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OCT 0 6 2017

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

Subject: Response to the Referenced Technical Incompleteness Determination, Waste Isolation Pilot Plant Hazardous Waste Facility Permit Number: NM4890139088-TSDF

Reference: New Mexico Environment Department correspondence from John E. Kieling, Chief, Hazardous Waste Bureau to Todd Shrader, CBFO, and Bruce C. Covert, NWP, dated August 17, 2017, subject: Technical Incompleteness Determination, November 10, 2016 Response to July 22, 2015 Technical Incompleteness Determination on the March 18, 2013 Class 3 Permit Modification Request, Waste Isolation Pilot Plant, EPA I.D. Number NM4890139088

Dear Mr. Kieling:

Enclosed is the Permittees' response to the referenced Technical Incompleteness Determination. Enclosed are the following:

- Response to comments
- List describing editorial/format changes associated with enclosed redline-strike-out and clean copy versions of applicable portions of the Permit
- Compact disc including redline-strike out and clean copy versions of applicable portions of the Permit

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. George T. Basabilvazo at 575-234-7488.

Sincerely,

Signatures on File

Todd Shrader, Manager
Carlsbad Field Office

Bruce C. Covert, Project Manager
Nuclear Waste Partnership LLC

Enclosure (3)

cc: w/enclosure

R. Maestas, NMED	*ED
D. Biswell, NMED	ED
CBFO M&RC	

*ED denotes electronic distribution

CBFO:OEP:GTB:AC:17-1070:UFC 5487.00

Enclosure 1

Response to Comments

Response to Comments

1. **PMR Overview, p. 5; pdf p. 24:**
The PMR states: "The bulkhead component of the WPC design functions as an effective closure system, since it prevents the active ventilation of filled panels. Active ventilation removes VOCs from the panels and entrains them in the underground exhaust air. This exhaust air serves as the only pathway for VOCs associated with the hazardous waste to pose a threat to human health or the environment." These statements are not clear when compared to the Permittees' Design Report which indicates that releases are not controlled by the bulkheads during active ventilation of the mine but by the release rates from individual waste containers (DOE-NWP 2016, Appendix E, p. E-159). Please provide clarification.

RESPONSE: The following is provided as a clarification to the Overview. The statement in the Overview is that bulkheads "prevent active ventilation". This is consistent with the definition of a bulkhead in Permit Part 1, Section 1.5.14. and the description of bulkheads in Permit Attachment A2, Section A2-2a(3). Active ventilation can be thought of as ventilation in a room, area, or building, designed to control contaminant levels within the structure by dilution and removal. In the WIPP facility underground, active ventilation is only needed for areas where human activity is underway or anticipated. In other areas, active ventilation is blocked, and although ventilation leakage may occur, it is not intended to control contaminants by dilution and removal.

The paragraph referred to in the Overview is merely establishing that the ventilation air pathway is the only pathway of concern with regard to the impacts of volatile organic compounds (VOCs) on human health. The majority of the VOCs that are emitted from the containers of waste are entrained in the ventilation airstream and are removed from the mine creating an exposure pathway for surface non-waste workers. The rate at which VOCs are emitted from the mine are a direct function of the ventilation flow rate. However, there is another mechanism that controls the rate of emission from the waste container. This is gaseous diffusion of VOCs through the container filter. Volatile organic compounds will migrate from the containers as long as the concentration outside the container is less than the concentration within the container. For the purposes of modeling, the ventilation leakage in the closed disposal room is assumed to maintain this gradient (i.e., no VOC source depletion is assumed) so that VOCs continue to migrate out of the containers.

An important consideration in the modeling is how VOCs become entrained in the airstream and at what concentration, when the ventilation to the disposal room is significantly reduced by a bulkhead. There are two options for modeling these emissions. One is that the disposal areas are sealed such that there is no ventilation air passing through them. In this case, which will be achieved for the closures that use the run-of-mine salt component, the disposal area will reach an equilibrium concentration equal to the average of the concentration in the disposed containers.

Once equilibrium is reached, the only mechanism to cause VOCs to leave the disposal area is internal pressure that results from the creep closure of the room and the generation of gases within the containers as waste decomposes. These phenomena result in very small emissions around the closures.

Another way to model the emissions from closed disposal areas is to assume some leakage rate associated with the bulkheads. Since this is observed in the facility with day-to-day bulkhead use, it is more realistic. This is the ventilation characteristic that the Permittees' Design Report is addressing for Cases 2, 3, and 4. The Permittees' Design Report indicates that because the bulkheads are not seals, equilibration will not occur and containers will continue to emit VOCs. This approach allows the Permittees to estimate a VOC concentration over time for the purpose of modeling the emissions from closed disposal areas.

2. **PMR Appendix E, Golder Design Report, p. E-28; pdf p. 494:**
The PMR Design Report states: "Based on the calculations of thermal runaway due to nitrate salt-bearing waste, the WPC design requires that the distance between the waste container and the steel bulkhead is at least 22 feet." The cited minimum separation distance between the waste container and the steel bulkhead is based on the exothermic event in Room 7, Panel 7, involving a single waste container (September 30, 2014 Information Regarding the WIPP Nitrate Salt Isolation Plan, Attachment B, Evaluation of Thermal Effects on Panel Closures from Heat Event, Gross 2014b). The adopted design thermal runaway event conservatively consists of the simultaneous ignition of three drums and would result in a greater release of radiant energy than ignition of a single drum (DOE-NWP 2016, p. 13 and p. E-18). Please provide documentation demonstrating that the specified minimum separation distance of 22 feet is sufficient to maintain bulkhead functionality when subjected to the heat effects of the design thermal runaway event, or provide an acceptable alternative specification.

RESPONSE: The Permittees' Design Report references the "WIPP Nitrate Salt Bearing Waste Container Isolation Plan, Revision 2" (Isolation Report). The three calculation notes in the Isolation Report document the expected performance of the bulkhead should another thermal runaway occur. The Isolation Report was written specifically for Panel 6 and Panel 7, Room 7. At the time, the proposed closure included an inbye and outbye bulkhead. The inbye bulkhead was assumed to be at least 22-feet from the waste based on the distance of the bulkheads in Panels 3 and 4 from the waste face. Attachment B of the Isolation Report points out that thermal effects on plastic materials (specifically melted slipsheets and melted MgO supersacks) from a one-drum event were seen about 25-feet downwind from the source of the heat. This indicates that the inbye bulkhead could be affected by a three-drum event under the right conditions (such as the event occurring at the waste face). However, the steel bulkhead is expected to remain intact under a three-drum event because steel is more resistant to melting (and thermal effects in general) than plastic and because the flashing between a steel bulkhead and the rock walls is flame-resistant, as noted below.

