filtration mode). Continuous filtration is used to mitigate any radioactive releases. The filtration system, as originally designed, can accommodate only a small percentage of the original design flow needed to support the normal operations of construction, maintenance, and waste emplacement. The addition of S#5 and associated connecting drifts represents an upgrade to the UVS, and will provide a new intake and exhaust system capable of restoring full-scale, concurrent, mining, maintenance, and waste emplacement operations.

Shaft #5 will be located nominally 1,200 feet west of the AIS and will provide the majority of the intake air to the repository. The SHS and WS will provide additional minor amounts of intake air to the North Ventilation Circuit and the Waste Shaft Station Circuit, respectively. The AIS will be converted from an intake shaft to an exhaust shaft for the Construction Circuit exhaust air only, while the North, Disposal, and Waste Shaft Station Circuits will continue to exhaust through the ES and the filtration system. This modification is an upgrade to the existing ventilation system with a two-fold purpose:

- Allow the Construction Circuit air to exhaust through the unfiltered AIS as a means of reducing particulate build-up on the roughing filters in the Exhaust Filter Building described in Permit Attachment A2, Section A2-2a(3), *Underground Ventilation System Description* and reducing the amount of salt particulate (harvested by the Salt Reduction Building) that must be characterized as waste and disposed of. Such waste minimization is an important element of the Resource Conservation & Recovery Act (**RCRA**) for protecting human health and the environment.

- Aid in increasing the intake air volume that will facilitate the resumption of concurrent mining, waste emplacement, and support activities (e.g., maintenance, ground control, infrastructure modifications). Additional air flow will dilute gases and diesel particulate matter and allow more pieces of diesel equipment to be operated simultaneously while maintaining air quality standards for workers. Operation of additional equipment will allow for an increase in ground control work (*i.e*., bolting), which will further enhance the safety of the workers.

Shaft #5 is needed to perform underground work concurrently and in a timely manner. This will allow the Permittees to maintain and operate the underground facility in a safe manner while, at the same time, meeting the strategic mission of the DOE.

The proposed S#5 will advance the Permittees' ability to control the underground ventilation and enhance control over the differential pressures maintained between the Construction Circuit and the North, Waste Shaft, and Disposal Circuits. This increased control improves the prevention of leakage of contaminated air from the Disposal Circuit and minimizes ventilation impacts associated with ambient temperature and pressure changes. This will increase the Permittees' ability to prevent releases, thereby enhancing protection of public health and the environment, and to facilitate compliance with the Permit Attachment A2, Section A2-2a(3), *Subsurface Structures*. Permit Attachment A2, Section A2-2a(3), *Subsurface Structures*, requires that a

pressure differential be maintained between the construction side and the waste disposal side to ensure that any leakage is towards the disposal side. Furthermore, the proposed changes will improve the processes that the Permittees use to provide ventilation air to support workers in the underground where equipment exhaust gases and particulate could pose a health and safety risk as they perform day-to-day mining, maintenance, and waste management activities.

The repository is a mined facility that includes shafts and access drifts, which are designed to accommodate the mine depth and the various functions such as hoisting, salt removal, waste emplacement, and ventilation. The proposed modification does not change the fundamental design of the repository, and does not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. The Permittees are simply proposing to modify the manner in which certain components are used (*i.e*., a downcast shaft becomes an upcast shaft, fans push air through portions of the facility in addition to pulling air through portions of the facility). Moreover, the ventilation processes for the permitted units will remain unchanged, although changes to operating procedures for the revised ventilation system will be necessary. Evacuation routes for workers in the regulated unit remain the same. Changes to underground drawings and maps are necessary only for areas outside the permitted unit (*i.e*., entries that lie south of S-1600 per Permit Part 4, Section 4.5.3.1., *Underground Traffic Flow*). The changes being made primarily impact descriptive text in the Permit, such as the text in Permit Attachment A2, Section A2-2a(3), *Underground Ventilation System Description.* This proposed modification does not alter the Permit condition relative to minimum ventilation (*i.e*., 35,000 scfm in an active disposal room when workers are present actively emplacing waste) found in Permit Part 4, Section 4.5.3.2., *Ventilation.* The Permit modification enhances the Permittees' ability to maintain the requisite pressure differential between the disposal circuit and other portions of the facility.

A Permit modification is necessary because the Permit does not currently include S#5, its surface location and structures, and the connecting drifts to the WIPP underground facility within the descriptive material and figures.

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 Attachment A, Attachment A2, Attachment A4, Attachment B, Attachment D, and Attachment G. This Permit modification is needed to address the changes, modifications, or updates due to the addition of a new shaft and associated connecting drifts.

Table 1: Description of Changes and Explanation of Need

Permit Part/Section	Impact
Attachment A, Section A-3	Section A-3 provides the property description including the PPA acreage. Revisions to this section are needed to include a second PPA around S#5.
Attachment A, Section A-4	This section provides a general description of the facility, both surface and underground, and a general description of how the transuranic (**TRU**) mixed waste is handled and disposed of. Revisions to this section are needed to describe S#5 and its general location.
Attachment A2, Section A2-1	This section provides a general description of the repository including the shafts and ventilation flow paths. Revisions to this section are needed to describe the ventilation and operational configuration of the shafts when S#5 is in use.

Permit Part/Section	Impact
Attachment A2, Section A2-2a(2)	This section describes the shafts that connect the underground facility to the surface. This section is being revised to include a description of S#5 along with the ventilation configuration of the five shafts when S#5 is in use. The reference in A2-2a(2) to the *Final Design Validation Report* in Appendix D1 is being modified to indicate that the report discusses the first four shafts as opposed to all shafts. The description of grout injected behind the shaft linings to retard water seepage into the shaft is being modified to include grout or a polymeric spray coating. The description of water rings in the shafts are being modified to include the water stops at the S#5 liner cold joints. A description of the collar configuration for S#5 and the AIS is being added to show that the shafts will be covered. These changes are needed to update the Permit with the descriptive language pertaining to S#5.
Attachment A2, Section A2-2a(3)	This section describes the subsurface structures. A description of the ventilation configuration of each shaft when S#5 is in use is being added to the Underground Facilities Ventilation System description. A description of the ventilation configuration of the shafts, the surface intake fans, and the ventilation circuits is being added to the Underground Ventilation System Description section. A reference to 35,000 cubic feet per minute (**cfm**) for each active room will have “standard” added prior to the unit (*i.e.*, cfm) for clarification. These changes are needed to update the Permit with the descriptive language pertaining to S#5.
Attachment A2, Figure A2-1	The *Repository Horizon* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. These changes are needed to update the Permit with the information pertaining to S#5.
Attachment A2, Figure A2-2-S#5	The *Spatial View of the Miscellaneous Unit and Waste Handling Facility (with S#5)* figure is being added to show the location of S#5 and the planned connecting drifts in relation to the existing underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment A2, Figure A2-9c	Figure A2-9c, *Underground Ventilation System Airflow (with Shaft #5)* is being added to show the repository ventilation flow with S#5. This change is needed to update the Permit with the information pertaining to S#5.
Attachment A4, Figure A4-4	The *Typical Underground Transport Route Using E-140* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment A4, Figure A4-4a	The *Typical Underground Transport Route Using W-30* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment B, Figure B2-2	The *Planimetric Map-WIPP Facility Boundaries* figure is being modified to show the additional PPA around S#5. This change is needed to update the Permit with the information pertaining to S#5.
Attachment B, Figure B2-2a	The *Legend to Figure B2-2* figure is being modified to describe the additional PPA area around S#5 in the “Notes” section of the figure. This change is needed to update the Permit with the information pertaining to S#5.
Attachment B, Figure B3-1-S#5	The *Spatial View of the WIPP Facility (with S#5)* figure is being added to show the spatial view of the facility with S#5 and the planned connecting drifts. This change is needed to update the Permit with the information pertaining to S#5.
Attachment B, Figure B3-2	The *Repository Horizon* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment D, Figure D-2-S#5	The *Spatial View of the WIPP Facility (with S#5)* figure is being added to show the location of S#5 and the planned connecting drifts in relation to the existing underground facility. This change is needed to update the Permit with the information pertaining to S#5.

Permit Part/Section	Impact
Attachment D, Figure D-3	The *WIPP Underground Facilities* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment D, Figure D-5-NFB	The *Fire-Water Distribution System with Building 416* figure is being replaced to show the fire-water loop extending to the S#5 area. This change is needed to update the Permit with the information pertaining to S#5.
Attachment D, Figure D-5-S#5	The *Fire-Water Distribution System (with S#5)* figure is being added to show the fire-water loop around the S#5 area. This change is needed to update the Permit with the information pertaining to S#5.
Attachment D, Figure D-7	The *Designated Underground Assembly Areas* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment D, Figure D-8	The *WIPP Site Evacuation Routes* figure is being modified to show the evacuation routes from the S#5 area. This change is needed to update the Permit with the information pertaining to S#5.
Attachment G, *Introduction*	This section is being modified to show that the shaft seal systems apply to all shafts, not "the four" shafts as is currently stated. This change is needed to update the Permit with the information pertaining to S#5.
Attachment G, Figure G-1	The *Location of Underground HWDUs and Anticipated Closure Locations* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.
Attachment G, Figure G-6	The *Approximate Locations of Boreholes in Relation to the WIPP Underground* figure is being modified to show the location of S#5 along with the planned drifts to connect the shaft to the underground facility. This change is needed to update the Permit with the information pertaining to S#5.

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.

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	Part 2.3.1 Attachment C		✓
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Part 2.3.1.1 Attachment C		✓
	§264.13(c)	Off-site waste analysis requirements	Part 2.2.1 Attachment C		✓
§270.14(b)(4)	§264.14(a-c)	Security procedures and equipment	Part 2.6		✓
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Part 2.7 Attachment E1-a		✓
	§264.174	Container inspections	Attachment E1-b(1)		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Attachment E-1b Attachment E-1b(1)		✓
§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	Part 2.12 Attachment D		✓
	§264.51	Contingency plan design and implementation	Part 2.12.1 Attachment D		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment D	✓	
	§264.53	Contingency plan copies	Part 2.12.2 Attachment D		✓
	§264.54	Contingency plan amendment	Part 2.12.3 Attachment D		✓
	§264.55	Emergency coordinator	Part 2.12.4 Attachment D-4a(1)		✓
	§264.56	Emergency procedures	Attachment D-4		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Attachment A Part 2.11		✓
§270.14(b)(8)(i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Part 2.11		✓
§270.14(b)(8)(ii)		Runoff or flood prevention (e.g., berms, trenches, and dikes)	Attachment A1-1c(1) Part 2.11		✓
§270.14(b)(8)(iii)		Prevention of contamination of water supplies	Part 2.11		✓
§270.14(b)(8)(iv)		Mitigation of effects of equipment failure and power outages	Part 2.11		✓
§270.14(b)(8)(v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Part 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)(vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Part 2.11 Part 4 Attachment A2 Attachment D-4e Attachment G-1a Attachment N		✓
	§264 Subpart C	Preparedness and Prevention	Part 2.10		✓
	§264.31	Design and operation of facility	Part 2.10		✓
	§264.32	Required equipment	Part 2.10.1 Attachment D		✓
	§264.33	Testing and maintenance of equipment	Part 2.10.2 Attachment E-1a		✓
	§264.34	Access to communication/alarm system	Attachment E-1a Part 2.10.3		✓
	§264.35	Required aisle space	Part 2.10.4		✓
	§264.37	Arrangements with local authorities	Attachment D-4a(3)		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes	Part 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	Attachment G2-2.2 Part B, Rev. 6 Chapter B		✓
§270.14(b) (11)(iii-v)	§264.18(b)	100-year floodplain standard	Attachment A1-1c(1) Part B, Rev. 6 Chapter B		✓
	§264.18(c)	Other location standards	Part B, Rev. 6 Chapter B		✓
§270.14(b)(12)	§264.16(a-e)	Personnel training program	Part 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	Attachment 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	Part 6.3 Attachment G-1d(4)		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure	Attachment G-2a		✓
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Attachment G-1e(2)		✓

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)	§264.113	Time allowed for closure	Part 6.5 Attachment G-1d		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Part 6.6 Attachment G-1e(2)		✓
§270.14(b)(13)	§264.115	Certification of closure	Part 6.7 Attachment G-2a		✓
§270.14(b)(13)	§264.116	Survey plat	Part 6.8 Attachment G-2b		✓
§270.14(b)(13)	§264.117	Post-closure care and use of property	Part 7.3 Attachment H-1a		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Part 7.5 Attachment H-1a(1)		✓
§270.14(b)(13)	§264.178	Closure/ containers	Part 6.9 Attachment A1-1h Attachment G-1		✓
§270.14(b)(13)	§264.601	Environmental performance standards-Miscellaneous units	Attachment A-4 Attachment D-1 Attachment G-1a		✓
§270.14(b)(13)	§264.603	Post-closure care	Part 7.3 Attachment G-1a(3)		✓
§270.14(b)(14)	§264.119	Post-closure notices	Part 7.4 Attachment 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		✓
§270.14(b)(19)(ix)		Injection and withdrawal wells	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)(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 Part 4.3 Attachment A1		✓
	§264.171	Condition of containers	Part 3.3 Attachment A1		✓
	§264.172	Compatibility of waste with containers	Part 3.4 Attachment A1		✓
	§264.173	Management of containers	Part 3.5 Attachment A1		✓
	§264.174	Inspections	Part 3.7 Attachment E-1 Attachment A1-1e		✓
§270.15(a)	§264.175	Containment systems	Part 3.6 Attachment A1		✓
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Attachment A1-1g Part 2.1		✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Attachment A1-1g Part 2.3.3.4		✓
	§264.178	Closure	Part 6 Attachment G		✓
§270.15(e)	§264.179	Air emission standards	Part 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		
	§264.602	Monitoring, analysis, inspection, response, reporting, and corrective action	Part 4 Attachment A2 Attachment E-1 Attachment N		✓

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
	§264.603	Post-closure care	Attachment H Attachment H1		✓
	§264 Subpart E	Manifest system, record keeping, and reporting	Part 1 Part 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
Attachment A, Section A-3, *Property Description*	Added new sentence “A second PPA consisting of a nominal 22 acres surrounds Shaft #5.” after second sentence.
Attachment A, Section A-4, *Facility Type*	Added new sentence “A fifth shaft, Shaft #5, located nominally 1,200 feet west of the Air Intake Shaft also connects the underground facility to the surface.” after second sentence in second paragraph.
Attachment A2, List of Figures	Added entries for new Figure A2-2-S#5 and Figure A2-9c to the list of figures.
Attachment A2, Section A2-1, *Description of the Geologic Repository*	Added new subsection heading *Description of Four-Shaft Configuration* after the fifth paragraph. Added “(air pathway).” Added new subsection *Description of Five-Shaft Configuration (with Shaft #5)* after the sixth paragraph that includes the following text: “A fifth shaft, Shaft #5 (S#5), also connects the underground facility with the surface. The relationship between the WIPP surface facility, the five shafts, and the underground facility horizon is shown in Figure A2-2-S#5. With S#5 in use, the configuration of the shafts is as follows: • Shaft #5 provides the majority of the intake air for the underground facility. • The Air Intake Shaft provides the exhaust air pathway for the construction area of the underground facility. • The Waste Shaft Conveyance headframe and hoist are located within the WHB and are 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 Waste Shaft provides intake air for the Waste Shaft Station. • The Salt Handling Shaft provides a portion of the ventilation for the north area of the underground facility and is also used to hoist mined salt to the surface and serve as the principle personnel transport shaft. • The Exhaust Shaft serves as a common exhaust air pathway for the north, disposal, and waste shaft station areas of the underground facility.”
Attachment A2, Section A2-2a(2), *Shafts*	Added new subsection heading *Four-Shaft Configuration* before first paragraph. Removed hyphen between “secondary” and “supply.” Replaced “duct” with “pathway.” Replaced “duct” with “air pathway.” Added new subsection *Five-Shaft Configuration (with Shaft #5)* after the second paragraph that includes the following text: “A fifth shaft, S#5, also extends from the surface to the repository level. The inside diameter of S#5 is approximately 26 ft (8 m). With S#5 in use, it is the primary source of fresh air to the underground facility. With S#5 in use, the ventilation functions of the existing shafts are as follows: • Salt Handling Shaft serves as a secondary supply-air pathway for the underground facility. • The Waste Handling Shaft serves as the supply-air pathway for the Waste Shaft Station. • The Air Intake Shaft serves as the exhaust air pathway for the construction area of the underground facility.

Affected Permit Section	Explanation of Change
	• The Exhaust Shaft serves as the exhaust air pathway for the north, disposal and waste shaft station areas of the underground facility." Added new subsection heading *General Shaft Description* after new subsection *Five-Shaft Configuration (with Shaft #5)*. Added "original four" in last sentence of first paragraph after the heading *General Shaft Description*. Added "or a polymeric spray coating" after lining in fourth sentence of second paragraph after the heading *General Shaft Description*. Added "and S#5" after Shaft in first sentence of fourth paragraph, removed space between "-" and "collection," and added "Shaft #5 is outfitted with water stops at each shaft liner cold joint throughout the lined portion of the shaft." as last sentence of fourth paragraph after the heading *General Shaft Description*. Added "Shaft #5 is covered to direct intake air into the underground facility using fans located on surface. The fans are connected to the shaft via ducting and a plenum." to end of sixth paragraph after the heading *General Shaft Description*. Added new paragraph "With S#5 in use, the Air Intake Shaft is converted to an exhaust shaft for Construction Circuit air by routing the air through a plenum and ducting to an unfiltered exhaust stack." after the sixth paragraph after the heading *General Shaft Description*.
Attachment A2, Section A2-2a(3), *Subsurface Structures*	Added new paragraph "With S#5 in use (Figure A2-9c), the Salt Handling Shaft serves as the secondary supply-air pathway for the underground facility while S#5 serves as the primary supply-air pathway for the underground facility. The Waste Shaft supplies the intake air for the Waste Shaft Station. The Air Intake Shaft provides the exhaust route for the Construction Circuit while the Exhaust Shaft provides the exhaust route for the North, Disposal, and Waste Shaft Station Circuits." after second paragraph under subsection *Underground Facilities Ventilation System*. Added new paragraph "When the repository is configured to use five shafts, two fans located on the surface and connected via ducting and a plenum to S#5, supply the majority of the intake air to the underground facility. One fan operates at a time, while the idle fan is available as a back-up fan. The Salt Handling Shaft serves as a secondary air intake shaft for the north area and the Waste Shaft serves as the air intake shaft for the waste shaft station area of the underground facility. The Air Intake Shaft serves as an unfiltered exhaust shaft for the construction area of the underground facility. The north, disposal, and waste shaft station areas of the underground facility are exhausted through the Exhaust Shaft and the associated filtration system." after first paragraph under subsection *Underground Ventilation System Description*. Added "standard" after "minimum ventilation rate of 35,000." Added "When the repository is configured to use four shafts," to the first paragraph under subsection *Underground Ventilation Modes of Operation.* Added new paragraph "When the repository is configured to use five shafts, two intake fans located on the surface and connected to S#5 via ducting and a plenum, supply the majority of the intake air to the underground facility. The fans are designed to operate one fan at a time with the second fan available as a back-up fan. The fans have variable frequency drives that can adjust the intake flow at S#5 to meet the requirements of the underground ventilation filtration system and the Construction Circuit." after third set of bullets under subsection *Underground Ventilation Modes of Operation*.