More importantly, the offset no longer matters with regard to the three-drum heat event in Panels 6 or 7 for the following reasons:

- The Permittees plan to close Panel 6 by placing bulkheads near the intersections of the panel entries and the mains, or in the mains themselves, without the installation of additional bulkheads in Panel 6. In this configuration, the closure bulkheads are at least two hundred feet (the length of a panel access drift) from the closest waste containers in Room 1 of Panel 6. Given this large standoff distance, thermal effects on the closure bulkheads will be negligible for a three-drum event.
- The Permittees plan to close Panel 7 by placing bulkheads near the intersections of the panel entries and the mains, which will be two hundred feet from any nitrate salt bearing waste. Given this large standoff distance, thermal effects on the closure bulkheads for Panel 7 will also be negligible for a three-drum event.
- The Permittees have changed the waste characterization program to prevent a recurrence of the thermal runaway conditions. That is, an oxidizer like nitrate salt bearing waste will not be combined with an organic desiccant that could provide the reactants for a thermal runaway reaction.
- Per the Isolation Plan, Attachment B, Page 10, the flashing component of the closure, which is the only portion that could burn, is Mine Safety and Health Administration approved flame-resistant material.

An alternative specification is not needed for the minimum separation of the waste from an inbye bulkhead because inbye bulkheads will not be installed in Panels 6 or 7 and because the off-set distance of 22-feet is not used in the Permittees' Design Report except that it is specified for use by the geotechnical engineer who has to make decisions regarding placement of the closure components.

3. PMR Overview, p. 2; pdf p. 21:
The PMR states "These roof falls are likely to continue since the areas will not be maintained once the closures are in place." Roof falls should therefore be considered an 'expected ground condition' under WPC Design Requirement 7. Analysis of the functionality of an ROM salt closure plug in the Design Report assumes progressive settlement of an intact roof beam and does not appear to consider the likelihood of a roof fall occurring above the ROM salt during the 17- to 31-year period when an air gap exists between the salt plug and the drift roof. The stresses on the ROM salt and in the drift roof will not be the same following a roof fall as compared with those associated with progressive downward movement of an intact beam. Please provide an assessment of the extent to which these differences could affect the plug length, consolidation, and air gap closure of the ROM salt.

RESPONSE: Regarding Requirement 7, the consideration of ground conditions is specified to assure safe working conditions during closure installation. That means, the threat of an immediate roof fall must be remediated in order to assure the safety of the workers. Remediation may include bolting, roof removal, or selection of an optimum portion of the entry for the closure.

Consideration for a subsequent roof fall is captured in Requirement 10: "*structural analysis shall use data acquired from the WIPP underground.*" The Permittees' Design Report uses WIPP underground creep closure data in the development of the run-of-mine (ROM) salt requirements.

Based on modeling performed for the Permittees' Design Report, the geometry of mine entries and the surrounding stress field is expected to be affected by roof falls. The roof fall impacts, however, are expected to be minimal in areas with the ROM salt installation due to limited space between the ROM salt and the surrounding rock mass (the maximum predicted air gap is only 12 percent of the entry height) and due to the fact that the ROM salt acts as a visco-elasto-plastic support providing a level of confinement which reduces the risk against sizable roof falls. The ROM salt performance in the W-30 entry (Zimmerly and Zavicar 2012) indicates that the air-gap is likely to be smaller than predicted by numerical models (a relatively small or no air gap was observed between the ROM salt and the surrounding rock mass in 2015 during the block wall inspection) supporting the observation of a relatively low potential for roof falls in the ROM salt areas. In the event of bed separation causing the immediate roof to fail the most likely scenario is that the separated material will settle on the ROM salt with a minimal air gap above the separation. Stresses in the immediately overlying material will be modified, but closure of the separated material and ROM salt will still occur providing the needed load for salt consolidation. The only likely effect will be densification of the ROM salt due to the roof fall impact (causing an increase in the ROM salt fractional density on the order of 8 percent of less) followed by a delay in creep driven consolidation. While the ROM salt might exhibit limited deformation in the longitudinal direction (a fraction of the vertical deformation which is estimated to be less than 10 percent), the length of ROM salt required for the WPC-B construction is not likely to be affected by roof falls.

4. **PMR Overview, p. 17; pdf p. 36:**
The section entitled "Revision to Remove On-Going Disposal Room VOC Monitoring." states that VOC monitoring is no longer needed as panel closures are installed and closure performance standards are applied. However, the text as written could be interpreted to imply all VOC monitoring will be discontinued regardless of the timing of each individual panel closure. Please clarify in your response whether disposal room VOC monitoring will be discontinued for each individual panel only when that panel closure is installed, and clarify the timing of the elimination of disposal room VOC monitoring.

RESPONSE: The Permit Part 4, Section 4.6.3. requires the Permittees to conduct Room-Based VOC monitoring to protect underground workers from an acute exposure to VOCs while a hazardous waste disposal unit (HWDU) is being filled with waste. Once waste emplacement is completed, the Ongoing Disposal Room VOC Monitoring (ODRVM) is required by Permit Part 4, Section 4.4.3. to protect underground workers for HWDUs that are filled, but have not been closed or do not have explosion-isolation walls in place. Sampling under the ODRVM program continues until panel closure is initiated. This measure was included in the Permit to provide protection for workers in the vicinity of filled panels for which completion of final closure has been deferred (awaiting approval of a modified panel closure design). Once the final closure design is approved, the Permittees do not anticipate any further deferrals of panel closure. That is to say, panel closure will begin within 30-days of placing the last waste in the panel. At this time, Room-Based VOC Monitoring will be discontinued in the panel. Therefore, the PMR proposes the deletion of the ODRVM since it will no longer be needed. There is a schedule in Permit Attachment G, Table G-1 that provides the anticipated dates for panel closure.

5. **PMR Appendix B, Attachment G, Section G-1a(1), p. B-31; pdf p. 79:**
The Permittees replaced established free release limits of less than 20 disintegrations per 100 square centimeters (dpm/100 cm^2) for alpha radioactivity and less than 200 dpm/100 cm^2 for beta-gamma radioactivity for contaminated container storage units with a statement that DOE-established radiological protection limits would be used. This change was not discussed by the Permittees and it is not clear why the change was made. The DOE-established radiological protection limits do not appear to be defined. Although the Permit does not specifically regulate radionuclides it does have an obligation to ensure that the repository is able to function for the disposal of CH and RH mixed waste. Please clarify why the free release limits were eliminated and replaced with a non-specific limit.