Affected Permit Section	Explanation of Change
Attachment A2, Figure A2-1	Replaced Figure A2-1 *Repository Horizon* with new figure.
Attachment A2, Figure A2-2-S#5	Added new Figure A2-2-S#5, *Spatial View of the Miscellaneous Unit and Waste Handling Facility (with S#5),* after Figure A2-2.
Attachment A2, Figure A2-9c	Added new Figure A2-9c, *Underground Ventilation System Airflow (with S#5),* after Figure A2-9b.
Attachment A4, Figure A4-4	Replaced Figure A4-4, *Typical Underground Transport Route Using E-140,* with new figure.
Attachment A4, Figure A4-4a	Replaced Figure A4-4a, *Typical Underground Transport Route Using W-30,* with new figure.
Attachment B, Table of Contents	Added entry for Figure B3-1-S#5, *Spatial View of the WIPP Facility (with S#5),* to Table of Contents, Appendix B3 Facilities.
Attachment B, Appendix B2, Figure B2-2	Replaced Figure B2-2, *Planimetric Map-WIPP Facility Boundaries,* with new figure.
Attachment B, Appendix B2, Figure B2-2a	Replaced Figure B2-2a, *Legend to Figure B2-2,* with new figure.
Attachment B, Appendix B3, Figure B3-1-S#5	Added new Figure B3-1-S#5, *Spatial View of the WIPP Facility (with S#5),* after Figure B3-1.
Attachment B, Appendix B3, Figure B3-2	Replaced Figure B3-2, *Repository Horizon,* with new figure.
Attachment D, List of Figures	Added entries for Figure D-2-S#5, *Spatial View of the WIPP Facility (with S#5),* and Figure D-5-S#5, *Fire-Water Distribution System (with S#5),* to Table of Contents.
Attachment D, Figure D-2-S#5	Added new Figure D-2-S#5, *Spatial View of the WIPP Facility (with S#5),* after Figure D-2.
Attachment D, Figure D-3	Replaced Figure D-3, *WIPP Underground Facilities,* with new figure.
Attachment D, Figure D-5-NFB	Replaced Figure D-5-NFB, *Fire-Water Distribution System with Building 416,* with new figure.
Attachment D, Figure D-5-S#5	Added new Figure D-5-S#5, *Fire-Water Distribution System (with S#5),* after Figure D-5.
Attachment D, Figure D-7	Replaced Figure D-7, *Designated Underground Assembly Areas,* with new figure.
Attachment D, Figure D-8	Replaced Figure D-8, *WIPP Site Evacuation Routes,* with new figure.
Attachment G, *Introduction*	Deleted “the four” before shaft and added “for each shaft” after systems in first paragraph of the introduction.
Attachment G, Figure G-1	Replaced Figure G-1, *Location of Underground HWDUs and Anticipated Closure Locations,* with new figure.
Attachment G, Figure G-6	Replaced Figure G-6, *Approximate Locations of Boreholes in Relation to the WIPP Underground,* with new figure.

Appendix B
Proposed Revised Permit Text

Proposed Revised Permit Text:

ATTACHMENT A

GENERAL FACILITY DESCRIPTION AND PROCESS INFORMATION

A-3 Property Description

The WIPP property has been divided into functional areas. The Property Protection Area (**PPA**), surrounded by a chain-link security fence, which encompasses approximately 34 acres without the New Filter Building (**NFB**) and approximately 44 acres with the NFB, and provides security and protection for all major surface structures. A second PPA consisting of a nominal 22 acres surrounds Shaft #5. The DOE Off Limits Area encloses the PPA, and is approximately 1,454 acres. These areas define the DOE exclusion zone within which certain items and material are prohibited. The final zone is marked by the WIPP Site Boundary (WIPP Land Withdrawal Area), a 16-section Federal land area under the jurisdiction of the DOE.

A-4 Facility Type

There are three basic groups of structures associated with the WIPP facility: surface structures, shafts and underground structures. The surface structures accommodate the personnel, equipment, and support services required for the receipt, preparation, and transfer of TRU mixed waste from the surface to the underground. There are two surface locations where TRU mixed waste is managed and stored. The first area is the Waste Handling Building (**WHB**) Container Storage Unit (**WHB Unit**) for TRU mixed waste management and storage. The WHB Unit consists of the WHB contact-handled (**CH**) Bay and the remote-handled (**RH**) Complex. The second area designated for managing and storing TRU mixed waste is the Parking Area Container Storage Unit (**Parking Area Unit**), an outside container storage area which extends south from the WHB to the rail siding. The Parking Area Unit provides storage space for up to 50 loaded Contact-Handled Packages and 14 loaded Remote-Handled Packages on an asphalt and concrete surface. Part 3 of the permit authorizes the storage and management of CH and RH TRU mixed waste containers in these two surface locations. The technical requirements of 20.4.1.500 NMAC (incorporating 40 CFR §§264.170 to 264.178) are applied to the operation of the WHB Unit and the Parking Area Unit. Permit Attachment A1 describes the container storage units, the TRU mixed waste management facilities and operations, and compliance with the technical requirements of 20.4.1.500 NMAC.

Four vertical shafts connect the surface facility to the underground. These are the Waste Shaft, the Salt Handling Shaft, the Exhaust Shaft and the Air Intake Shaft. A fifth shaft, Shaft #5, located nominally 1,200 feet west of the Air Intake Shaft also connects the underground facility to the surface. The Waste Shaft is the only shaft used to transport TRU mixed waste to the underground. The WIPP underground structures are located in a mined salt bed 2,150 feet below the surface.

The WIPP is a geologic repository mined within a bedded salt formation, which is defined in 20.4.1.100 NMAC (incorporating 40 CFR §260.10) as a miscellaneous unit. As such, hazardous waste management units within the repository are subject to permitting according to 20.4.1.900 and .901 NMAC (incorporating 40 CFR §270), and are regulated under 20.4.1.500 NMAC, Miscellaneous Units.

ATTACHMENT A2

GEOLOGIC REPOSITORY

LIST OF TABLES

LIST OF FIGURES

ATTACHMENT A2

GEOLOGIC REPOSITORY

A2-1 Description of the Geologic Repository

Management, storage, and disposal of transuranic (**TRU**) mixed waste in the Waste Isolation Pilot Plant (**WIPP**) geologic repository is subject to regulation under 20.4.1.500 NMAC. The WIPP is a geologic repository mined within a bedded salt formation, which is defined in 20.4.1.101 NMAC (incorporating 40 CFR §260.10) as a miscellaneous unit. As such, HWMUs within the repository are eligible for permitting according to 20.4.1.101 NMAC (incorporating 40 CFR §260.10), and are regulated under 20.4.1.500 NMAC, Miscellaneous Units.

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 Hazardous Waste Disposal Units (**HWDUs**) in the geologic repository, will be met.

The Disposal Phase will consist of receiving contact-handled (**CH**) and remote-handled (**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.

The WIPP geologic repository is mined within a 2,000-feet (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 during the Disposal Phase. During the term of this Permit, disposal of TRU mixed waste will occur only in the HWDUs designated as Panels 5 through 8 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.

Panels 1 through 8 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.

Description of Four-Shaft Configuration

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 (air pathway) 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.

Description of Five-Shaft Configuration (with Shaft #5)

A fifth shaft, Shaft #5 (**S#5**), also connects the underground facility with the surface. The relationship between the WIPP surface facility, the five shafts, and the underground facility horizon is shown in Figure A2-2-S#5. With S#5 in use, the configuration of the shafts is as follows:

- Shaft #5 provides the majority of the intake air for the underground facility.
- The Air Intake Shaft provides the exhaust air pathway for the construction area of the underground facility.
- The Waste Shaft Conveyance headframe and hoist are located within the WHB and are 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 Waste Shaft provides intake air for the Waste Shaft Station.
- The Salt Handling Shaft provides a portion of the ventilation for the north area of the underground facility and is also used to hoist mined salt to the surface and serve as the principle personnel transport shaft.
- The Exhaust Shaft serves as a common exhaust air pathway for the north, disposal, and Waste Shaft Station areas of the underground facility.

The HWDUs identified as Panels 1 through 8 (Figure A2-1) provide room for up to 5,244,900 cubic feet (ft^3) (148,500 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 provide room for up to 93,050 ft^3 (2,635 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.

The WIPP facility is located in a sparsely populated area with site conditions favorable to isolation of TRU mixed waste from the biosphere. Geologic and hydrologic characteristics of the site related to its TRU mixed waste isolation capabilities are discussed in Addendum L1 of the WIPP Hazardous Waste Facility Permit Amended Renewal Application (DOE, 2009). Hazard prevention programs are described in this Permit Attachment. Contingency and emergency

response actions to minimize impacts of unanticipated events, such as spills, are described in Permit Attachment D. The closure plan for the WIPP facility is described in Permit Attachment G.

A2-2 Geologic Repository Design and Process Description

A2-2a Geologic Repository Design and Construction

A2-2a(2) Shafts

Four-Shaft Configuration

The WIPP facility uses four shafts: the Waste Shaft, the Salt Handling Shaft, the Air Intake Shaft, and the Exhaust Shaft. These shafts are vertical openings that extend from the surface to the repository level.

The Waste Shaft is located beneath the WHB and is 19 to 20 ft (5.8 to 6.1 m) in diameter. The Salt Handling Shaft, located north of the Waste Shaft beneath the salt handling headframe, is 10 to 12 ft (3 to 3.6 m) in diameter. Salt mined from the repository horizon is removed through the Salt Handling Shaft. The Salt Handling Shaft is the main personnel and materials hoist and also serves as a secondary supply air ~~duct~~ pathway for the underground areas. The Air Intake Shaft, northwest of the WHB, varies in diameter from 16 ft 7 in. (4.51 m) to 20 ft 3 in. (6.19 m) and is the primary source of fresh air underground. The Exhaust Shaft, east of the WHB, is 14 to 15 ft (4.3 to 4.6 m) in diameter and serves as the exhaust ~~duct~~ air pathway for the underground air. In some cases, the Salt Handling Shaft may be used as an unfiltered exhaust shaft to ventilate areas of the underground that do not need filtration.

Five-Shaft Configuration (with S#5)

A fifth shaft, S#5, also extends from the surface to the repository level. The inside diameter of S#5 is approximately 26 ft (8 m). With S#5 in use, it is the primary source of fresh air to the underground facility. With S#5 in use, the ventilation functions of the existing shafts are as follows:

- Salt Handling Shaft serves as a secondary supply-air (intake air) pathway for the underground facility.
- The Waste Shaft serves as the supply-air (intake air) pathway for the Waste Shaft Station.
- The Air Intake Shaft serves as the exhaust air pathway for the construction area of the underground facility.
- The Exhaust Shaft serves as the exhaust air pathway for the north, disposal and Waste Shaft Station areas of the underground facility.

General Shaft Description

Openings excavated in salt experience closure because of salt creep (or time-dependent deformation at constant load). The closure affects the design of all of the openings discussed in this section. Underground excavation dimensions, therefore, are nominal, because they change with time. The unlined portions of the shafts have larger diameters than the lined portions, which allows for closure caused by salt creep. Each shaft includes a shaft collar, a shaft lining, and a shaft key section. The Final Design Validation Report in Appendix D1 of the WIPP RCRA Part B Permit Application (DOE, 1997) discusses the original four shafts and shaft components in greater detail.

The reinforced-concrete shaft collars extend from the surface to the top of the underlying consolidated sediments. Each collar serves to retain adjacent unconsolidated sands and soils and to prevent surface runoff from entering the shafts. The shaft linings extend from the base of the collar to the top of the salt beds approximately 850 ft (259 m) below the surface. Grout injected behind the shaft lining or a polymeric spray coating retards water seeping into the shafts from water-bearing formations, and the liner is designed to withstand the natural water pressure associated with these formations. The shaft liners are concrete, except in the Salt Handling Shaft, where a steel shaft liner has been grouted in place.

The shaft key is a circular reinforced concrete section emplaced in each shaft below the liner in the base of the Rustler and extending about 50 ft (15 m) into the Salado. The key functions to resist lateral pressures and assures that the liner will not separate from the host rocks or fail under tension. This design feature also aids in preventing the shaft from becoming a route for groundwater flow into the underground facility.

On the inside surface of each shaft, excluding the Salt Handling Shaft and S#5, there are three water-collection rings: one just below the Magenta, one just below the Culebra, and one at the lowermost part of the key section. These collection rings will collect water that may seep into the shaft through the liner. The Salt Handling Shaft has a single water collection ring in the lower part of the key section. Water collection rings are drained by tubes to the base of the shafts where the water is accumulated. Shaft #5 is outfitted with water stops at each shaft liner cold joint throughout the lined portion of the shaft.

WIPP shafts and other underground facilities are, for all practical purposes, dry. Minor quantities of water (which accumulate in some shaft sumps) are insufficient to affect the waste disposal area. This water is collected, brought to the surface, and disposed of in accordance with current standards and regulations.

The Waste Shaft is protected from precipitation by the roof of the waste shaft conveyance headframe tower. The Exhaust Shaft is configured at the top with a 14 ft- (4.3 m-) diameter duct that diverts air into the exhaust filtration system or to the atmosphere, as appropriate. The Salt Handling and Air Intake Shaft collars are open except for the headframes. Rainfall into the shafts is evaporated by ventilation air. Shaft #5 is covered to direct intake air into the underground facility using fans located on the surface. The fans are connected to the shaft via ducting and a plenum.

With S#5 in use, the Air Intake Shaft is converted to an exhaust shaft for Construction Circuit air by routing the air through a plenum and ducting to an unfiltered exhaust stack.

The waste hoist system in the Waste Shaft and all Waste Shaft furnishings are designed to resist the dynamic forces of the hoisting system, which are greater than the seismic forces on the underground facilities. In addition the Waste Shaft conveyance headframe is designed to withstand the design-basis earthquake (**DBE**). Maximum operating speed of the hoist is 500 ft (152.4 m) per minute. During loading and unloading operations, the waste hoist is steadied by fixed guides. The waste hoist is equipped with a control system that will detect malfunctions or abnormal operations of the hoist system, such as overtravel, overspeed, power loss, or circuitry failure. The control response is to annunciate the condition and shut the hoist down. Operator response is required to recover from the automatic shutdown. Waste hoist operation is continuously monitored by the CMS. A battery powered FM transmitter/receiver allows communication between the hoist conveyance and the hoist house.

A2-2a(3) Subsurface Structures

Underground Facilities Ventilation System

The underground facilities ventilation system will provide a safe and suitable environment for underground operations during normal WIPP facility operations. The underground system is designed to provide control of potential airborne contaminants in the event of an accidental release or an underground fire.

The underground is divided into specific areas that are supported by different ventilation flows referred to as ventilation circuits. Consequently, the underground ventilation system is comprised of four separate circuits, as designated on Figure A2-9a: one serving the northern experimental areas (North Circuit), one serving the construction areas (Construction Circuit), one serving the waste disposal areas (Disposal Circuit), and one serving the waste shaft station area (Waste Shaft Station Circuit). The four circuits are recombined near the bottom of the Exhaust Shaft, which serves as a common exhaust route from the underground level to the surface. In some cases, the Salt Handling Shaft may be used as an unfiltered exhaust shaft (Figure A2-9b) to ventilate areas of the underground that do not need filtration.

With S#5 in use (Figure A2-9c), the Salt Handling Shaft serves as the secondary supply-air pathway for the underground facility while S#5 serves as the primary supply-air pathway for the underground facility. The Waste Shaft supplies the intake air for the Waste Shaft Station. The Air Intake Shaft provides the exhaust route for the Construction Circuit while the Exhaust Shaft provides the exhaust route for the North, Disposal, and Waste Shaft Station Circuits.

Underground Ventilation System Description

The underground ventilation system consists of centrifugal exhaust fans, two identical HEPA-filter assemblies arranged in parallel, isolation dampers, a filter bypass arrangement, two skid-mounted HEPA-filter assemblies arranged in parallel, and associated ductwork. The fans, connected by the ductwork to the underground exhaust shaft so that they can independently draw air through the Exhaust Shaft, are divided into three groups. One group consists of three main exhaust fans, two of which are utilized to provide the nominal air flow of 425,000 standard ft^3 per minute (**scfm**) throughout the WIPP facility underground during normal (unfiltered) operation. One main fan may be operated in the alternate mode to provide 260,000 scfm underground ventilation flow. These fans are located near the Exhaust Shaft. The second group consists of three filtration fans, and each can provide 60,000 scfm of air flow. These fans,

located at the Exhaust Filter Building, can be operated in the filtration mode, where exhaust is diverted through HEPA filters, or in the reduced or minimum ventilation mode, where air is not drawn through the HEPA filters. The third group consists of two skid-mounted filtration fans and HEPA-filter assemblies, each of which can provide approximately 23,000 scfm of air flow. The skid-mounted filtration fan and HEPA-filter assemblies, referred to as the Interim Ventilation System (**IVS**) located south of the Exhaust Filter Building, are only operated in filtration mode, where exhaust is diverted through HEPA filters. In addition to the surface fans, an underground fan has been installed to ventilate uncontaminated areas in the North and Construction Circuits. This system is referred to as the Supplemental Ventilation System (**SVS**) and will be used in conjunction with IVS (as shown in Figure A2-9b). When this fan is operating, the Salt Shaft will serve as an unfiltered exhaust shaft for the North and Construction Circuits. A portion of the airflow provided by the SVS to the Construction Circuit can also be used to provide fresh air to the Disposal Circuit, if needed. In this case, the air from the Disposal Circuit will continue to be exhausted through the HEPA filtration system.

When the repository is configured to use five shafts, two fans located on the surface and connected via ducting and a plenum to S#5, supply the majority of the intake air to the underground facility. One fan operates at a time, while the idle fan is available as a back-up fan. The Salt Handling Shaft serves as a secondary air intake shaft for the north area and the Waste Shaft serves as the air intake shaft for the Waste Shaft Station area of the underground facility. The Air Intake Shaft serves as an unfiltered exhaust shaft for the construction area of the underground facility. The north, disposal, and Waste Shaft Station areas of the underground facility are exhausted through the Exhaust Shaft and the associated filtration system.

The underground mine ventilation is designed to supply sufficient quantities of air to all areas of the repository. During normal operating mode (simultaneous mining and waste emplacement operations), approximately 140,000 actual ft^3 (3,962 m^3) per min can be supplied to the panel area. This quantity is necessary in order to support the level of activity and the pieces of diesel equipment that are expected to be in operation.

At any given time during waste emplacement activities, there may be significant activities in multiple rooms in a panel. For example, one room may be receiving CH TRU mixed waste containers, another room may be receiving RH TRU mixed waste canisters, and the drilling of RH TRU mixed waste emplacement boreholes may be occurring in another room. The remaining rooms in a panel will either be completely filled with waste; be idle, awaiting waste handling operations; or being prepared for waste receipt. A minimum ventilation rate of 35,000 standard ft^3 (990 standard m^3) per minute will be maintained in each active room when waste disposal is taking place and workers are present in the room. This quantity of air is required to support the numbers and types of diesel equipment that are expected to be in operation in the area, and to support the underground personnel working in that area. The remainder of the air is needed in order to account for air leakage through inactive rooms. If an active room ventilation rate of 35,000 scfm cannot be met, actions as described in Permit Attachment O shall be taken during waste disposal operations when workers are present.

Underground Ventilation Modes of Operation

When the repository is configured to use four shafts, ~~T~~the underground ventilation system is designed to perform under three types of operation: normal (the HEPA exhaust filtration system is bypassed), filtered (the exhaust is filtered through the HEPA filtration system), if radioactive

contaminants are detected or suspected, or a combined mode in which the air in the Disposal Circuit is filtered and the air in the North and Construction Circuits is unfiltered.

The possible modes of exhaust fan operation are as follows:

- 2 main fans in operation
- 1 main fan in operation
- 1 filtration fan in filtered operation
- 2 fans in filtered operation (one filtration fan and one IVS fan or two IVS fans)
- 3 fans in filtered operation (one filtration fan and two IVS fans)
- 1 filtration fan in unfiltered operation
- 2 filtration fans in unfiltered operation
- 1 main and 1 filtration fan in unfiltered operation
- 3 fans in filtered operation (one filtration fan and two IVS fans exhausting through the Exhaust Shaft) and an underground SVS fan in operation (boosting fresh air into the mine causing the Salt Handling Shaft to serve as an unfiltered exhaust shaft for the North and Construction Circuits)

Underground Ventilation Filtration System Modes of Operation with Building 416

The UVFS, which includes the NFB, is designed to perform under two types of operation: filtered (the exhaust is filtered through the HEPA filtration system), and bypassed (the HEPA exhaust filtration system is bypassed).

For UVFS Filtration Mode

- 1 exhaust fan
- 2 exhaust fans
- 3 exhaust fans
- 4 exhaust fans

For UVFS Bypass Mode

- 1 to 4 exhaust fans

Under some circumstances (such as power outages and maintenance activities, etc.), all mine ventilation may be discontinued for short periods of time.

In the normal mode, two main surface exhaust fans, located near the Exhaust Shaft, will provide continuous ventilation of the underground areas. In this mode, underground flows join at the bottom of the Exhaust Shaft before discharge to the atmosphere. However, in some cases, the Salt Handling Shaft may be used as an unfiltered exhaust shaft to ventilate areas of the underground that do not need filtration.