   RESPONSE: The release limits were deleted because they are delineated separately through the DOE radiological control program and are not specified by the RCRA regulations. Any changes to the radiological control program should only impact WIPP standard operating procedures and should not drive a Permit modification. The revised language that specifies limits established by the DOE assures current protection and proper functioning. The DOE is the agency charged by statute to determine and establish protective limits. Such limits can be established for individual situations and facilities depending on conditions and circumstances. The general reference to "DOE-established radiological protection limits" is equivalent to how other non-RCRA regulations such as those established by the Mine Safety Health Administration are dealt with in the Permit.

6. **PMR Appendix B, Attachment G, Section G-1a(1), p. B-31; pdf p. 79:**
The Permittees eliminated the following permit language related to Solid Waste Management Units: "In the event portions of these units which require decontamination cannot be decontaminated, these portions will be removed and the resultant wastes will be managed as appropriately." Please provide justification why this text was removed from the Permit.

   RESPONSE: The language that was deleted applies to the above ground storage areas. However, the text is easy to misinterpret to include decontamination or removal of portions of the Hazardous Waste Disposal Units in the underground since these are listed in Table K-4. Instead, Permit Attachment G, Section G-1e(3) is sufficiently detailed to assure the removal of contaminated equipment, facilities or surfaces in the Container Storage Units above ground and it does not need to be repeated here.

7. **PMR Appendix B, Attachment G, Section G-1d(2), p. B-35; pdf p. 83:**
The Permittees eliminated the reference WIPP Facility Safety Analysis Report as the source of the DOE policy to develop a final D&D plan. However, there was no given policy reference to ensure that this D&D plan will be developed. Please explain why the policy reference is not needed in the Permit.

RESPONSE: The citation of the Final Safety Analysis Report (FSAR) is tied to a commitment in the Consultation and Cooperation Agreement with the State of New Mexico (C&C Agreement). The C&C Agreement specifies decontamination and decommissioning (D&D) as a Key Milestone that requires consultation with the state. Another portion of the C&C Agreement specified the contents of the FSAR to include a discussion of D&D in Chapter 3 in accordance with DOE practice at the time. The FSAR has been replaced with the Documented Safety Analysis (DSA). Previously, Chapter 16 of the DSA addressed D&D. The current DOE standard for the DSA no longer requires this discussion; therefore, it has been deleted in DSA Revision 5b. Therefore, the DSA/FSAR reference is no longer correct. DOE now has Orders (such as 430.1A) and Standards that address what is now referred to as "Deactivation and Decommissioning". A specific policy reference is not needed and a reference to general policy is appropriate.

8. **PMR Appendix B, Attachment G, Section G-1(e)1, p. B-37; pdf p. 85:**
The Permittees eliminated the design requirement for the panel closure system in the first bullet to ensure that the VOC concentrations at the point of compliance will be mitigated to be at least an order of magnitude below the limits at the point of compliance. Please explain why this design requirement is no longer needed.

RESPONSE: The "order-of-magnitude" should not be interpreted as a change to the environmental performance limits established by the Permit. It was a design goal established to address uncertainty associated with air dispersion modeling and with VOC monitoring in the underground. In essence, this design goal limited the contribution from closed panels only and did not affect other sources of VOCs such as open panels. Previously, the performance limits at the nearest resident or the WIPP Site Boundary were not specified in the Permit except in a general statement in Permit Attachment G1, Section 1.3.2: "Worker exposure to VOCs, and VOC emissions to non-waste workers or to the nearest resident will not pose greater than a 10^{-6} excess cancer risk in order to meet health-based standards." However, when the Permit was issued, the NMED applied a cumulative excess cancer risk of 10^{-5} to non-waste workers on the surface. In order to clarify the limits for the nearest resident, the Permittees are proposing to add the referenced health-based limits to Permit Part 6. As explained in the TID Response, these limits are based on a 10^{-6} excess cancer risk or a Hazard Index of 1, depending on which provides the greatest protection. Because the specific limits are provided, the general limit, which is incorrect for the non-waste surface worker, is deleted. In addition, the use of surface sampling at Station VOC-C removes much of the uncertainty associated with monitoring and air dispersion modeling. Furthermore, the "order of magnitude" margin is unnecessary since the health-based limits themselves are adequately protective.

9. **PMR Appendix B, Attachment G, Section G-1e(3), p. B-39; pdf p.87**:
Provide clarification concerning "fixing" of contamination to address current practices used at the WIPP.

RESPONSE: It is described in Permit Attachment G, Section G-1e(3): "…or to fix the contaminants to the surface so they are not easily removable, …" "Fixing" radiological contamination is added as an option to decontamination in cases where it is determined to be the best alternative for protecting workers from radiological contamination. "Fixing" involves attaching the contaminants to the surface so they are not easily removed. This is accomplished by spraying the salt surface with a water mist and allowing it to dry and form a salt crust on top of the contaminants. In this manner, the contamination is not re-suspended into the airstream.

The Permittees propose the following redline/strikeout be added to the PMR text as a revision to Permit Attachment D, Section D-4f(1). This change is needed to clarify the use of water spray on salt surfaces as a fixative in the underground:

> D-4f(1) Management and Disposition of Released Material
>
> When a release of TRU mixed waste has occurred, priority is given to actions required to minimize radiological exposure to workers and the public. In most cases, these actions are sufficient to mitigate any health effects associated with contamination by hazardous waste or hazardous waste constituents.
>
> If a release of site-generated hazardous waste occurs, the contaminated surface will be cleaned, and decontamination materials will be placed in containers and dispositioned appropriately. If the release is TRU mixed waste, decontamination and disposition will be in accordance with the RWP.
>
> If radioactive contamination is detected on equipment or on structures, radiological cleanup standards will be used to determine the effectiveness of decontamination efforts and/or the final disposition of the equipment or structures. Many types of equipment are difficult to decontaminate and may have to be discarded as derived waste. Fixatives (e.g., paint or water spray on salt in the underground) may be used on contaminated structures if the contamination cannot be safely removed.

10. PMR Overview, p. 14; pdf p. 33, #6:
"Unexplained increases in the concentrations of VOCs measured by the Repository VOC Monitoring Program may indicate bulkhead deterioration and will trigger bulkhead inspections." Please indicate the actions the Permittees intend to take to address this.

RESPONSE: The Permit Part 4, Section 4.6.2.3. currently defines VOC cumulative risk levels that trigger remedial actions on the part of the Permittees with regard to Repository VOC monitoring. Levels that approach or exceed the action levels indicate an increasing source of VOCs in the underground. In order to address these increasing levels and to protect human health, the Permittees are required to implement remedial actions as defined in the current Permit Part 4, Section 4.6.2.4. There are essentially two sources for increases in VOC concentrations: the waste being disposed in the active HWDU or leakage from closed HWDUs due to bulkhead deterioration. Since the bulkheads are accessible until waste is placed in front of them, they can be inspected to determine if they need to be repaired or replaced to mitigate VOC emissions.

11. PMR Overview, p. 14; pdf p. 33, #8:
Explain further as to why design requirement "IIIb" is obsolete.

RESPONSE: When the Permit Application was submitted, WIPP facility structures were designed to meet DOE design and quality assurance (QA) requirements specified in DOE Order 6430.1, *General Design Criteria*. WIPP facility structures were evaluated against the Design Classification System Criteria. Application of these criteria identified the underground area of the repository as a Design Class IIIb nonreactor nuclear facility. The design class designations were defined for categorizing structures, systems, and components in accordance with the importance of their function relative to health and safety of the public and on-site personnel during plant operations.

With regard to Design Class IIIb, Permit Attachment A1, Table A1-1, footnote g states "Design of underground structures, mining equipment, and facilities are basically governed by the MSHA and experience in local mines." In place of the Design Class IIIb designation, the text simply reflects the MSHA requirement for underground stoppages.

12. General:
The October 29, 2013 Permittee Response to NMED Technical Incompleteness Determination, Appendix 1-A, included proposed changes to Permit Part 7, Section 7.3.2. The November 10, 2016 PMR does not contain this proposed change. It appears that this change is still appropriate.

RESPONSE: The Permittees propose the following redline/strikeout be added to the PMR text. This change is necessary because the access drifts will not be accessible after installation of the closure bulkheads and only some of the closure bulkheads will be accessible:

7.3.2. Post-Closure Care and Monitoring

7.3.2.1. General Monitoring, Inspection, and Maintenance Requirements

The Permittees shall monitor and perform inspections of the Underground HWDU closures, and perform maintenance of the ~~closed Underground HWDU access drifts after construction of each HWDU closure system, as specified in Permit Attachment A2 (Geologic Repository)~~ accessible bulkheads of the closures, as necessary. The Permittees shall monitor and maintain the components, structures and equipment of the waste containment systems at the facility as specified in Permit Attachments H and H1, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(a)(1)(ii)).

Enclosure 2

List of Changes

List of Changes

The Permittees are providing on a Compact Disc (Enclosure 3) a redline/strikeout and clean copy versions of the applicable portions of the Permit as requested in the August 17, 2017, Technical Incompleteness Determination (TID). During the development of these files, the Permittees identified and are proposing additional minor formatting changes (e.g., changing alpha numeric lists to bullets lists) and editorial changes (e.g., punctuation changes, acronym usage, adding/updating table of contents) to the Permit text that differed from, or were not included with, the redline/strikeout of the Permit text proposed in the revised Class 3 Permit Modification Request (submitted with the initial Technical Incompleteness response on November 16, 2016).

Additionally, changes were made to ensure consistency with the current Permit, which has been revised via Class 1 Permit Modification Notifications since November 16, 2016, and to address the changes proposed in the responses in Enclosure 1. These changes are described below.

Part 4, Section 4.5.1.

- Deleted closing quotation mark after reference to Permit Attachment A3.

Part 6

- Added page number change to *Table of Contents*.

Part 7

- Added markup of Section 7.3.2.1. to address response to TID Comment (12).

Attachment A2

- Added page marked “(This page intentionally left blank)” after text so tables start on the correct page.

Attachment A3

- Added page marked “(This page intentionally left blank)” as the last page to ensure an even number of overall pages.

Attachment D

- Deleted “(This page intentionally left blank)” on Page iii; it is not needed.
- Added markup of Section D-4f(1) to address response to TID Comment (9).

Attachment E

- Added page marked “(This page intentionally left blank)” as the last page to ensure an even number of overall pages.
- Provided redline/strikeout of Table E-1 against the current Permit text (as revised per December 6, 2016, and June 14, 2017, Class 1 Permit modifications).

Attachment G

- Added changes to *Table of Contents* and *List of Figures*. These were not included in the November 16, 2016 revised PMR.
- Added a period at the end of the paragraph following the bulleted list in Section G-1e(1).
- The EPA and VOC acronym callouts had been previously deleted; added acronym callouts at the new first instance used.
- Bolded PPE in acronym first use.
- Reversed deletion of period at the end of second sentence of first paragraph in Section G-1e(~~2~~3)(c).
- Deleted "(This page intentionally left blank)" page after text; it is not needed.

Attachment G1

- Replaced *Table of Contents* with new format.
- Lowercased the word "contractor" in all instances except when part of a title, resulting in global changes throughout this file.
- Changed *List of Abbreviations/Acronyms/Units* title to *List of Abbreviations/Acronyms*.
- Added page marked "(This page intentionally left blank)" after *List of Abbreviations/Acronyms/Units*.
- Removed from the *List of Abbreviations/Acronyms/Units* any acronyms not used in text.
- G1-1, 1st paragraph, 1st line: bolded the WIPP acronym.
- G1-1, 1st paragraph, last line: (1) added comma after installation; (2) bolded WPC acronym.
- G1-1, 2nd paragraph, 2nd sentence: (1) defined and bolded VOC acronym; (2) deleted definition of WPC.
- G1-2b, 2nd paragraph, 4th sentence: added comma after the number 2.
- G1-3, 2nd paragraph: (1) made "Technical Specifications" in the last line lowercase.
- G1-4, 1st paragraph: Revise sentence to read, "The technical specifications are included in Attachment G1, Appendix G1-A, and are listed in Table G1-1."

Attachment G1A

General Changes

- Developed new *Table of Contents* and *List of Tables.*
- Throughout the document, made changes to dashes to ensure consistency.
- Lowercased the following words in all instances except when part of a title, resulting in global changes throughout this file:
  - Drawings
  - Specifications
  - Contractor
  - Work Plan
  - Submittal Procedures
  - Reference Standards
- Redefined acronyms at the start of each section.
- Bolded several acronyms in the callouts to ensure consistent formatting.