Typically, outside air will be supplied to the construction areas and the waste disposal areas through the Air Intake Shaft, the Salt Handling Shaft, and access entries. A small quantity of outside air will flow down the Waste Shaft to ventilate the Waste Shaft station. The ventilation system is designed to operate with the Air Intake Shaft as the primary source of fresh air. Under these circumstances, sufficient air will be available to simultaneously conduct all underground operations (e.g., waste handling, mining, experimentation, and support). Ventilation may be

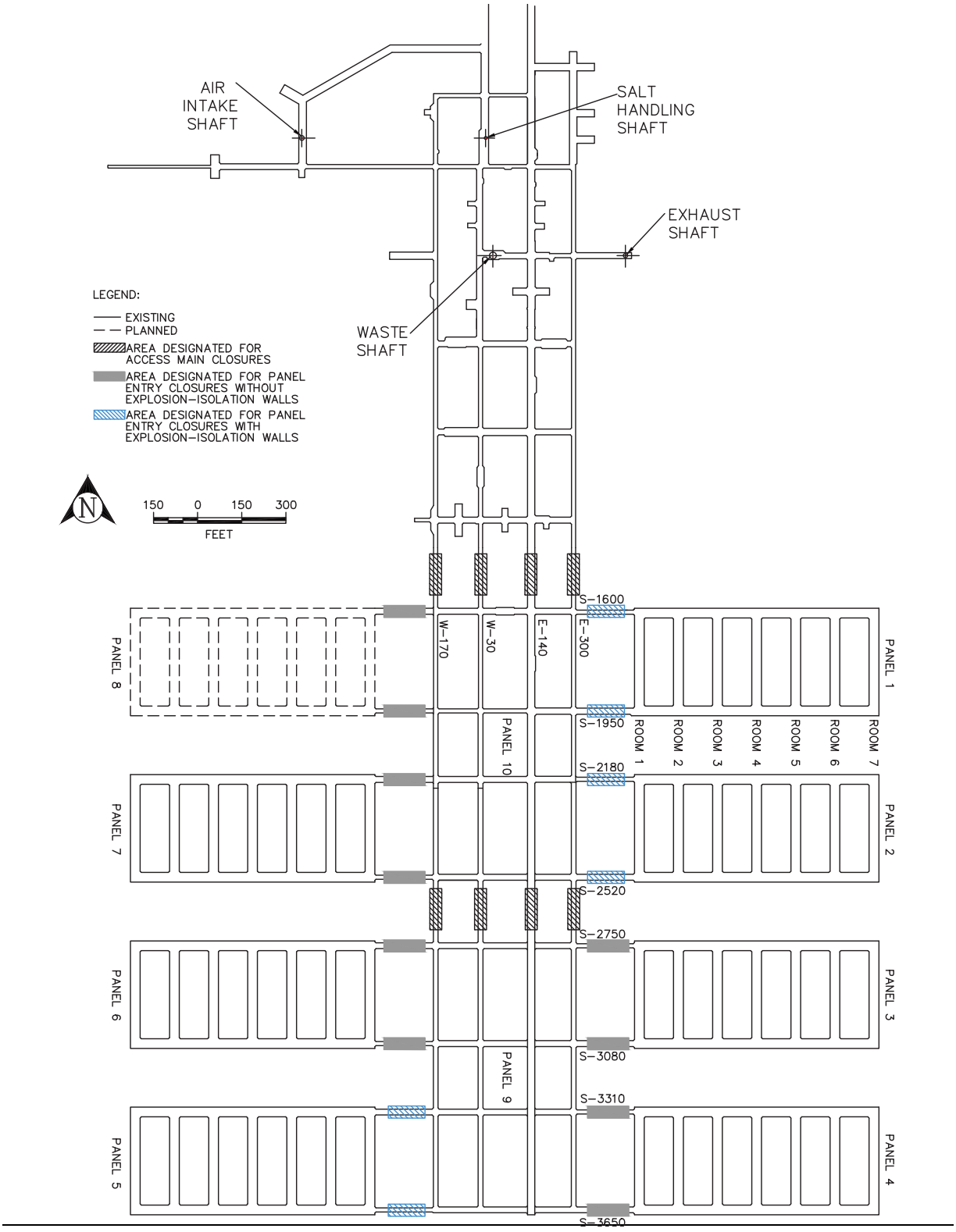
supplied by operating fans in the configurations listed in the above description of the ventilation modes.

An underground SVS fan, located in the S-90 drift, provides additional ventilation to the underground facility, as needed. The SVS ventilates the following:

- The North and Construction Circuits, exhausting through the Salt Handling Shaft and
- The disposal areas of the underground, exhausting through the Exhaust Shaft and through the filtration system

When the repository is configured to use five shafts, two intake fans located on the surface and connected to S#5 via ducting and a plenum, supply the majority of the intake air to the underground facility. The fans are designed to operate one fan at a time with the second fan available as a back-up fan. The fans have variable frequency drives that can adjust the intake flow at S#5 to meet the requirements of the underground ventilation filtration system and the Construction Circuit.

If the nominal flow of 425,000 scfm (12,028 m^3/min) is not available (e.g., only one of the main ventilation fans is available) underground operations may proceed, but the number of activities that can be performed in parallel may be limited depending on the quantity of air available. Ventilation may be supplied by operating one or more of the filtration exhaust fans. To accomplish this, the isolation dampers will be opened, which will permit air to flow from the main exhaust duct to the filter outlet plenum or to the IVS. The filtration fans may also be operated to bypass the HEPA plenum. The isolation dampers of the filtration exhaust fan(s) to be employed will be opened, and the selected fan(s) will be switched on. In this mode, underground operations will be limited, because filtration exhaust fans cannot provide sufficient airflow to support the use of diesel equipment.


AIR INTAKE SHAFT
SALT HANDLING SHAFT
EXHAUST SHAFT
WASTE SHAFT
LEGEND:
EXISTING
PLANNED
AREA DESIGNATED FOR ACCESS MAIN CLOSURES
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITHOUT EXPLOSION-ISOLATION WALLS
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITH EXPLOSION-ISOLATION WALLS
N
150 0 150 300
FEET
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
W-170
W-30
E-140
E-300
PANEL 1
PANEL 2
PANEL 3
PANEL 4
PANEL 5
PANEL 6
PANEL 7
PANEL 8
PANEL 9
PANEL 10
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7

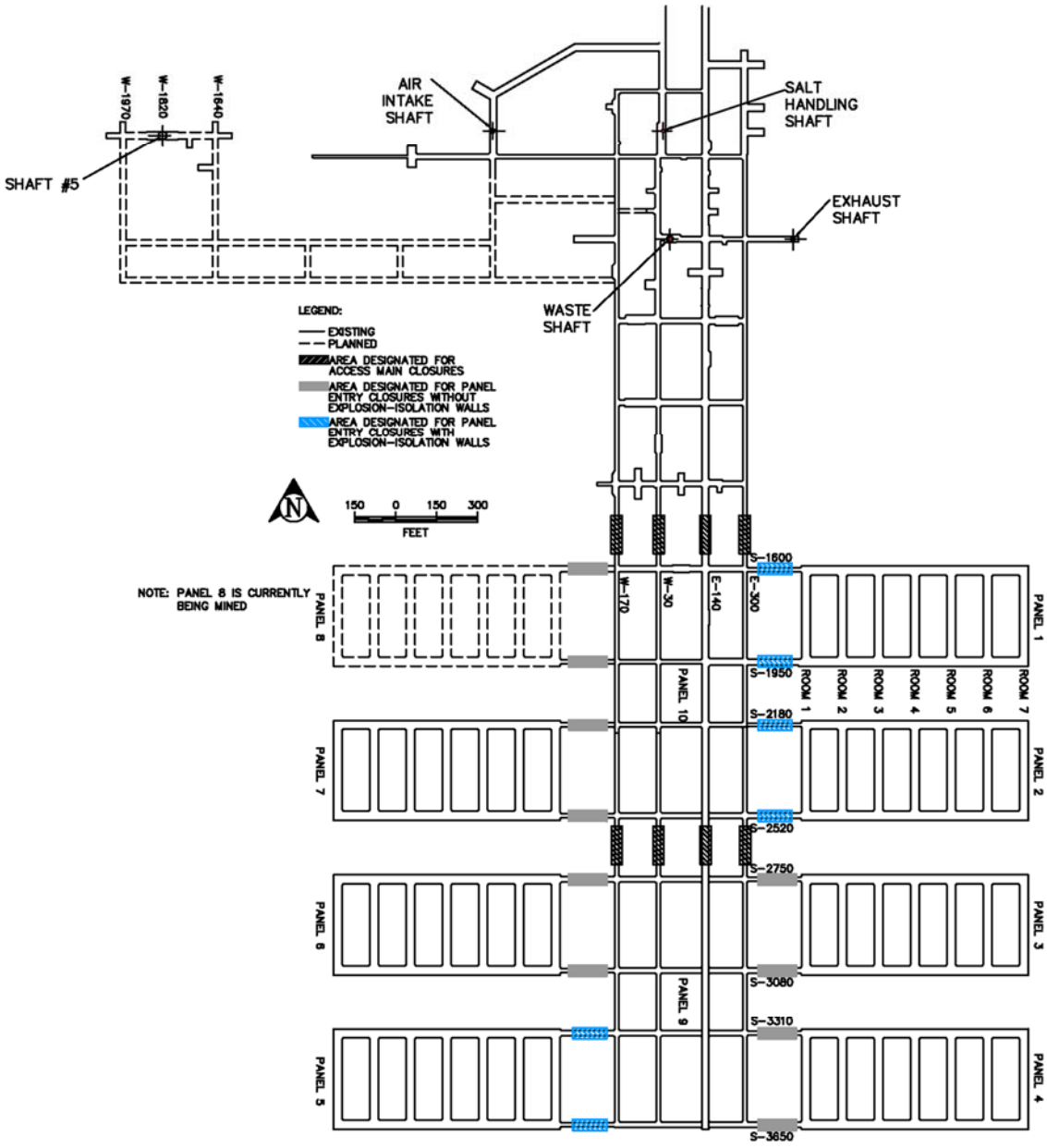


Figure A2-1
Repository Horizon

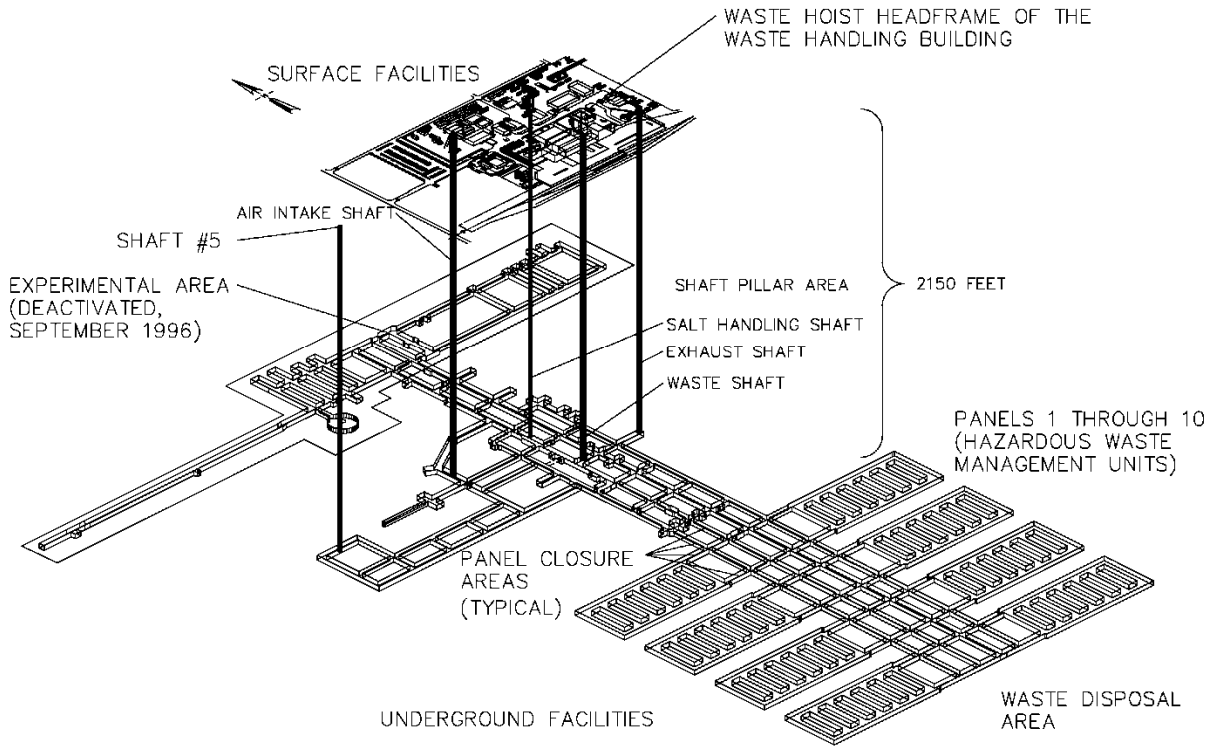


Figure A2-2-S#5
Spatial View of the Miscellaneous Unit and Waste Handling Facility (with S#5)

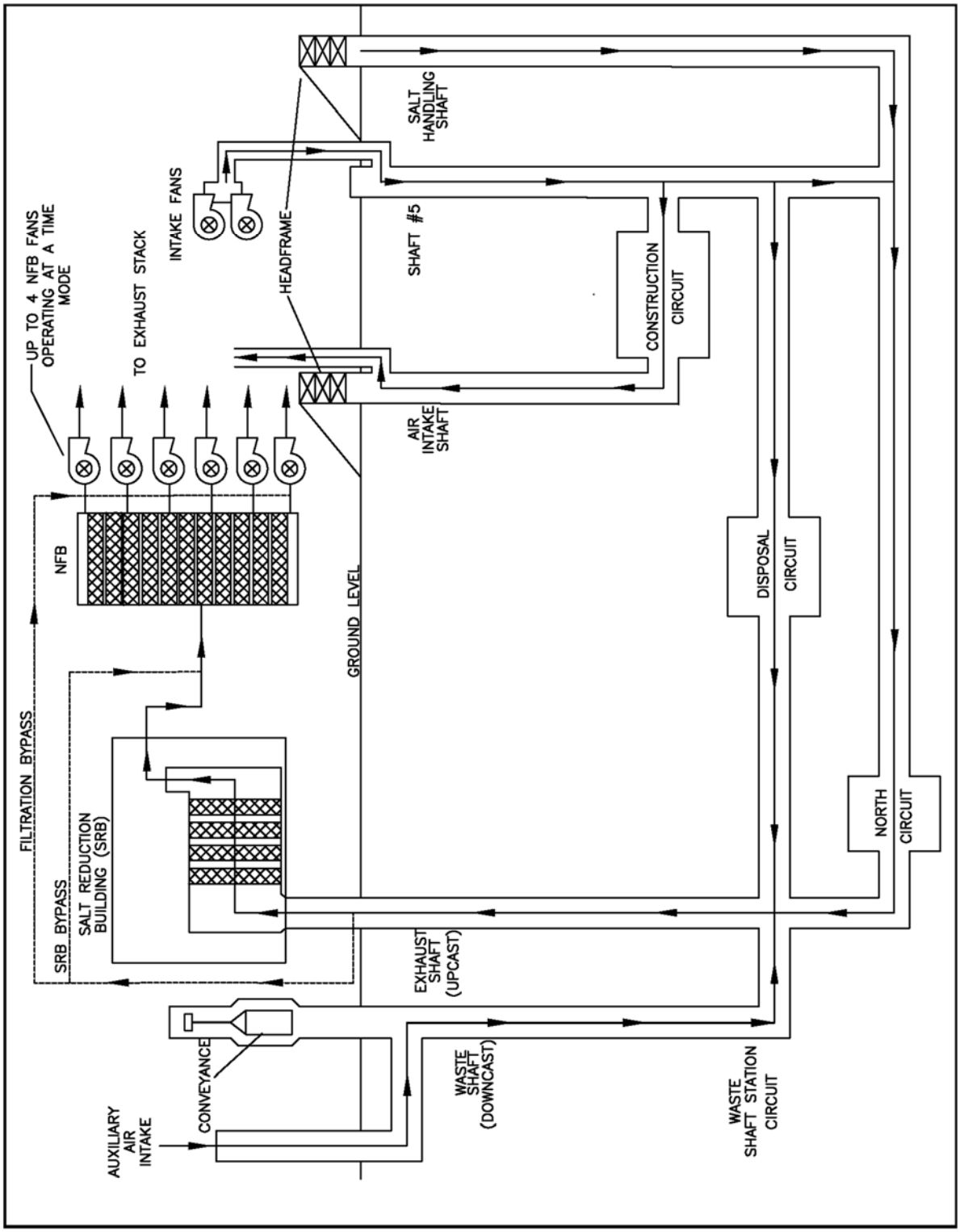
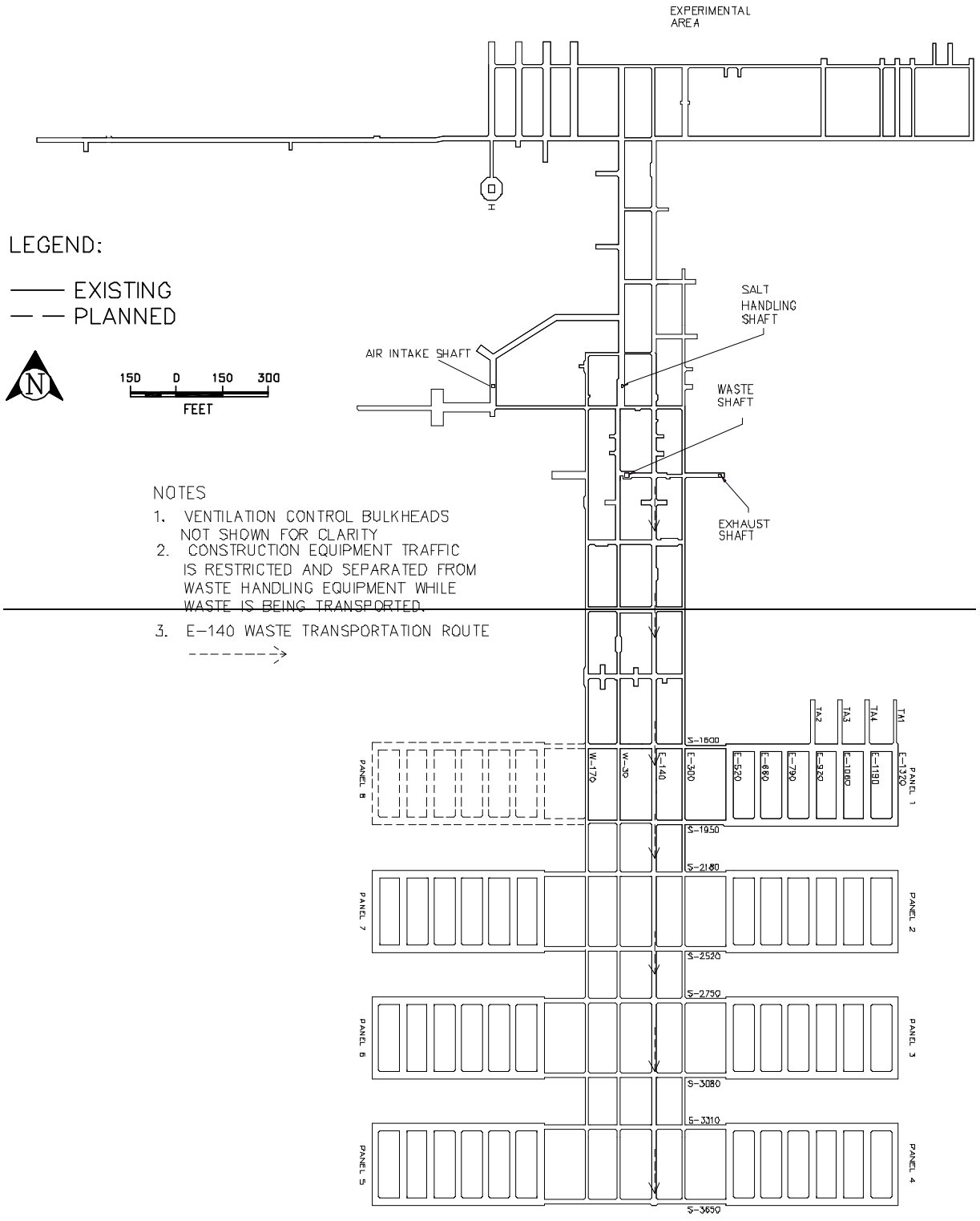


Figure A2-9c
Underground Ventilation System Airflow (with S#5)

ATTACHMENT A4

TRAFFIC PATTERNS


EXPERIMENTAL AREA
H
LEGEND:
EXISTING
PLANNED
N
150 0 150 300
FEET
AIR INTAKE SHAFT
SALT HANDLING SHAFT
WASTE SHAFT
EXHAUST SHAFT
NOTES
1. VENTILATION CONTROL BULKHEADS NOT SHOWN FOR CLARITY
2. CONSTRUCTION EQUIPMENT TRAFFIC IS RESTRICTED AND SEPARATED FROM WASTE HANDLING EQUIPMENT WHILE WASTE IS BEING TRANSPORTED.
3. E-140 WASTE TRANSPORTATION ROUTE
TA1
TA2
TA3
TA4
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
W-170
W-30
E-140
E-320
E-520
E-650
E-790
E-920
E-1060
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PANEL 2
PANEL 3
PANEL 4
PANEL 5
PANEL 6
PANEL 7
PANEL 8

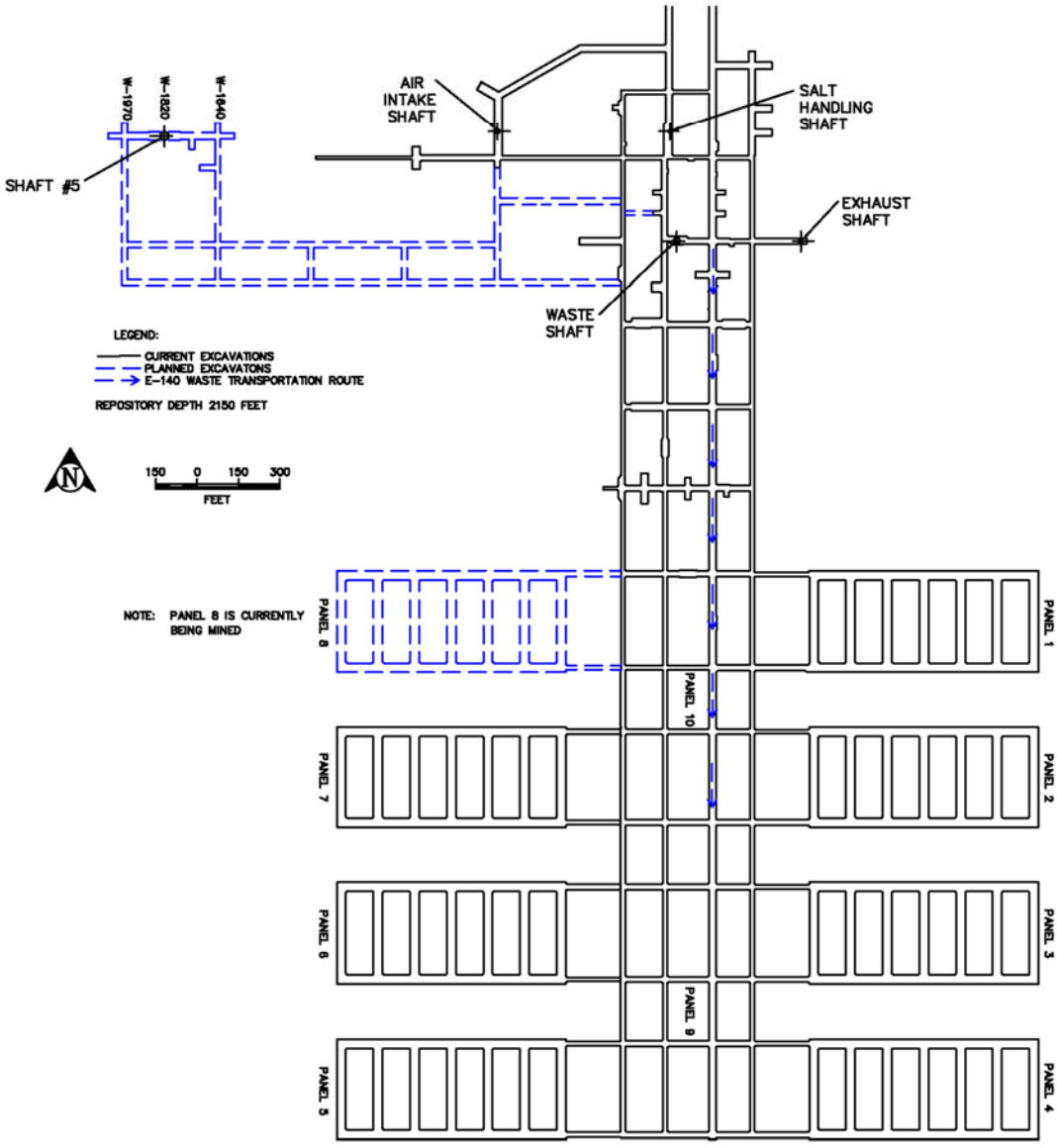
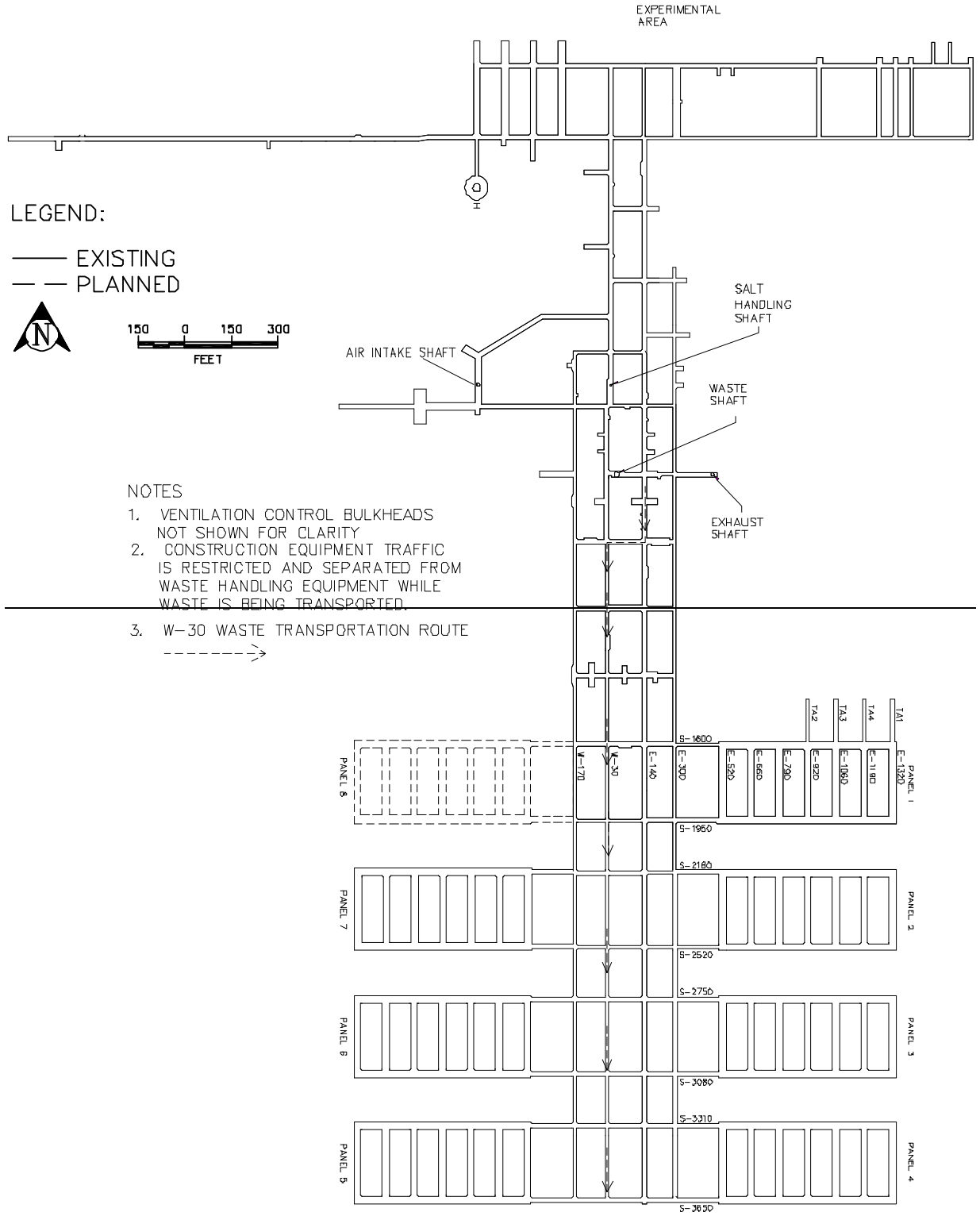


Figure A4-4
Typical Underground Transport Route Using E-140


EXPERIMENTAL AREA
LEGEND:
EXISTING
PLANNED
N
150 0 150 300
FEET
AIR INTAKE SHAFT
SALT HANDLING SHAFT
WASTE SHAFT
EXHAUST SHAFT
NOTES
1. VENTILATION CONTROL BULKHEADS NOT SHOWN FOR CLARITY
2. CONSTRUCTION EQUIPMENT TRAFFIC IS RESTRICTED AND SEPARATED FROM WASTE HANDLING EQUIPMENT WHILE WASTE IS BEING TRANSPORTED.
3. W-30 WASTE TRANSPORTATION ROUTE
TA1
TA2
TA3
TA4
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
W-170
W-30
E-140
E-300
E-520
E-650
E-790
E-920
E-1060
E-1180
E-1320
PANEL 1
PANEL 2
PANEL 3
PANEL 4
PANEL 5
PANEL 6
PANEL 7
PANEL 8

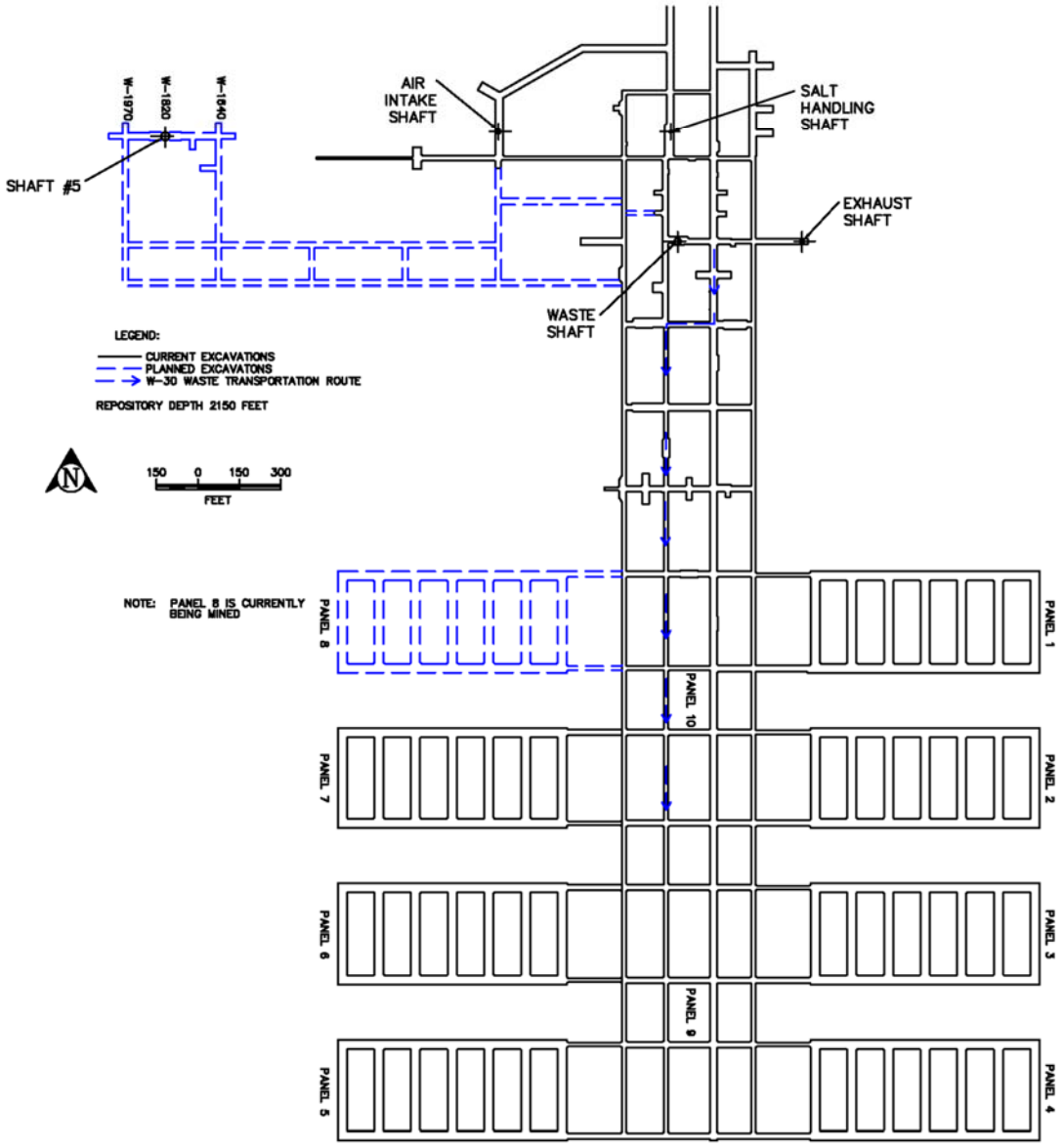


Figure A4-4a
Typical Underground Transport Route Using W-30

ATTACHMENT B

HAZARDOUS WASTE PERMIT APPLICATION PART A

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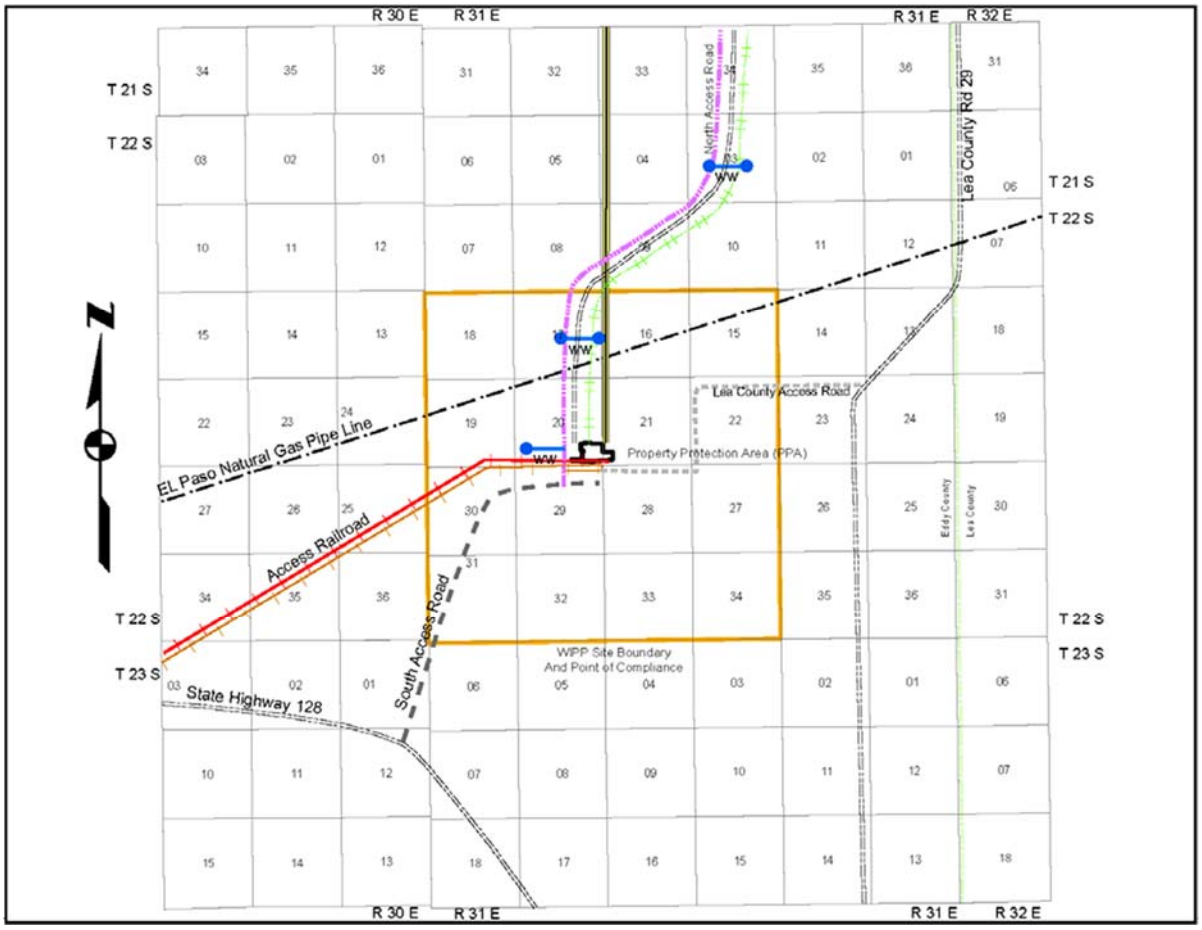
{APPENDIX B2
MAPS


R 30 E
R 31 E
R 31 E
R 32 E
T 21 S
T 22 S
T 22 S
T 23 S
T 21 S
T 22 S
T 22 S
T 23 S
North Access Road
Lea County Rd 29
Lea County Access Road
Property Protection Area (PPA)
EL Paso Natural Gas Pipe Line
Access Railroad
South Access Road
WIPP Site Boundary
And Point of Compliance
State Highway 128
Eddy County
Lea County
WW
WW
WW
N

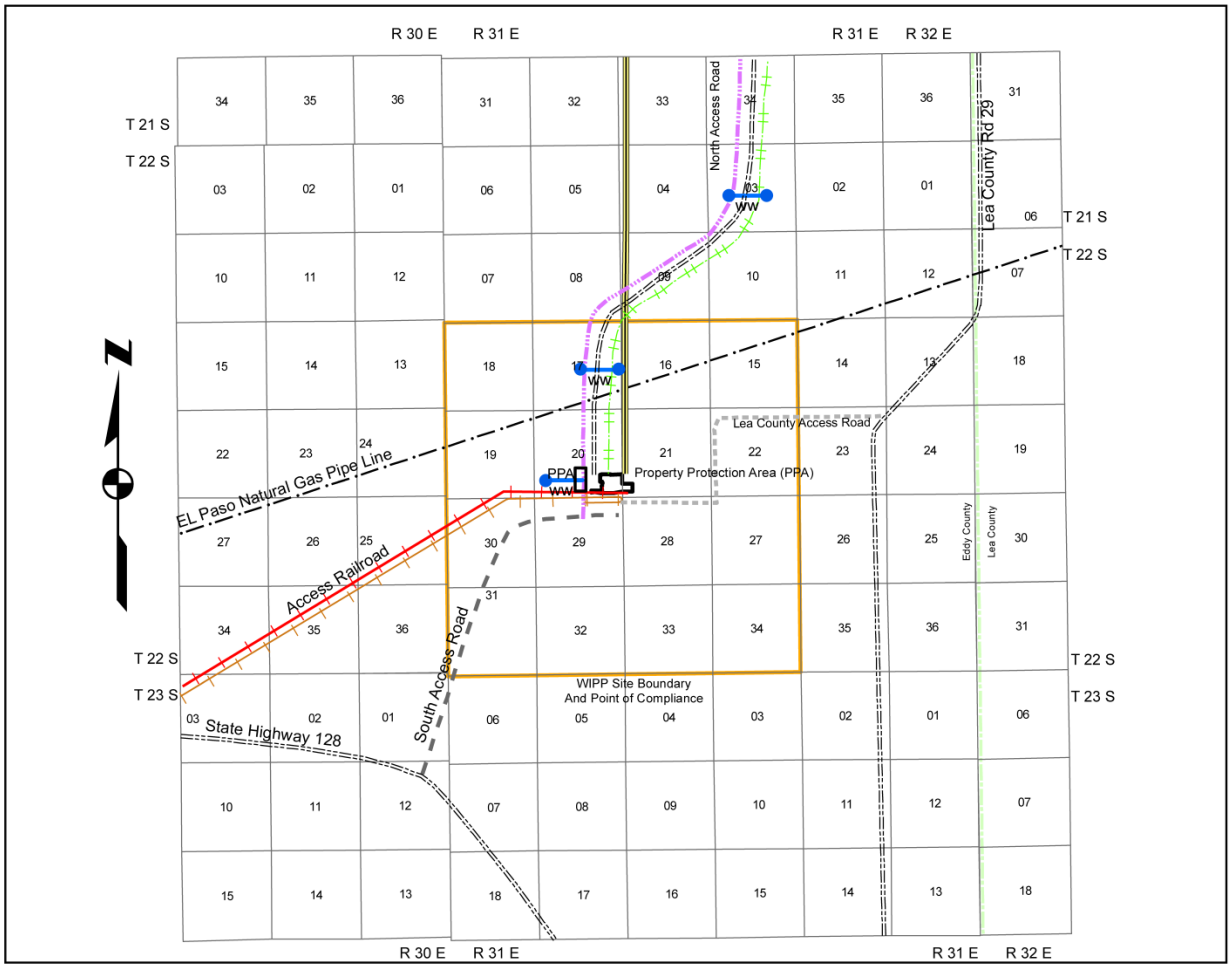


Figure B2-2
Planimetric Map-WIPP Facility Boundaries

Legend

WIPP Site Boundary 10,240 Acres.