Specific Changes

Section 01010

- Replaced alphanumeric lists with bulleted lists.
- 1.2, 1st paragraph: (1) spelled out WIPP and bolded the acronym, (2) bolded acronym WPC, and (3) added callouts for acronyms ROM and NWP and bolded both acronyms.
- 1.2, 1st list, item A: added comma after the number 2.
- 1st paragraph after 1st list: deleted callout for NWP and removed bolded format from the acronym.
- 1.2, 2nd list, item A: (1) deleted acronym callouts for HASP and CQCP, (2) added comma after HASP, and (3) added comma after CQCP.
- 1.2, 2nd list, item E: added comma after the number 7.
- 1.2, 2nd list, item F: added comma after the number 2.
- 1.3A: changed formatting to be consistent with current Permit.
- 1.3B: changed formatting to be consistent with current Permit.
- 1.4: changed formatting to be consistent with current Permit.
- 1.7: (1) added hyphen between "460" and "volt;" (2) added hyphen between "3" and "phase;" and (3) replaced the alpha list with bullet list.
- 1.8: lowercased the word "Sequence."
- 1.9, 2nd sentence: added comma after the word "equipment."
- 1.10: (1) bolded acronym JHA and (2) changed JHA reference from WP 12-111 to WP 12-1.

Section 01090

- 1.1: replaced alpha list with bulleted list.
- Multiple instances throughout the attachment: replaced "his" with "the contractor's."
- 1.3: changed formatting to be consistent with current Permit.

Section 01400

- 1.1, 1.2, 1.5, 1.6, 3.2, and 3.3: replaced alpha lists with bulleted lists.
- 1.2D: replaced 04100 with 03100.
- 1.3 1st line: deleted acronym callout and parentheses.
- 1.3 2nd sentence: bolded ROM.
- 1.4: changed formatting to be consistent with current Permit.
- 1.7: defined the acronym NWP.
- 1.8: numbered the section entitled *Submittals* to 1.9.
- 3.2A: deleted acronym callout for CQCP.
- 3.2B: deleted acronym callout for CQCP.
- 3.2B1: bolded CQC acronym callout.
- 3.6: changed formatting to be consistent with current Permit.

Section 01600

- 1.1, 1.2, 1.5, 1.6, and 1.7: replaced alpha lists with bulleted lists.
- 1.2E: replaced 04100 with 03100.

- 1.3: defined the acronym WIPP.
- 1.4: defined acronyms ROM and NWP.
- 1.6: added periods to the end of all sentences in the list.

Section 02010

- 1.1 and 1.2: replaced alpha lists with bulleted lists.
- 3.1: defined acronyms NWP and WPC.
- 3.2: changed title to “Use of Site” to be consistent with current Permit.
- 3.2: deleted “his” in multiple places.
- 3.3: replaced alpha list with bulleted list.
- 3.3C: added hyphen between 460 and volt; added hyphen between 3 and phase.
- 3.3, 1st paragraph after list and last paragraph of section: replaced “his” with “contractor.”
- 3.4: replaced “his” with “contractor.”

Section 022222: added numbering. This section did not have any heading numbering.

- 1.1 and 1.2: replaced alpha lists with bulleted lists.
- 1.1 list: (1) replaced A and C with the exact titles from text and (2) capitalized all listed items for consistency with other sections.
- 1.4: defined NWP.
- 3.1: defined WPC and ROM.
- 3.1: deleted the comma after “removing loose material.”

Section 03100

- 1.1: changed the “A” to a bullet and capitalized “placement.”
- 1.2: replaced alpha list with bulleted list.
- 1.3: defined NWP.
- 1.4 defined CQCP.
- 2.1 defined ROM.
- 3.1: added comma after 01010.
- 3.2: lowercased “Salt” in three places.

Section 03200

- 1.1: changed the “A” to a bullet and capitalized “bulkhead” and “installation.”
- 1.2: replaced alpha list with bulleted list.
- 1.3: defined NWP.
- 1.4: defined CQCP.
- 3.1: added comma after 01010.
- 3.3: defined HASP.
- 3.5: removed hyphen and made “noncompliance” one word for consistency with spelling in Section 01400.

Attachment H

- Deleted text “of the disposal unit” after “maintenance” in Section H-1.

- Added page marked “(This page intentionally left blank)” as the last page to ensure an even number of overall pages.

Attachment N

- Added page marked “(This page intentionally left blank)” after the acronyms and before the text.

ATTACHMENT A2

GEOLOGIC REPOSITORY

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ATTACHMENT A2

GEOLOGIC REPOSITORY

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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 Sampling Station VOC-C, as defined in Permit Attachment N (Volatile Organic Compound Monitoring Plan). Sampling Station VOC-C is the location where the concentration of volatile organic compounds (VOCs) in the air emissions from the Underground HWDUs will be measured and then compared to the VOC action levels (10^{-5} for carcinogens and HI>1 for non-carcinogens) as required by Permit Part 4, Section 4.6.2.3.

Four shafts connect the underground area with the surface. The Waste Shaft Conveyance headframe and hoist are located within the Waste Handling Building (**WHB**) and will be used to transport containers of TRU mixed waste, equipment, and materials to the repository horizon. The waste hoist can also be used to transport personnel. The Air Intake Shaft and the Salt Handling Shaft provide ventilation to all areas of the mine except for the Waste Shaft Station.

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

The HWDUs identified as Panels 1 through 8 (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

The WIPP facility, when operated in compliance with the Permit, will ensure safe operations and be protective of human health and the environment.

As a part of the design validation process, geomechanical tests were conducted in SPDV test rooms. During the tests, salt creep rates were measured. Separation of bedding planes and fracturing were also observed. Consequently, a ground-control strategy was implemented. The ground-control program at the WIPP facility mitigates the potential for roof or rib falls and maintains normal excavation dimensions, as long as access to the excavation is possible.

A2-2a(1) CH TRU Mixed Waste Handling Equipment

The following are the major pieces of equipment used to manage CH TRU waste in the geologic repository. A summary of equipment capacities, as required by 20.4.1.500 NMAC is included in Table A2-1.