U.S. DOE Right of Way Number NM-53809. For Waterline, 50 Feet Wide. The DOE had Agreed with the City of Carlsbad to Allow the Individuals to Tap this Line Located within the North Access Road Right of Way.

Tap Lines Connected to the Main WIPP Waterline.

Stock Water Tanks.

Southwestern Public Service Company Right of Way Number NM-43203 for Power 60 Feet Wide.

General Telephone of the Southwest Right of Way for Telephone Line, 30 Feet Wide, Located within the North Access Road Right of Way.

General Telephone of the of the Southwest Right of Way Number NM-60174 for Telephone Line, 30 Feet Wide, Located within the Railroad Right of Way.

U.S. DOE Right of Way Number NM-55675 for North Access Road, 170 Feet Wide.

U.S. DOE Right of Way for Access Roads Includes Right of Way Number NM-123703 for the South Access Road, 140 Feet Wide.

El Paso Natutal Gas Company Right of Way for Gas Pipeline, 30 Feet Wide in Section 16, 50 Feet Wide Elsewhere.

U.S. DOE Right of Way Number NM-55699 for Access Railroad, 150 Feet Wide.

NOTES

1. The Property Protection Area is a fenced area of approximately 34 acres without the New Filter Building (NFB) and approximately 44 acres with the NFB. It contains all surface facilities with the exception of salt storage piles, parking lot, landfill and waste water stabilization lagoons.

2. WIPP Site Boundary (WSB) provides a one mile buffer area around the area available for underground development

Legend

WIPP Site Boundary 10,240 Acres.

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NOTES

1. The Property Protection Area is a fenced area of approximately 34 acres without the New Filter Building (NFB) and approximatly 44 acres with the NFB. It contains all surface facilities with the exception of salt storage piles, parking lot, landfill and waste water stabalization lagoons.

2. An additional Property Protection Area of approximately 22 acres surrounds shaft #5.

3. WIPP Site Boundary (WSB) provides a one mile buffer area around the area available for underground development

Figure B2-2a
Legend to Figure B2-2

APPENDIX B3
FACILITIES

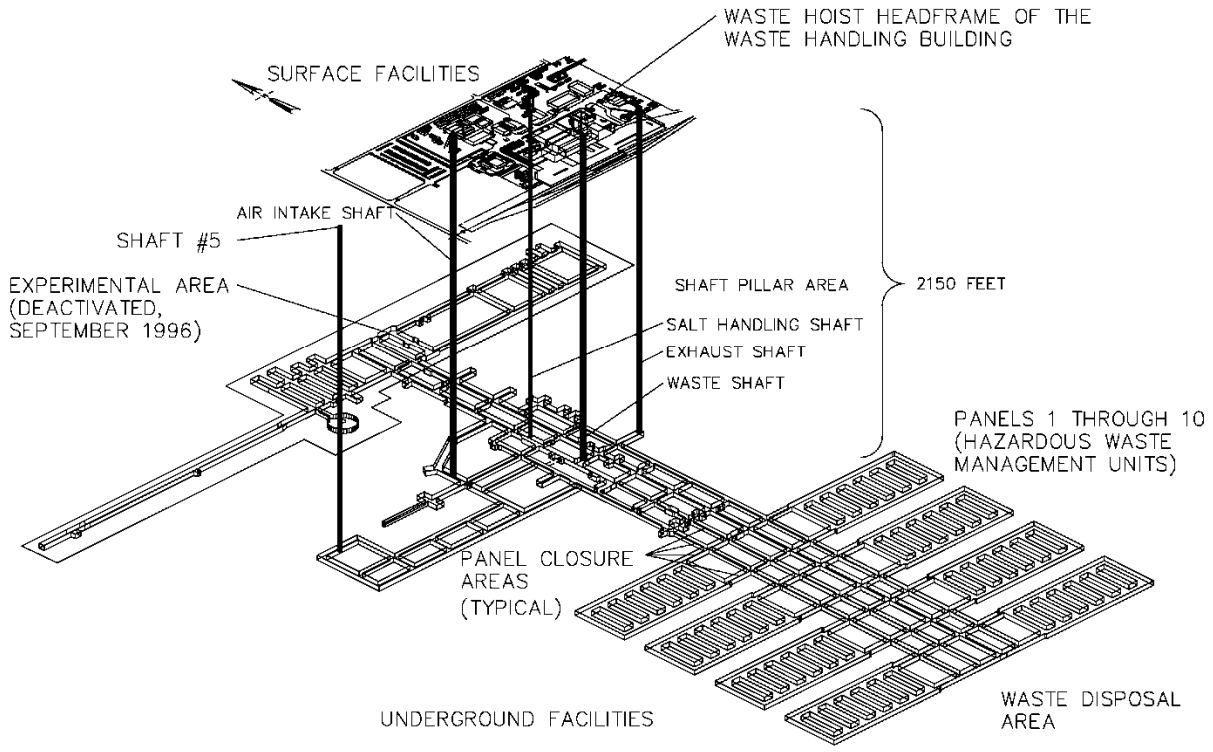
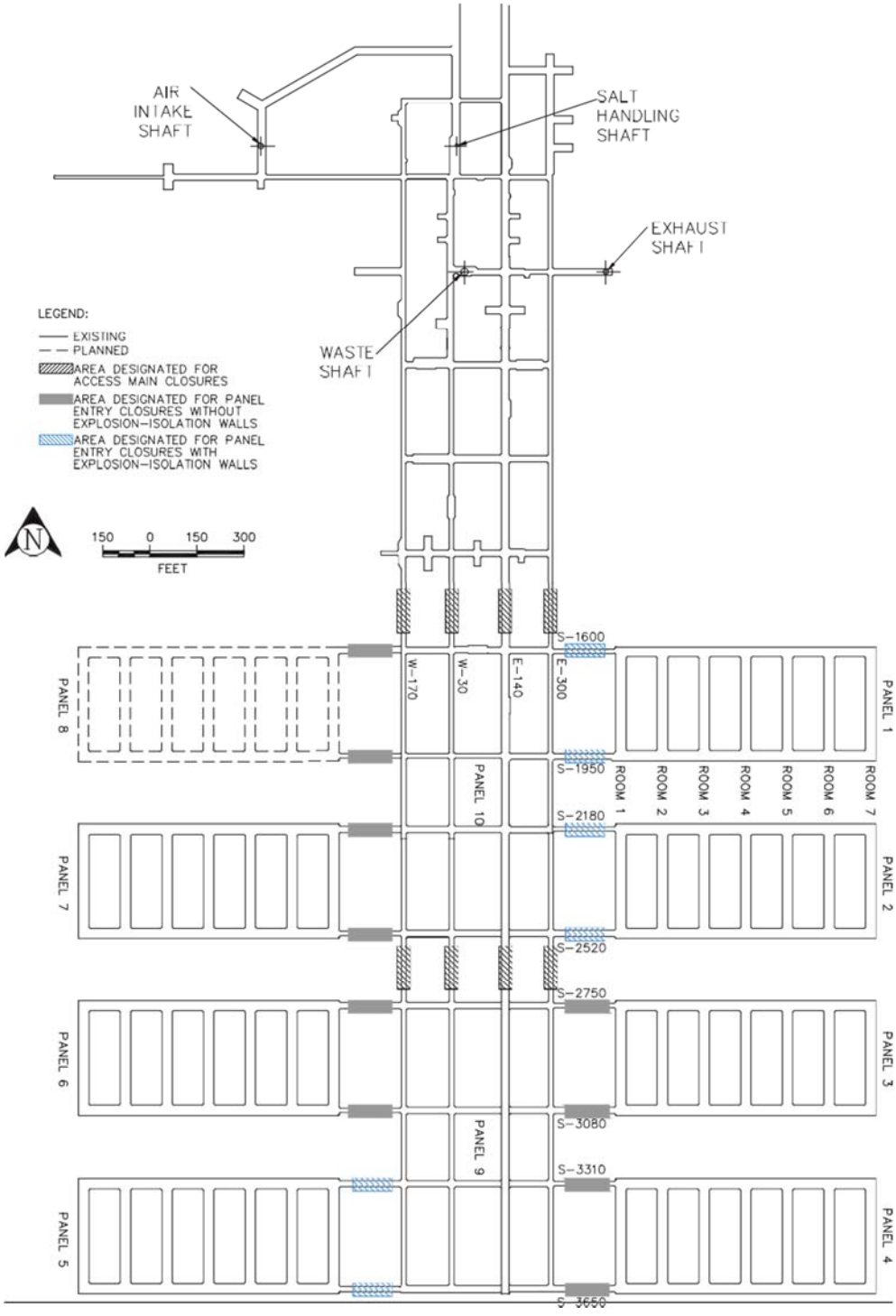


Figure B3-1-S#5
Spatial View of the WIPP Facility (with S#5)


AIR INTAKE SHAFT
SALT HANDLING SHAFT
EXHAUST SHAFT
WASTE SHAFT
LEGEND:
EXISTING
PLANNED
AREA DESIGNATED FOR ACCESS MAIN CLOSURES
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITHOUT EXPLOSION-ISOLATION WALLS
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITH EXPLOSION-ISOLATION WALLS
N
150 0 150 300
FEET
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
W-170
W-30
E-140
E-300
PANEL 1
PANEL 2
PANEL 3
PANEL 4
PANEL 5
PANEL 6
PANEL 7
PANEL 8
PANEL 9
PANEL 10
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7

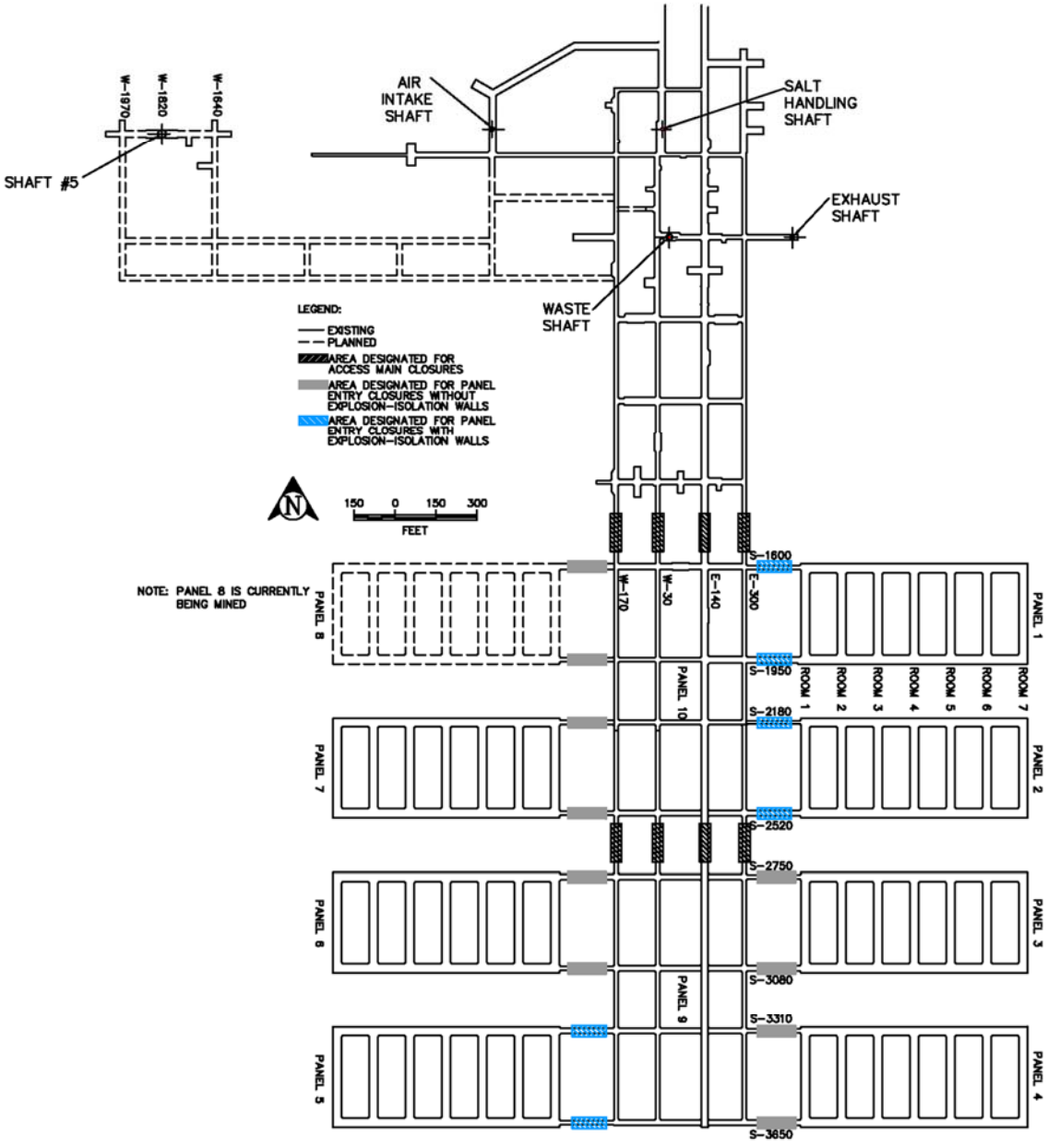


Figure B3-2
Repository Horizon

ATTACHMENT D

RCRA CONTINGENCY PLAN

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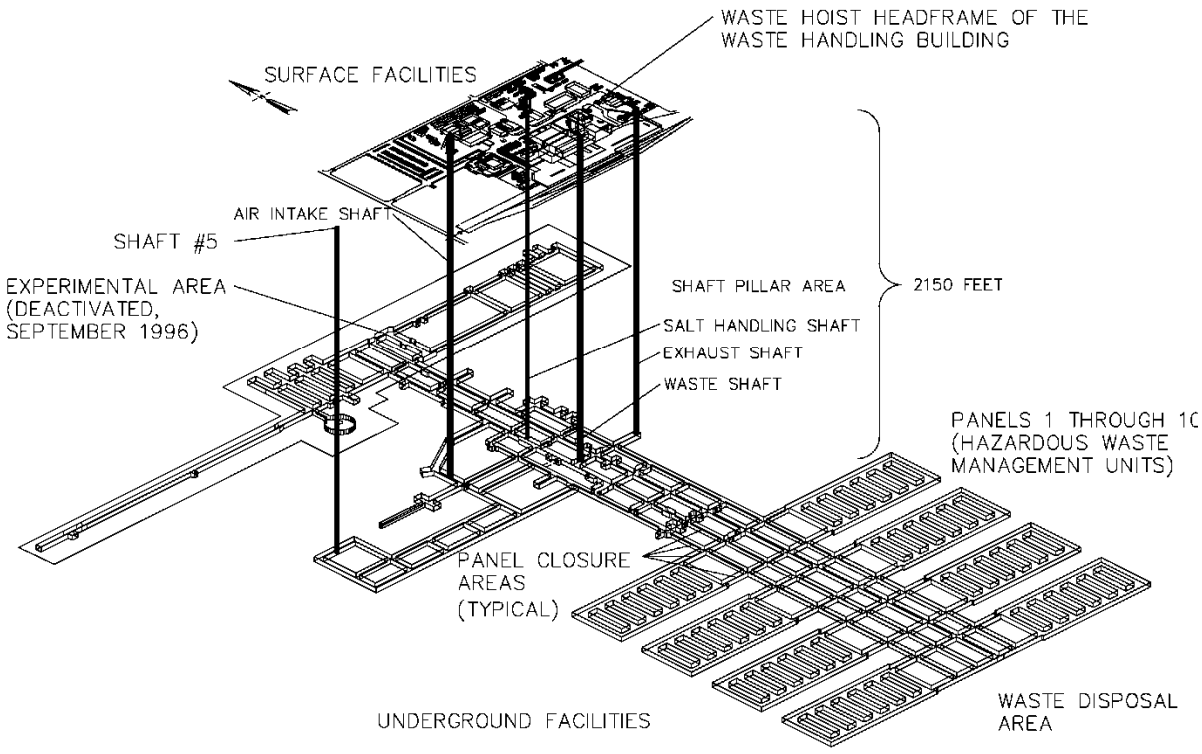
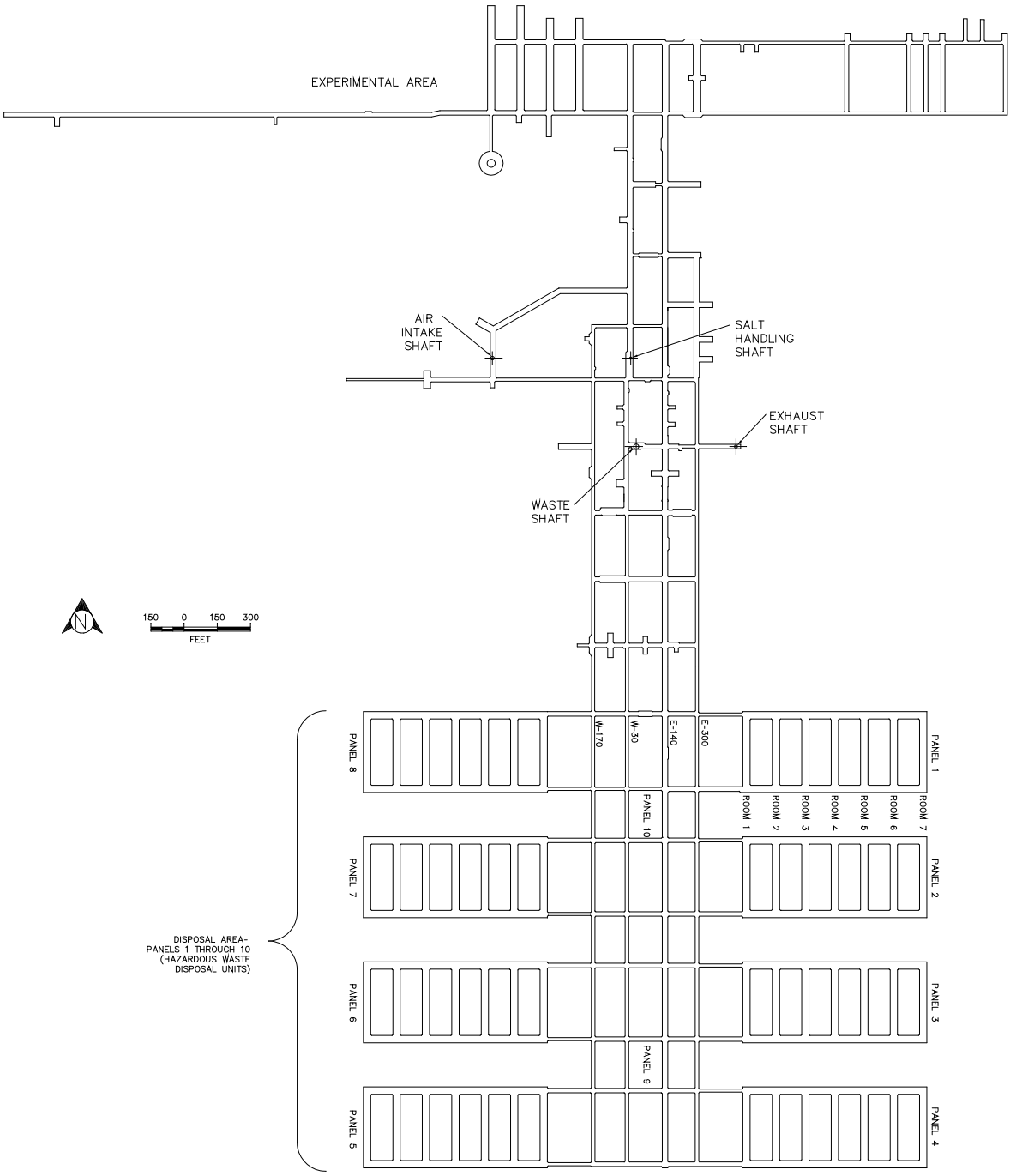


Figure D-2-S#5
Spatial View of the WIPP Facility (with S#5)


EXPERIMENTAL AREA
AIR INTAKE SHAFT
SALT HANDLING SHAFT
EXHAUST SHAFT
WASTE SHAFT
N
150 0 150 300
FEET
DISPOSAL AREA-PANELS 1 THROUGH 10 (HAZARDOUS WASTE DISPOSAL UNITS)
PANEL 8
PANEL 7
PANEL 6
PANEL 5
PANEL 10
PANEL 9
W-170
W-30
E-140
E-300
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7
PANEL 1
PANEL 2
PANEL 3
PANEL 4

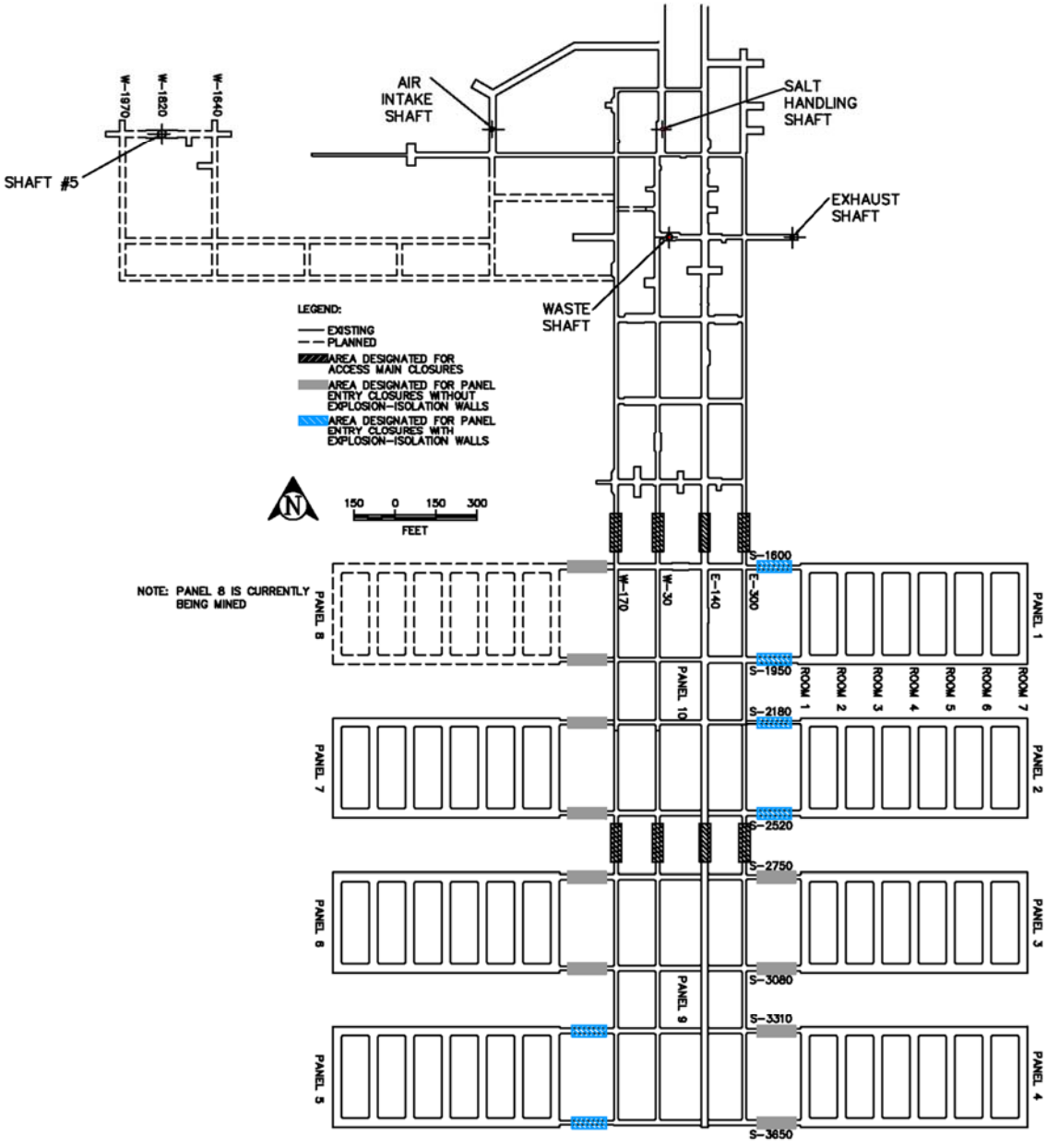
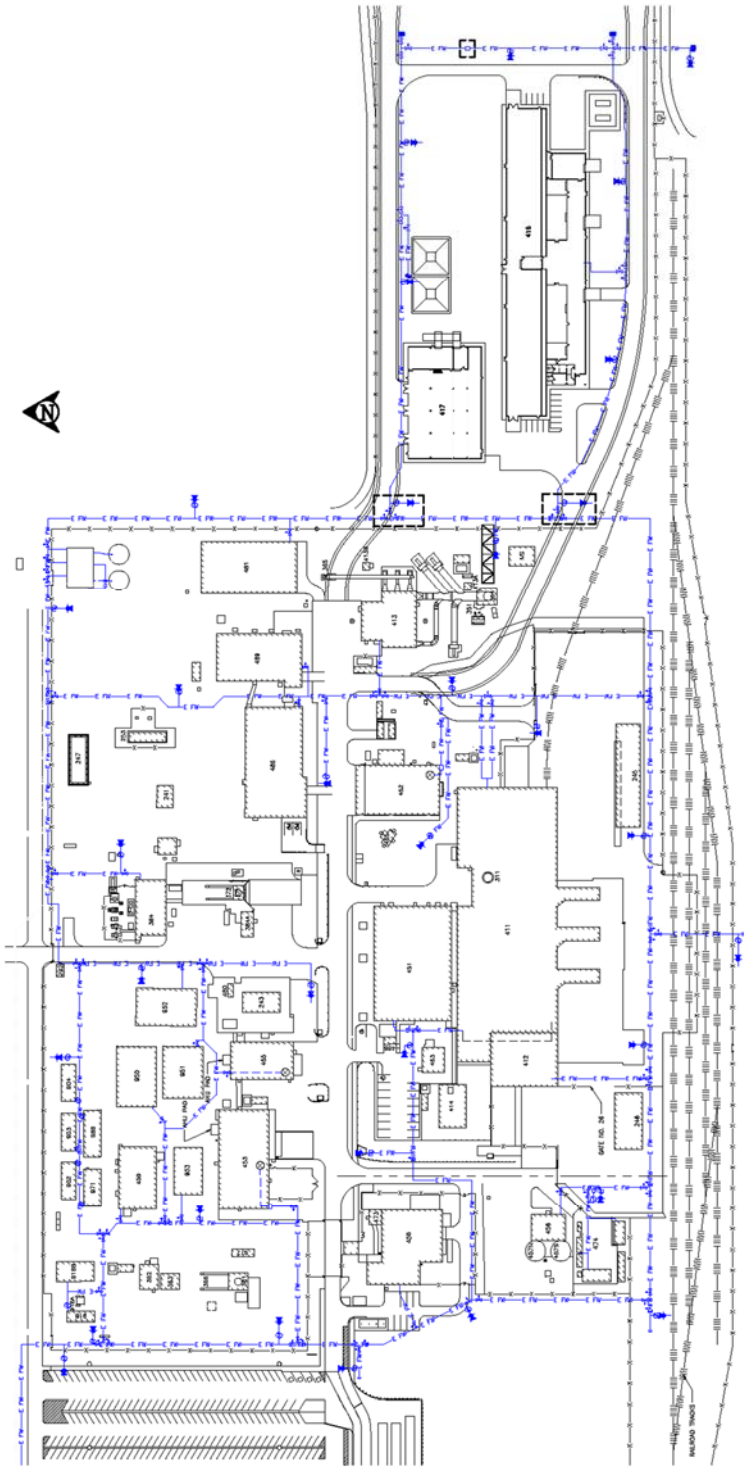


Figure D-3
WIPP Underground Facilities



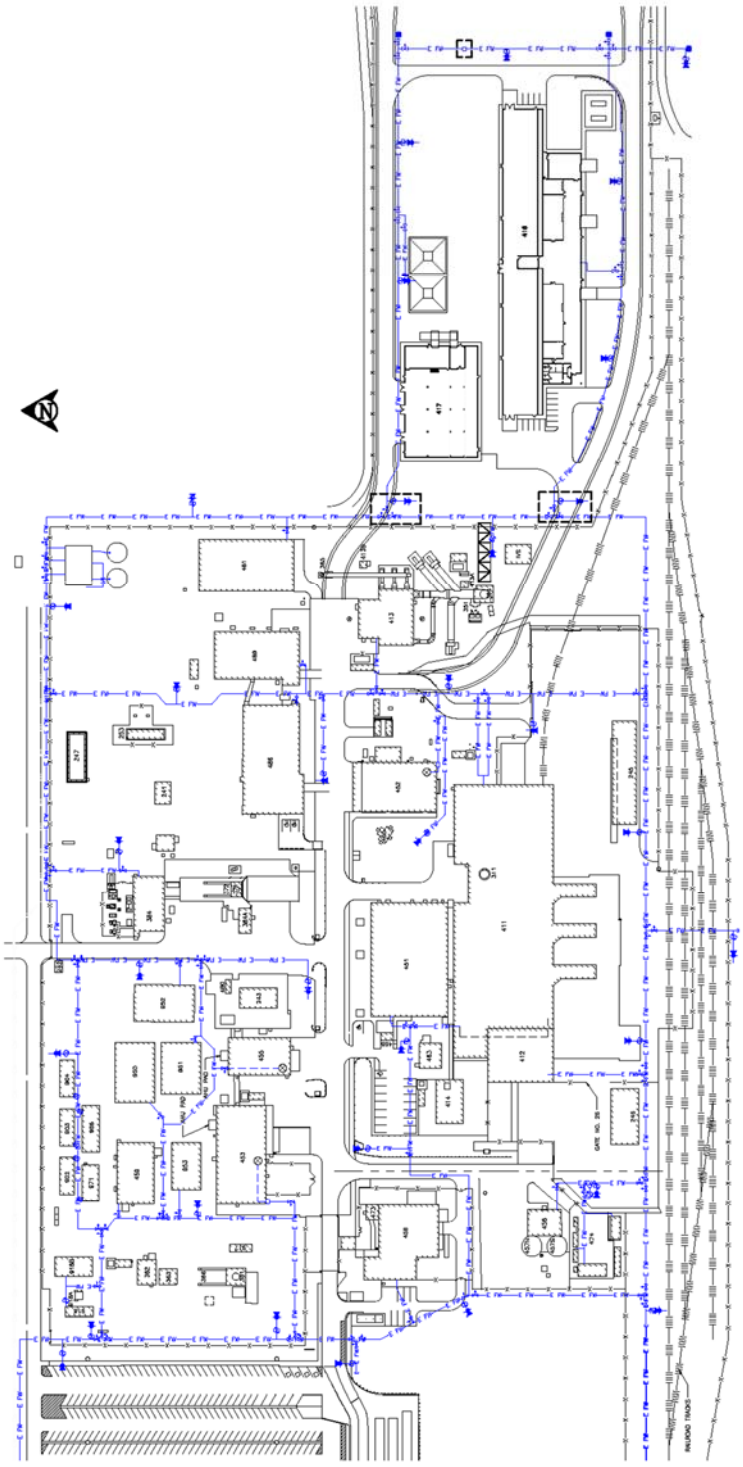


Figure D-5-NFB
Fire-Water Distribution System with Building 416

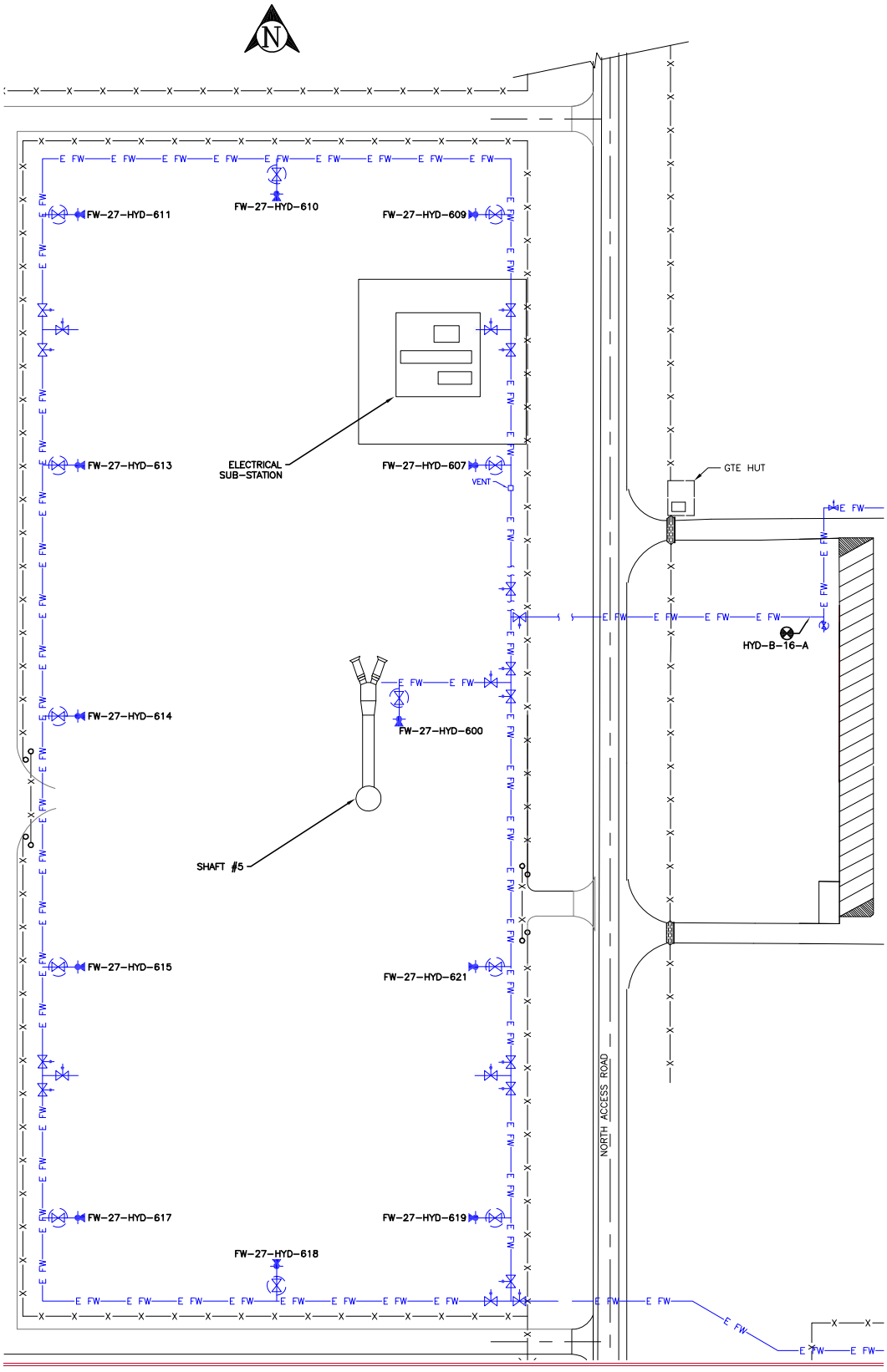
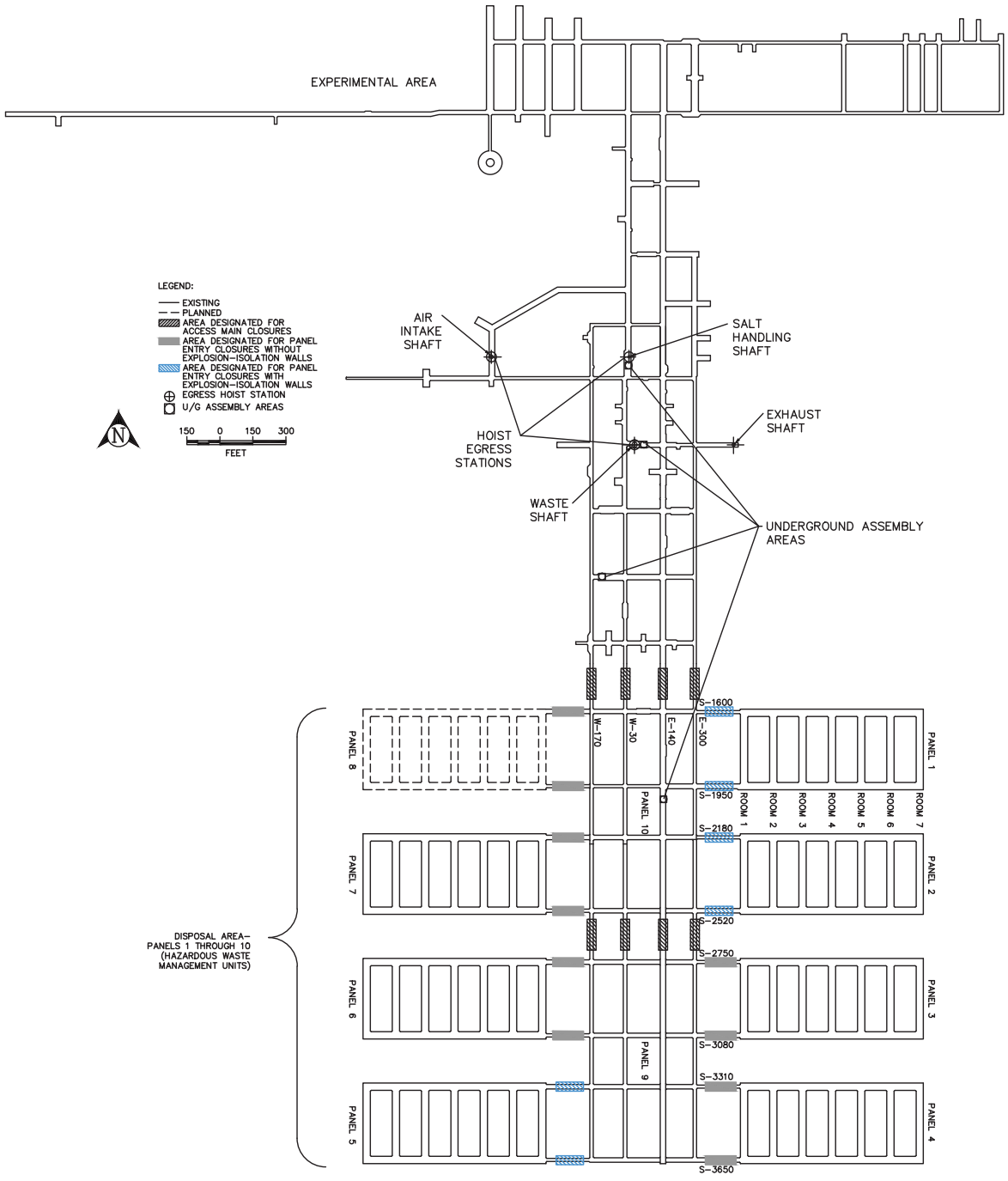


Figure D-5-S#5
Fire-Water Distribution System (with S#5)


EXPERIMENTAL AREA
LEGEND:
EXISTING
PLANNED
AREA DESIGNATED FOR ACCESS MAIN CLOSURES
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITHOUT EXPLOSION-ISOLATION WALLS
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITH EXPLOSION-ISOLATION WALLS
EGRESS HOIST STATION
U/G ASSEMBLY AREAS
150 0 150 300
FEET
AIR INTAKE SHAFT
SALT HANDLING SHAFT
EXHAUST SHAFT
HOIST EGRESS STATIONS
WASTE SHAFT
UNDERGROUND ASSEMBLY AREAS
DISPOSAL AREA-PANELS 1 THROUGH 10 (HAZARDOUS WASTE MANAGEMENT UNITS)
PANEL 8
PANEL 7
PANEL 6
PANEL 5
PANEL 10
PANEL 9
PANEL 1
PANEL 2
PANEL 3
PANEL 4
W-170
W-30
E-140
E-300
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7