Facility Pallets

The facility pallet is a fabricated steel unit designed to support 7-packs, 3-packs, or 4-packs of drums, standard waste boxes (**SWBs**), ten-drum overpacks (**TDOPs**), or a standard large box 2 (**SLB2**), and has a rated load of 25,000 pounds (lbs.) (11,430 kilograms (kg)). The facility pallet will accommodate up to four 7-packs, four 3-packs, two 3-packs of shielded containers, four 4-packs of drums, four SWBs (in two stacks of two units), two TDOPs, or one SLB2. Loads are secured to the facility pallet during transport to the emplacement area. Facility pallets are shown in Figure A2-3. Fork pockets in the side of the pallet allow the facility pallet to be lifted and transferred by forklift to prevent direct contact between TRU mixed waste containers and forklift tines. This arrangement reduces the potential for puncture accidents. WIPP facility operational documents define the operational load of the facility pallet to ensure that the rated load of a facility pallet is not exceeded.

Backfill

Magnesium oxide (**MgO**) will be used as a backfill in order to provide chemical control over the solubility of radionuclides in order to comply with the requirements of 40 CFR §191.13. The MgO backfill will be purchased prepackaged in the proper containers for emplacement in the underground. Purchasing prepackaged backfill eliminates handling and placement problems associated with bulk materials, such as dust creation. In addition, prepackaged materials will be easier to emplace, thus reducing potential worker exposure to radiation. Should a backfill container be breached, MgO is benign and cleanup is simple. No hazardous waste would result from a spill of backfill.

The MgO backfill will be managed in accordance with Specification D-0101 (MgO Backfill Specification) and WP05-WH1025 (CH Waste Downloading and Emplacement). These documents are kept on file at the WIPP facility by the Permittees.

Backfill will be handled in accordance with standard operating procedures. Typical emplacement configurations are shown in Figures A2-5 and A2-5a. Some emplacement configurations may include the use of MgO emplacement racks, as shown in Figure A2-5a.

Quality control will be provided within standard operating procedures to record that the correct number of sacks are placed and that the condition of the sacks is acceptable.

Backfill placed in this manner is protected until exposed when sacks are broken during creep closure of the room and compaction of the backfill and waste. Backfill in sacks utilizes existing techniques and equipment and eliminates operational problems such as dust creation and introducing additional equipment and operations into waste handling areas. There are no mine operational considerations (e.g. ventilation flow and control) when backfill is placed in this manner.

The Waste Shaft Conveyance

The hoist systems in the shafts and all shaft furnishings are designed to resist the dynamic forces of the hoisting system and to withstand a design-basis earthquake of 0.1 g. Appendix D2 of the WIPP RCRA Part B Permit Application (DOE, 1997) provided engineering design-basis earthquake report which provides the basis for seismic design of WIPP facility structures. 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, circuitry failure, or starting in a wrong direction) and will trigger an alarm that automatically shuts down the hoist.

The waste hoist moves the Waste Shaft Conveyance and is a multirope, friction-type hoist. A counterweight is used to balance the waste shaft conveyance. The waste shaft conveyance (outside dimensions) is 30 ft (9 m) high by 10 ft (3 m) wide by 15 ft (4.5 m) deep and can carry a payload of 45 tons (40,824 kg). During loading and unloading operations, it is steadied by fixed guides. The hoist's maximum rope speed is 500 ft (152.4 m) per min.

The Waste Shaft hoist system has two sets of brakes, with two units per set, plus a motor that is normally used to stop the hoist. The brakes are designed so that either set, acting alone, can stop a fully loaded conveyance under all emergency conditions.

The Underground Waste Transporter

The underground waste transporter is a commercially available diesel-powered tractor. The trailer was designed specifically for the WIPP for transporting facility pallets from the waste shaft conveyance to the Underground HWDU in use. This transporter is shown in Figure A2-6.

Underground Forklifts

CH TRU mixed waste containers loaded on slipsheets will be removed from the facility pallets using forklifts with a push-pull attachment (Figure A2-7) attached to the forklift-truck front carriage. The push-pull attachment grips the edge of the slipsheet (on which the waste containers sit) to pull the containers onto the platen. After the forklift moves the waste containers to the emplacement location, the push-pull attachment pushes the containers into position. The use of the push-pull attachment prevents direct contact between waste containers and forklift tines. SWBs and TDOPs may also be removed from the facility pallet by using forklifts equipped with special adapters for these containers. These special adapters will prevent direct contact between SWBs or TDOPs and forklift tines. In addition, the low clearance forklift that is used to emplace MgO may be used to emplace waste if necessary.

A forklift will be used to offload the SLB2 from the underground transporter and emplace the waste container in the waste stack.

A2-2a(2) Shafts

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 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 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.

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 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 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, 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.

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.

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.

The waste hoist has two pairs of brake calipers acting on independent brake paths. The hoist motor is normally used for braking action of the hoist. The brakes are used to hold the hoist in position during normal operations and to stop the hoist under emergency conditions. Each pair of brake calipers is capable of holding the hoist in position during normal operating conditions and stopping the hoist under emergency conditions. In the event of power failure, the brakes will set automatically.

The waste hoist is protected by a fixed automatic fire suppression system. Portable fire extinguishers are also provided on the hoist floor and in equipment areas.

A2-2a(3) Subsurface Structures

The subsurface structures in the repository, located at 2,150 ft (655 m) below the surface, include the HWDUs, the northern experimental areas, and the support areas. Appendix D3 of the WIPP RCRA Part B Permit Application (DOE, 1997) provided details of the underground layout. Figure A2-8 shows the proposed waste emplacement configuration for the HWDUs.

The status of important underground equipment, including fixed fire-protection systems, the ventilation system, and contamination detection systems, will be monitored by a central monitoring system, located in the Support Building adjacent to the WHB. Backup power will be provided as discussed below. The subsurface support areas are constructed and maintained to conform to Federal mine safety codes.

Underground Hazardous Waste Disposal Units (HWDUs)

During the terms of this and the preceding Permit, the volume of CH TRU mixed waste emplaced in the repository will not exceed 5,244,900 ft^3 (148,500 m^3) and the volume of RH TRU mixed waste shall not exceed 93,050 ft^3 (2,635 m^3). CH TRU mixed waste will be disposed of in Underground HWDUs identified as Panels 1 through 8. RH TRU mixed waste may be disposed of in Panels 4 through 8.

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

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

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

The layout of these excavations is shown on Figure A2-1.

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.

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.

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 ft^3 (990 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.