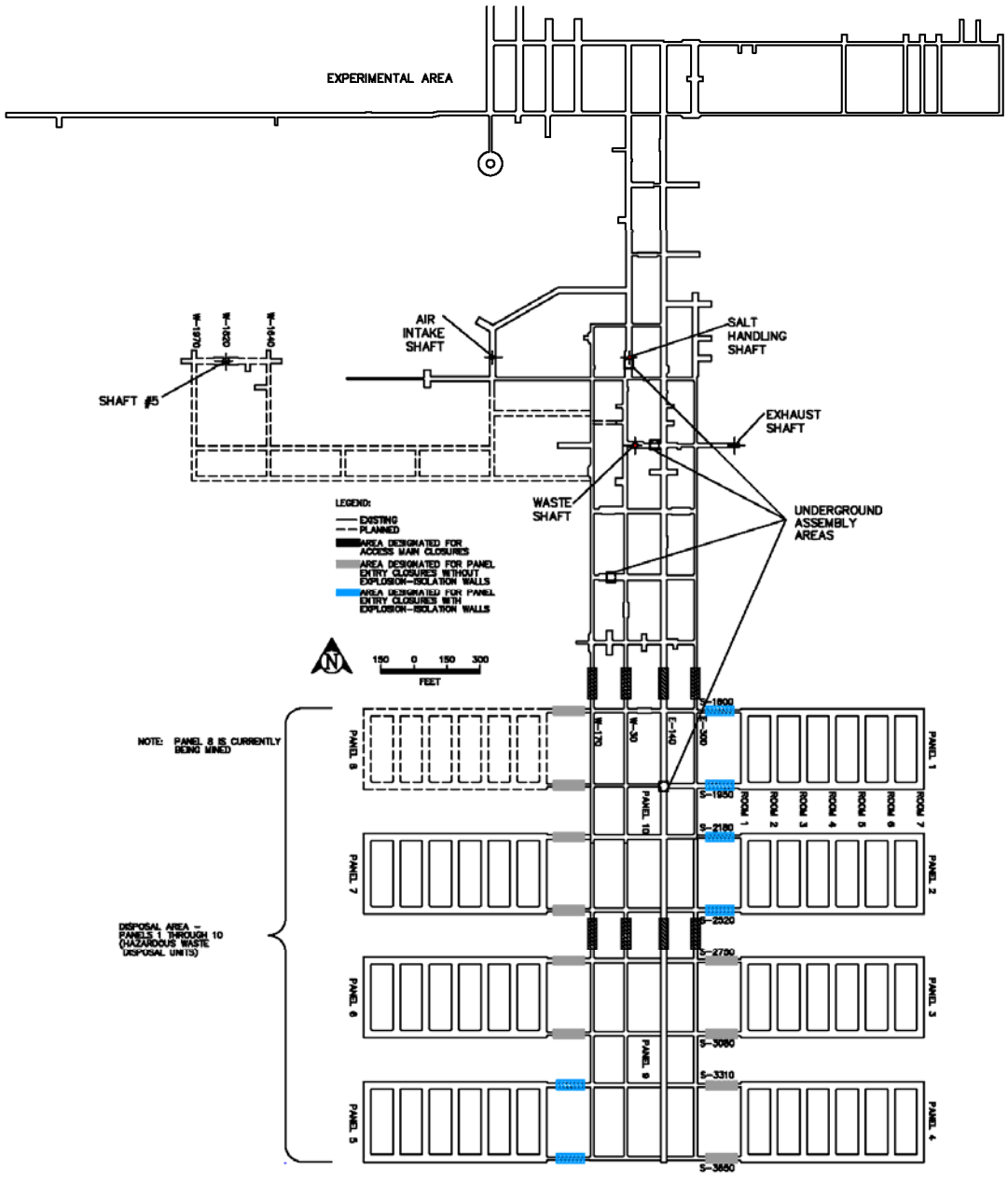
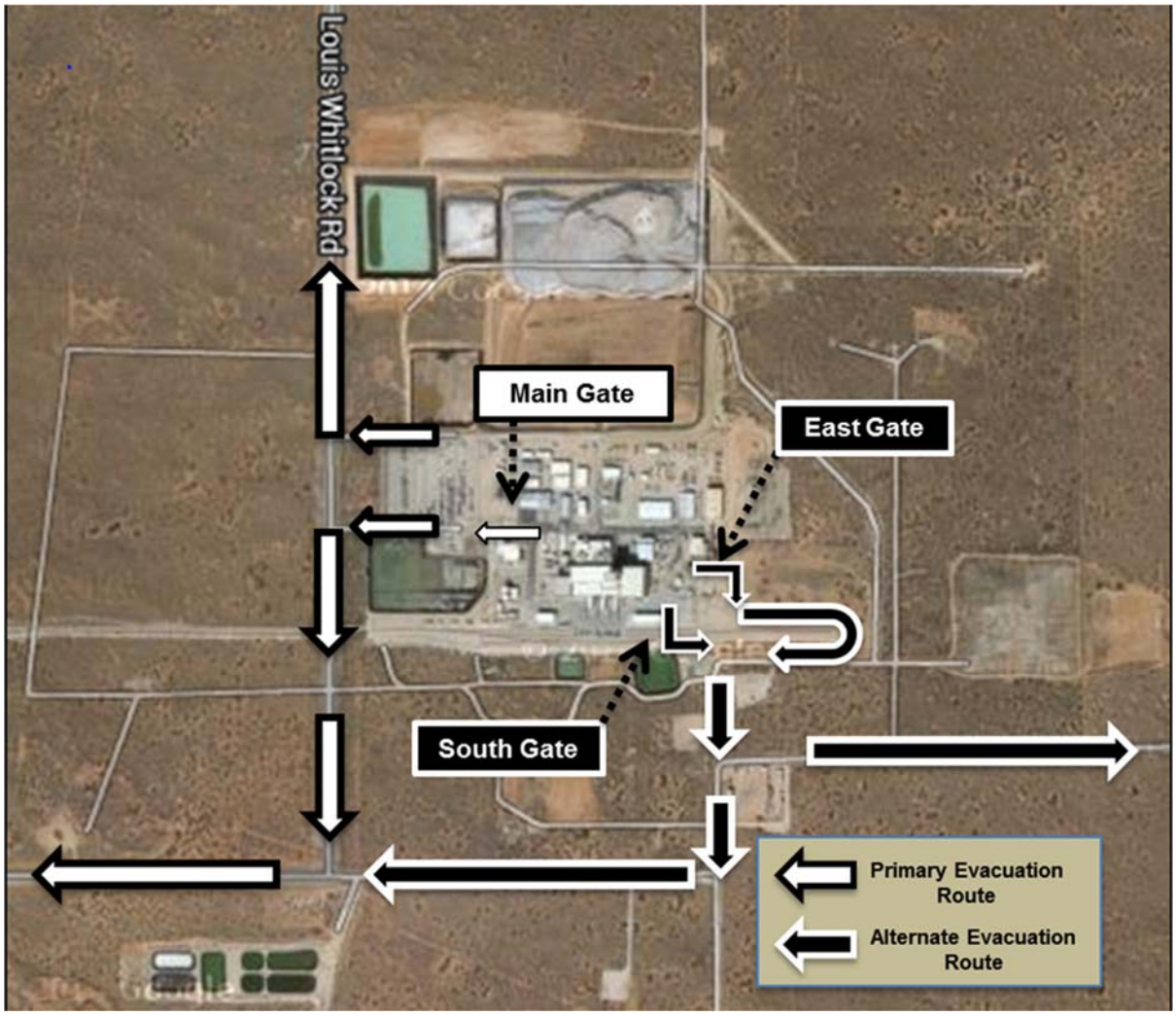


Figure D-7
Designated Underground Assembly Areas


Louis Whitlock Rd
Main Gate
East Gate
South Gate
Primary Evacuation Route
Alternate Evacuation Route

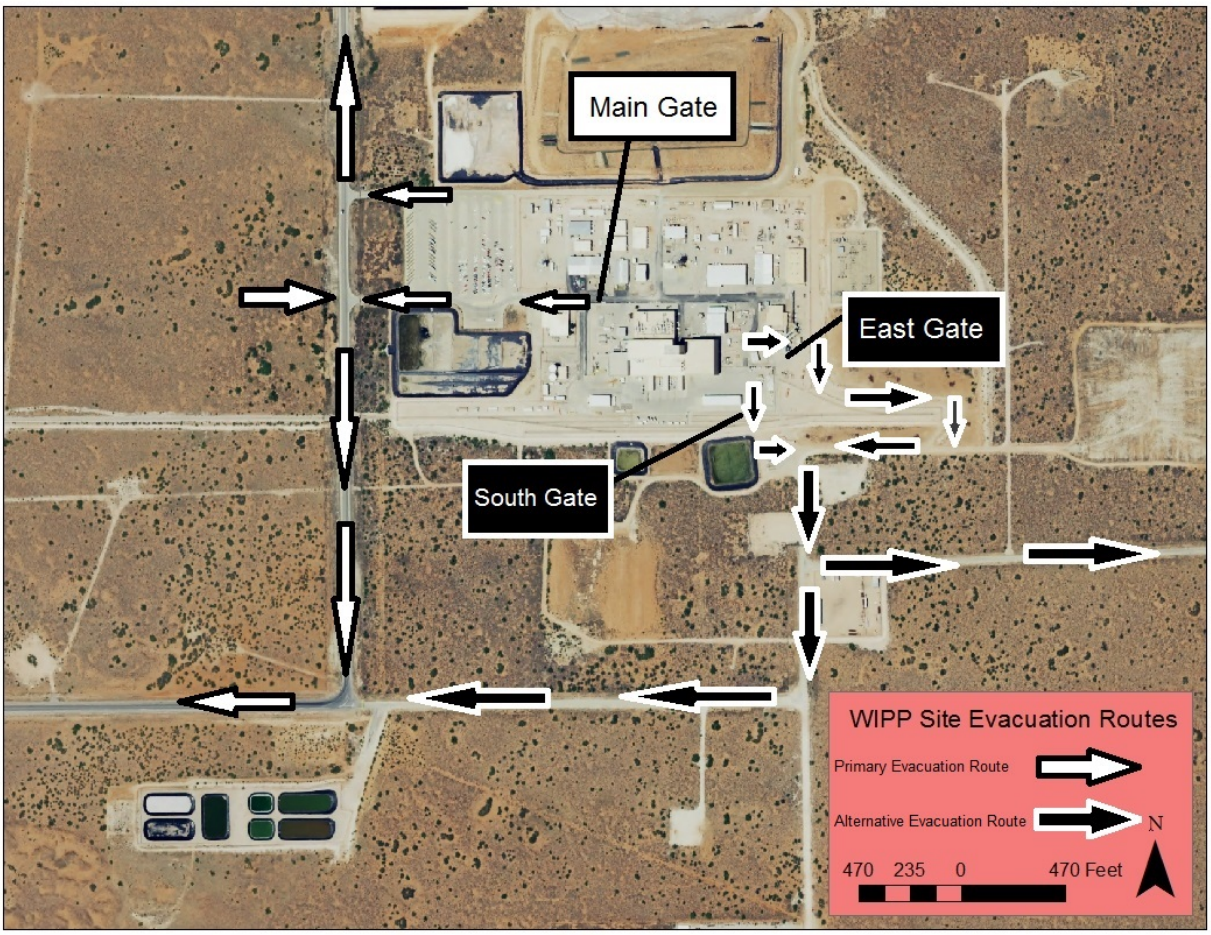


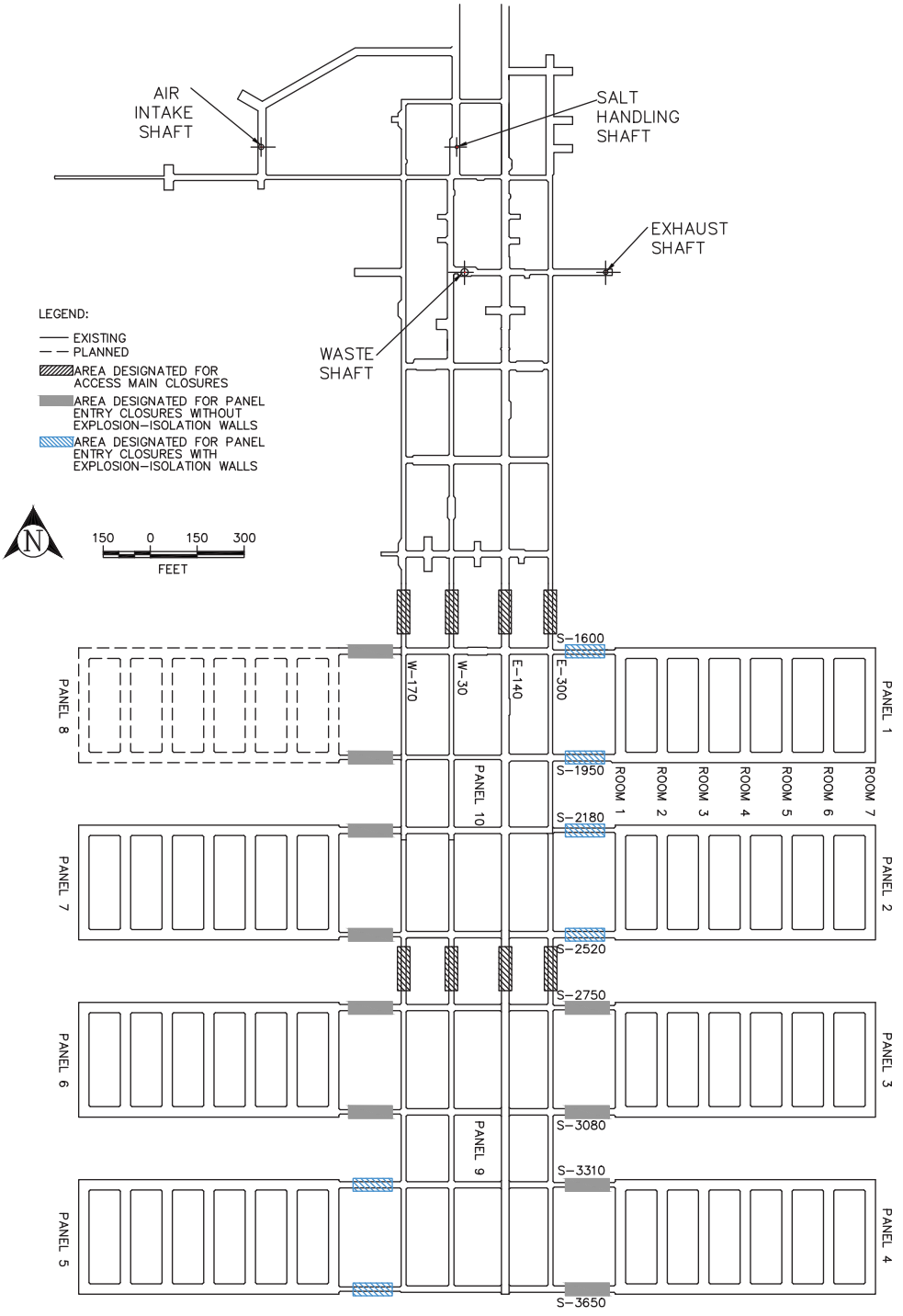
Figure D-8
WIPP Site Evacuation Routes

ATTACHMENT G

CLOSURE PLAN

Introduction

This Permit Attachment contains the Closure Plan that describes the activities necessary to close the Waste Isolation Pilot Plant (**WIPP**) individual units and facility. Since the current plans for operations extend over several decades, the Permittees will periodically reapply for an operating permit in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.10(h)). Consequently, this Closure Plan describes several types of closures. The first type is panel closure, which involves constructing closures in each of the underground hazardous waste disposal units (**HWDUs**) after they are filled. The second type is partial closure, which can be less than the entire facility and therefore less than an entire unit as described herein for the Waste Handling Building (**WHB**) Unit, the Parking Area Unit (**PAU**), or Permit-related surface equipment, structures and contaminated soils. The third type of closure is final facility closure at the end of the Disposal Phase, which will entail "clean" closure of all remaining surface storage units and construction of ~~the four~~ shaft seal systems for each shaft. Finally, in the event a new permit is not issued prior to expiration of an existing permit, a modification to this Closure Plan will be sought to perform contingency closure. Contingency closure defers the final closure of waste management facilities such as the Waste Handling Building Container Storage Unit (**WHB Unit**), the conveyances, the shafts, and the haulage ways because these will be needed to continue operations with non-mixed Transuranic (**TRU**) waste.


AIR
INTAKE
SHAFT
SALT
HANDLING
SHAFT
EXHAUST
SHAFT
WASTE
SHAFT
LEGEND:
EXISTING
PLANNED
AREA DESIGNATED FOR ACCESS MAIN CLOSURES
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITHOUT EXPLOSION-ISOLATION WALLS
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITH EXPLOSION-ISOLATION WALLS
N
150 0 150 300
FEET
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
W-170
W-30
E-140
E-300
PANEL 1
PANEL 2
PANEL 3
PANEL 4
PANEL 5
PANEL 6
PANEL 7
PANEL 8
PANEL 9
PANEL 10
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7