Air will be routed into a panel from the intake side. Air is routed through the individual rooms within a panel using any of the following flow control devices: underground bulkheads, brattice cloth barricades, bulkheads with doors or air regulators. Bulkheads are constructed by erecting framing of rectangular steel tubing and screwing galvanized sheet metal to the framing. Bulkhead members use telescoping extensions that are attached to framing and the salt which adjust to creep. Flexible flashing attached to the bulkhead on one side and the salt on the other completes the seal of the ventilation. Where controlled airflow is required, a louver-style damper or a slide-gate (sliding panel) regulator is installed on the bulkhead. Personnel access is available through most bulkheads, and vehicular access is possible through selected bulkheads. Vehicle roll-up doors in the panel areas are not equipped with warning bells or strobe lights since these doors are to be used for limited periodic maintenance activities in the return air path. Flow is also controlled using brattice cloth barricades. These consist of chain link fence that is bolted to the salt or attached to a structural member and covered with brattice cloth; and are used in instances where the only flow control requirement is to block the air. A brattice cloth air barricade is shown in Figure A2-11. Ventilation will be maintained only in all active rooms within a panel until waste emplacement activities are completed and the panel-closure system is installed. The air will be routed simultaneously through all the active rooms within the panel. The filled rooms will be isolated from the ventilation system, while the active rooms that are actively being filled will receive a minimum of 35,000 scfm of air when workers are present to assure worker safety. 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. After all rooms within a panel are filled, the panel will be closed using a closure system described Permit Attachment G and Permit Attachment G1.

Once a disposal room is filled and is no longer needed for emplacement activities, it will be barricaded against entry and isolated from the mine ventilation system. This may be accomplished by any of the following: by removing the air regulator bulkhead, closing bulkhead doors, constructing chain link/brattice cloth barricades and, if necessary, constructing bulkheads at each end. A typical bulkhead is shown in Figure A2-11a. There is no requirement for air for these rooms since personnel and/or equipment will not be in these areas.

The ventilation path for the waste disposal side is separated from the construction (e.g., mining) side by means of air locks, bulkheads, and salt pillars. A pressure differential is maintained between the construction side and the waste disposal side to ensure that any leakage is towards the disposal side. The pressure differential is produced by the surface fans in conjunction with the underground air regulators.

Underground Ventilation Modes of Operation

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)

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

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.

If the nominal flow of 425,000 scfm (12,028 m^3/min) is not available because the facility is operating in filtration mode, the exhaust air will pass through HEPA-filter assemblies, with filtration fans operating (i.e., all other fans are stopped). This system provides a means for removing the airborne particulates that may contain radioactive and hazardous waste particulates before they are discharged through the exhaust stack to the atmosphere. The filtration mode is activated manually or automatically if the radiation monitoring system detects abnormally high concentrations of airborne radioactive particulates (an alarm is received from the continuous air monitor in the exhaust drift of the active waste panel) or a waste handling incident with the potential for a waste container breach is observed. The filtration mode is not initiated by the release of gases such as VOCs.

If utility power fails, the exhaust filter system goes into the fail-safe position, and the system high-efficiency particulate-air filter dampers are placed into filtration position. When power is restored by the diesel generators, a decision is made whether to remain in filtration mode and energize a filtration fan or to realign the dampers into the minimum exhaust mode. Without any indication of a radiological release, the decision is usually the latter. TRU mixed waste handling and related operations cease upon loss of utility power and are not resumed until normal utility power is returned. As specified in Part 2, all waste handling equipment will "fail safe," meaning that it will retain its load during a power outage.

An underground SVS fan, located in the S-90 drift, provides additional ventilation to the underground facility, as needed. The SVS allows for fresh air to ventilate the North and Construction Circuits, with an unfiltered exhaust up the Salt Handling Shaft, and a portion from the Construction Circuit to provide supplemental ventilation to disposal areas of the underground which will exhaust out the Exhaust Shaft through the filtration system.

Underground Ventilation Normal Mode Redundancy

The underground ventilation system has been provided redundancy in normal ventilation mode by the addition of a third main fan. Ductwork leading to that new fan ties into the existing main exhaust duct.

Electrical System

The WIPP facility uses electrical power (utility power) supplied by the regional electric utility company. If there is a loss of utility power, TRU mixed waste handling and related operations will cease.

Backup, alternating current power will be provided on site by two 1,100-kilowatt diesel generators. These units provide 480-volt power with a high degree of reliability. Each of the diesel generators can carry predetermined equipment loads while maintaining additional power reserves. Predetermined loads include lighting and ventilation for underground facilities, lighting and ventilation for the TRU mixed waste handling areas, and the Air Intake Shaft hoist. The diesel generator can be brought on line within 30 minutes either manually or from the control panel in the Central Monitoring Room (CMR).

Uninterruptible power supply (**UPS**) units are also on line providing power to predetermined monitoring systems. These systems ensure that the power to the radiation detection system for airborne contamination, the local processing units, the computer room, and the CMR will always be available, even during the interval between the loss of off-site power and initiation of backup diesel generator power.

A2-2a(4) RH TRU Mixed Waste Handling Equipment

The following are the major pieces of equipment used to manage RH TRU mixed waste in the geologic repository. A summary of equipment capacities is included in Table A2-3.

The Facility Cask Transfer Car

The Facility Cask Transfer Car is a self-propelled rail car (Figure A2-14) that operates between the Facility Cask Loading Room and the geologic repository. After the Facility Cask is loaded, the Facility Cask Transfer Car moves onto the waste shaft conveyance and is then transported underground. At the underground waste shaft station, the Facility Cask Transfer Car proceeds away from the waste shaft conveyance to provide forklift access to the Facility Cask.

Horizontal Emplacement and Retrieval Equipment or Functionally Equivalent Equipment

The Horizontal Emplacement and Retrieval Equipment (**HERE**) or functionally equivalent equipment (Figure A2-15) emplaces canisters into a borehole in a room wall of an Underground HWDU. Once the canisters have been emplaced, the HERE then fills the borehole opening with a shield plug.

A2-2b Geologic Repository Process Description

Prior to receipt of TRU mixed waste at the WIPP facility, waste operators will be thoroughly trained in the safe use of TRU mixed waste handling and transport equipment. The training will include both classroom training and on-the-job training.