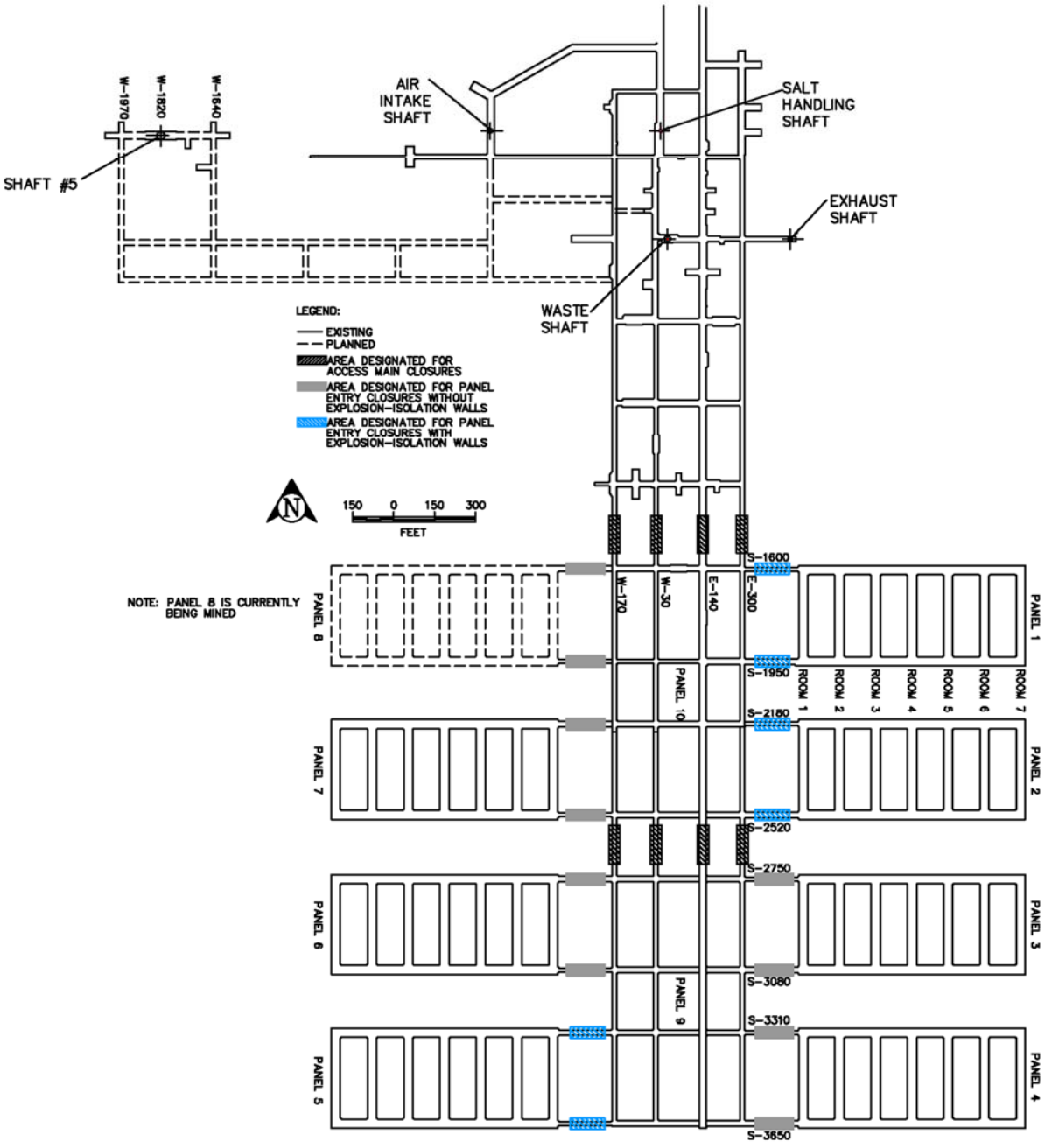
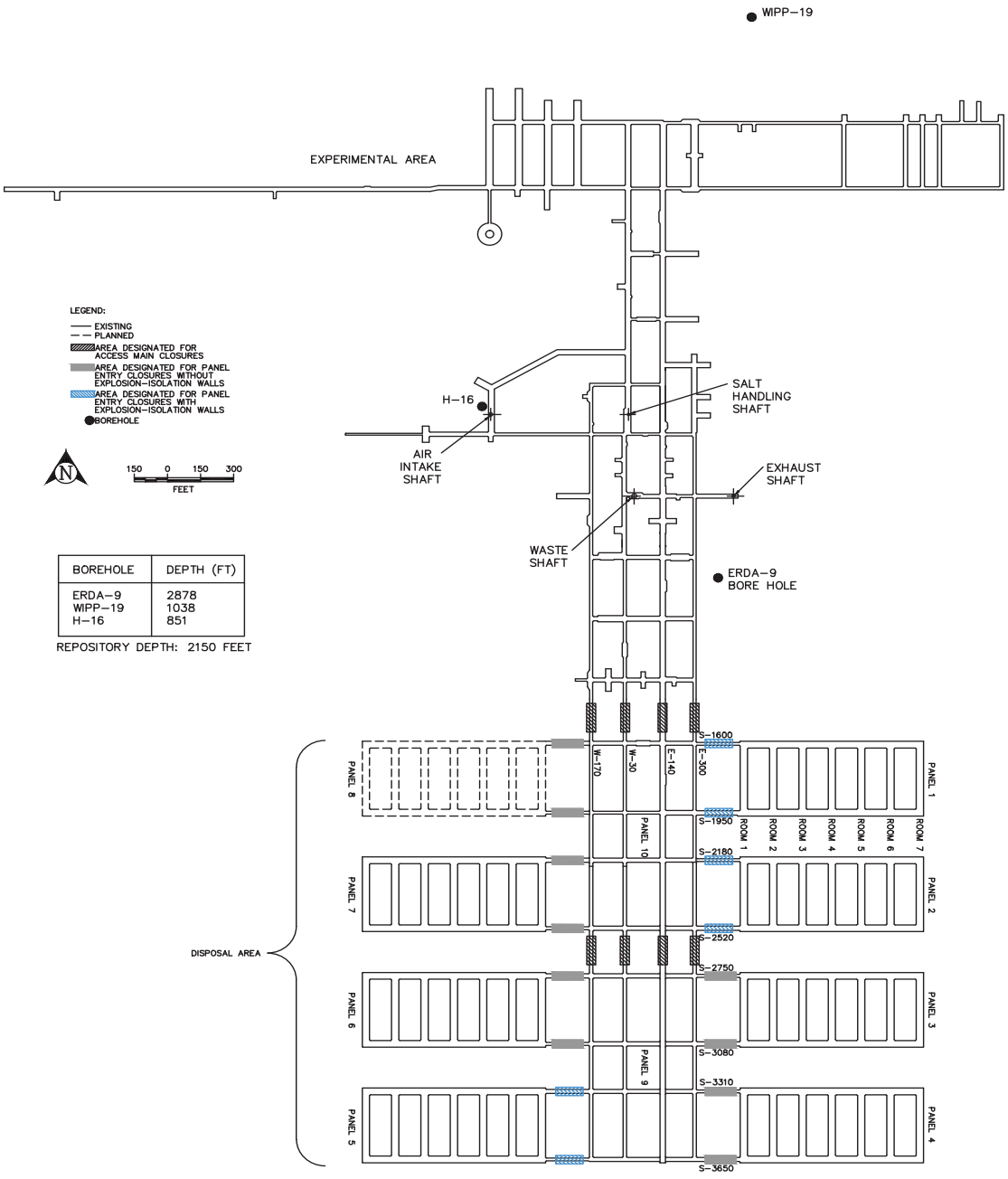
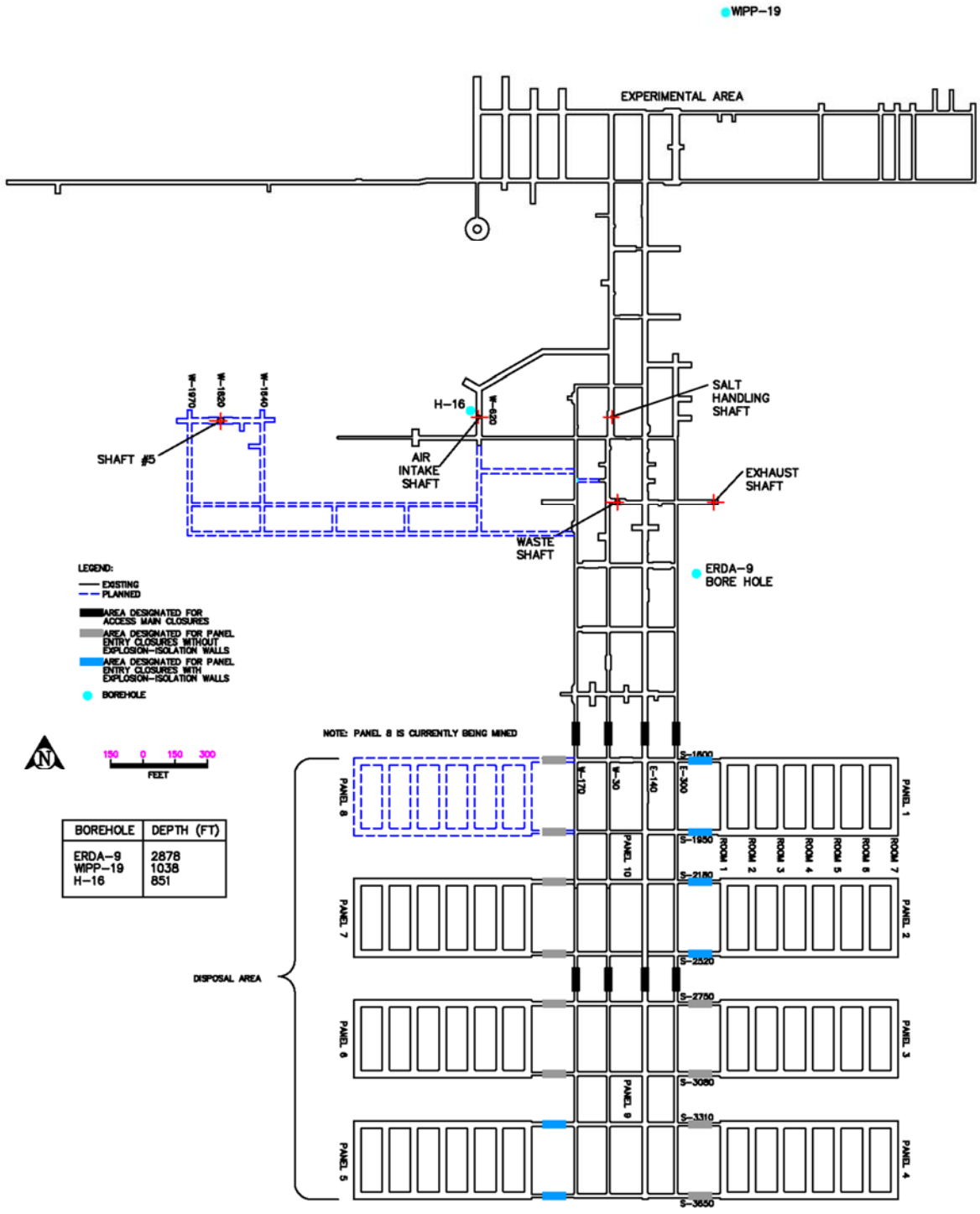


Figure G-1
Location of Underground HWDUs and Anticipated Closure Locations

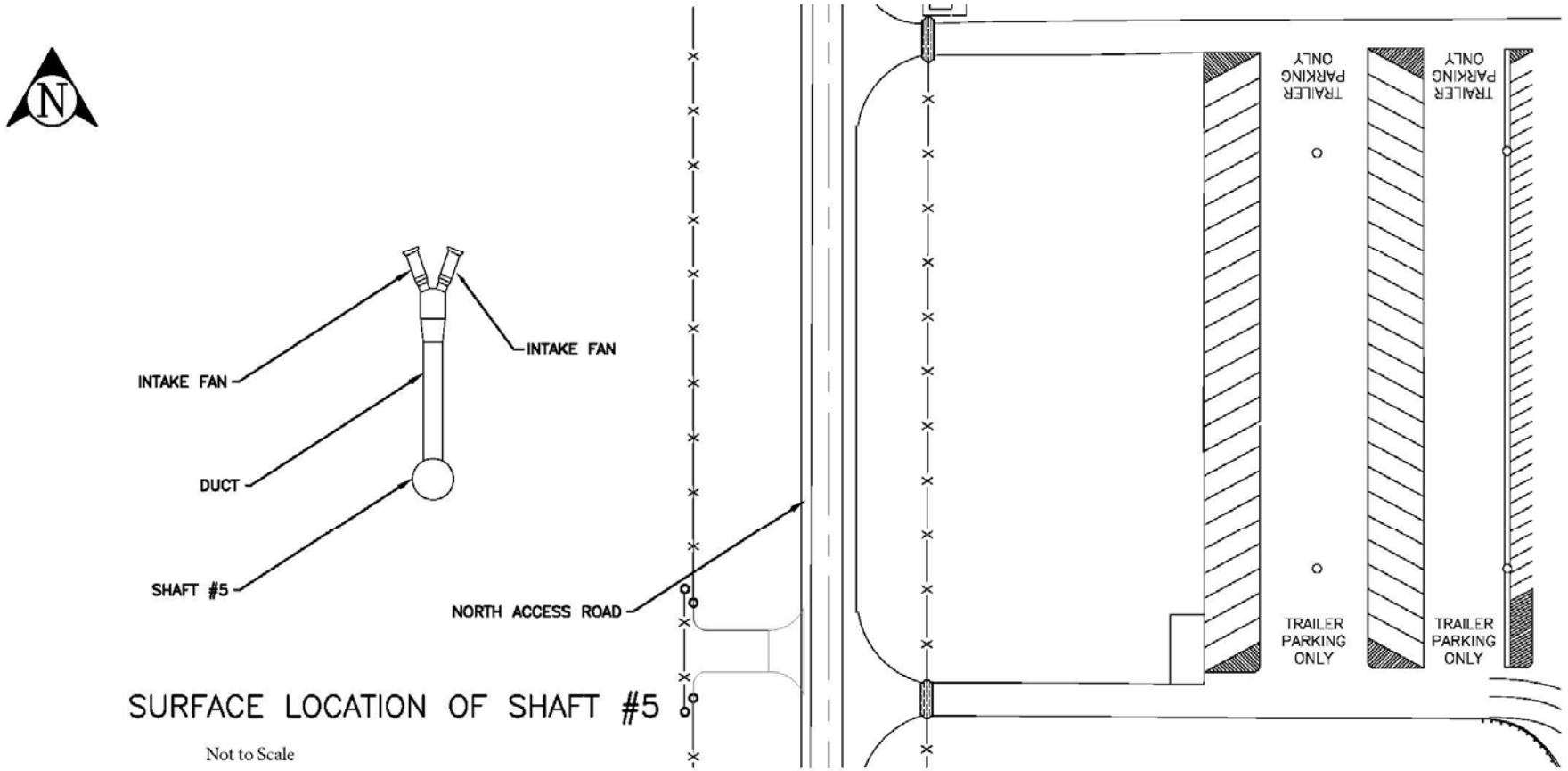

WIPP–19
EXPERIMENTAL AREA
LEGEND:
EXISTING
PLANNED
AREA DESIGNATED FOR ACCESS MAIN CLOSURES
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITHOUT EXPLOSION–ISOLATION WALLS
AREA DESIGNATED FOR PANEL ENTRY CLOSURES WITH EXPLOSION–ISOLATION WALLS
BOREHOLE
150 0 150 300
FEET
H–16
AIR INTAKE SHAFT
SALT HANDLING SHAFT
EXHAUST SHAFT
WASTE SHAFT
ERDA–9 BORE HOLE
BOREHOLE
DEPTH (FT)
ERDA–9
2878
WIPP–19
1038
H–16
851
REPOSITORY DEPTH: 2150 FEET
DISPOSAL AREA
PANEL 8
PANEL 7
PANEL 6
PANEL 5
PANEL 1
PANEL 2
PANEL 3
PANEL 4
PANEL 9
PANEL 10
W–170
W–30
E–140
E–300
S–1600
S–1950
S–2180
S–2520
S–2750
S–3080
S–3310
S–3650
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7



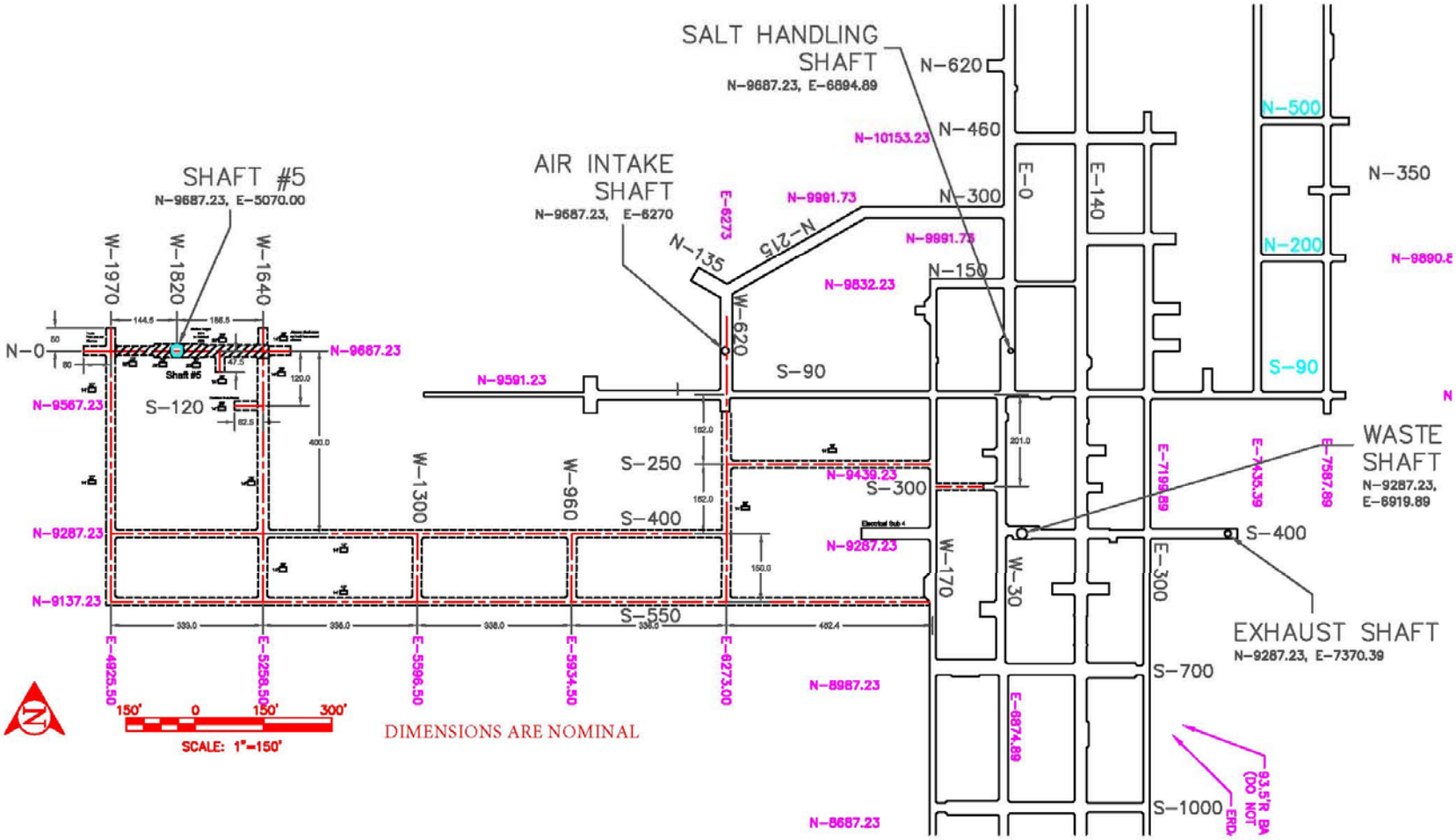
BOREHOLE	DEPTH (FT)
ERDA-9	2878
WIPP-19	1038
H-16	851

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

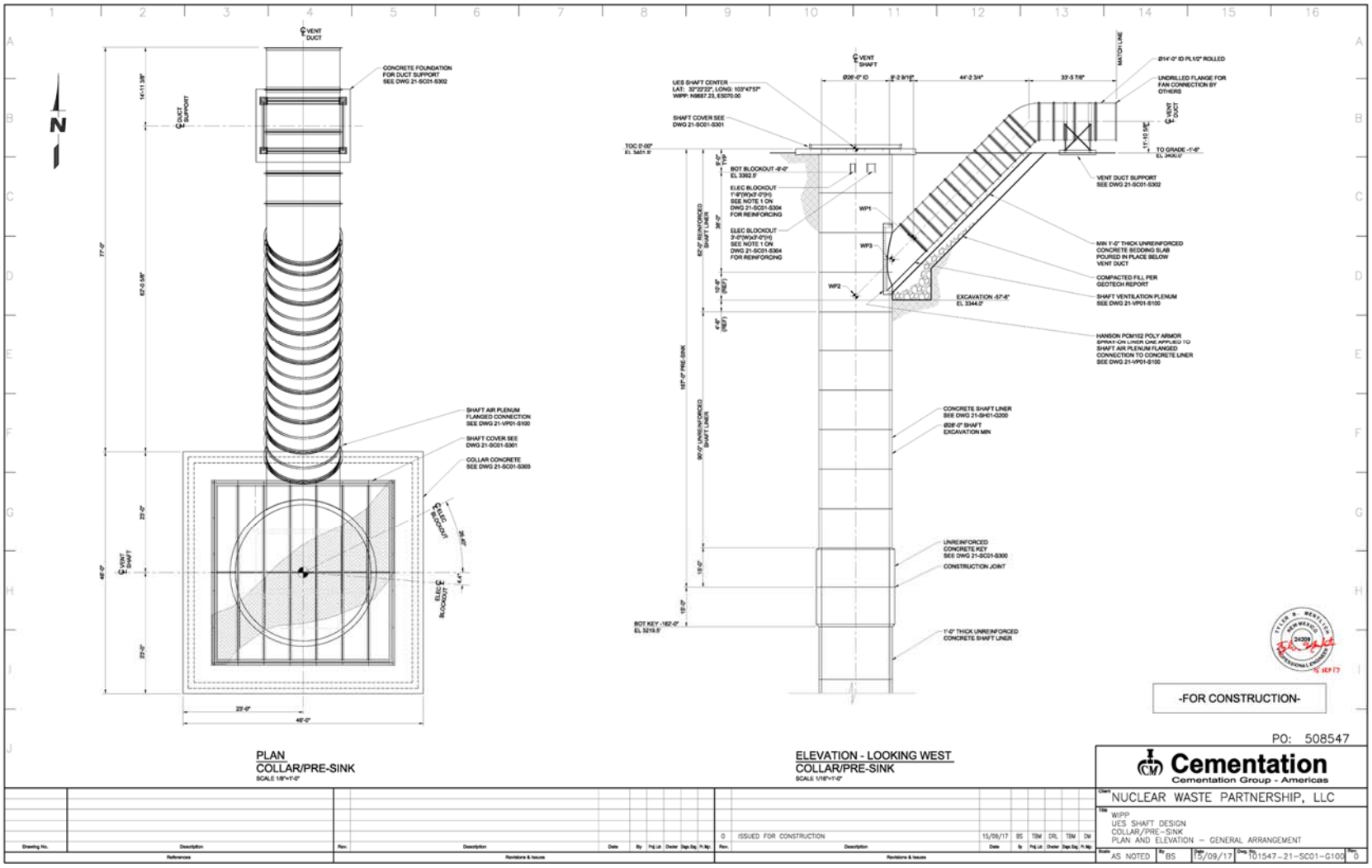
Appendix C
WIPP New Shaft and Connecting Drifts Illustrations



Surface Location of Shaft #5



Proposed Layout of Connecting Drifts from S#5 to the Existing Underground Facility



Design Drawing of New Shaft Collar with Vent Duct