RH TRU Mixed Waste Emplacement

The Facility Cask Transfer Car is loaded onto the waste shaft conveyance and is lowered to the waste shaft station underground. At the waste shaft station underground, the Facility Cask is moved from the waste shaft conveyance by the Facility Cask Transfer Car (Figure A2-16). A forklift is used to remove the Facility Cask from the Facility Cask Transfer Car and to transport the Facility Cask to the Underground HWDU. There, the Facility Cask is placed on the HERE (Figure A2-17). The HERE is used to emplace the RH TRU mixed waste canister into the borehole. The borehole will be visually inspected for obstructions prior to aligning the HERE and emplacement of the RH TRU mixed waste canister. The Facility Cask is moved forward to mate with the shield collar, and the transfer carriage is advanced to mate with the rear Facility Cask shield valve. The shield valves on the Facility Cask are opened, and the transfer mechanism advances to push the canister into the borehole. After retracting the transfer mechanism into the Facility Cask, the forward shield valve is closed, and the transfer mechanism is further retracted into its housing. The transfer mechanism is moved to the rear, and the shield plug carriage containing a shield plug is placed on the emplacement machine. The transfer mechanism is used to push the shield plug into the Facility Cask. The front shield valve is opened, and the shield plug is pushed into the borehole (Figure A2-18). The transfer mechanism is retracted, the shield valves close on the Facility Cask, and the Facility Cask is removed from the HERE.

A shield plug is a concrete filled cylindrical steel shell (Figure A2-21) approximately 61 in. long and 29 in. in diameter, made of concrete shielding material inside a 0.24 in. thick steel shell with a removable pintle at one end. Each shield plug has integral forklift pockets and weighs approximately 3,750 lbs. The shield plug is inserted with the pintle end closest to the HERE to provide the necessary shielding , limiting the borehole radiation dose rate at 30 cm to less than 10 mrem per hour for a canister surface dose rate of 100 rem/hr . Additional shielding is provided at the direction of the Radiological Control Technician based on dose rate surveys following shield plug emplacement. This additional shielding is provided by the manual emplacement of one or more shield plug supplemental shielding plates and a retainer (Figures A2-19 and A2-20).

The amount of RH TRU mixed waste disposal in each panel is limited based on thermal and geomechanical considerations and shall not exceed 10 kilowatts per acre as described in Permit Attachment A2-1. RH TRU mixed waste emplacement boreholes shall be drilled in the ribs of the panels at a nominal spacing of 8 ft (2.4 m) center-to-center, horizontally.

Figures A1-26 and A1-27 are flow diagrams of the RH TRU mixed waste handling process for the RH-TRU 72-B and CNS 10-160B casks, respectively.

CH TRU Mixed Waste Emplacement

CH TRU mixed waste containers and shielded containers will arrive by tractor-trailer at the WIPP facility in sealed shipping containers. Prior to unloading the packages from the trailer, they will undergo security and radiological checks and shipping documentation reviews. The trailers carrying the shipping containers will be stored temporarily at the Parking Area Container Storage Unit (Parking Area Unit). A forklift will remove the Contact Handled Packages from the transport trailers and a forklift or Yard Transfer Vehicle will transport them into the Waste Handling Building Container Storage Unit for unloading of the waste containers. Each TRUPACT-II may hold up to two 7-packs, two 4-packs, two 3-packs, two SWBs, or one TDOP. Each HalfPACT may hold up to seven 55-gal (208 L) drums, one SWB, one three-pack of shielded containers or four 85-gal (322 L) drums. Each TRUPACT-III will hold one SLB2. An overhead bridge crane or Facility Transfer Vehicle with transfer table will be used to remove the waste containers from the Contact Handled Packaging and place them on a facility or containment pallet. Each facility pallet has two recessed pockets to accommodate two sets of 7-packs, two sets of 3-packs, two sets of 4-packs, two SWBs stacked two-high, two TDOPs, or one SLB2. Each stack of waste containers will be secured prior to transport underground (see Figure A2-3). A forklift or the facility transfer vehicle will transport the loaded facility pallet to the conveyance loading room adjacent to the Waste Shaft. The facility transfer vehicle will be driven onto the waste shaft conveyance deck, where the loaded facility pallet will be transferred to the waste shaft conveyance, and the facility transfer vehicle will be backed off. Containers of CH TRU mixed waste (55-gal (208 L) drums, SWBs, 85-gal (322 L) drums, 100-gal (379 L) drums, and TDOPs) or shielded containers can be handled individually, if needed, using the forklift and lifting attachments (i.e., drum handlers, parrot beaks).

The waste shaft conveyance will lower the loaded facility pallet to the underground. At the waste shaft station, the CH TRU underground transporter will back up to the waste shaft conveyance, and the facility pallet will be transferred from the waste shaft conveyance onto the transporter (see Figure A2-6). The transporter will then move the facility pallet to the appropriate Underground HWDU for emplacement. The underground waste transporter is equipped with a fire suppression system, rupture-resistant diesel fuel tanks, and reinforced fuel lines to minimize the potential for a fire involving the fuel system.

A forklift in the HWDU near the waste stack will be used to remove the waste containers from the facility pallets and to place them in the waste stack using a push-pull attachment or, in the case of an SLB2, the SLB2 will be lifted from the facility pallet and placed directly on the floor of the emplacement room. The waste will be emplaced room by room in Panels 1 through 8. Each panel will be closed off when filled. If a waste container is damaged during the Disposal Phase, it will be immediately overpacked or repaired. CH TRU mixed waste containers will be continuously vented. The filter vents will allow aspiration, preventing internal pressurization of the container and minimizing the buildup of flammable gas concentrations.

Once a waste panel is mined and any initial ground control established, flow control devices will be constructed to assure adequate control over ventilation during waste emplacement activities. The first room to be filled with waste will be Room 7, which is the one that is farthest from the main access ways. A ventilation control point will be established for Room 7 either just outside the exhaust side of Room 6 or at the inlet side of Room 7. This ventilation control point will consist of a flow control device (e.g., bulkhead with a ventilation regulator, or brattice cloth barricade). When RH TRU mixed waste canister emplacement is completed in a room, CH TRU mixed waste emplacement can begin in that room. Stacking of CH waste will begin at the exhaust side of the room and proceed down the access drift, through the room and up the intake access drift until the entrance of Room 6 is reached. At that point, a brattice cloth and chain link barricade and, if necessary, bulkheads will be emplaced. This process will be repeated for Room 6, and so on until Room 1 is filled. At that point, the panel closure system will be constructed.

The emplacement of CH TRU mixed waste into the HWDUs will typically be in the order received and unloaded from the Contact Handled Packaging. There is no specification for the amount of space to be maintained between the waste containers themselves, or between the waste containers and the walls. Containers will be stacked in the best manner to provide stability for the stack (which is up to three containers high) and to make best use of available space. It is anticipated that the space between the wall and the container could be from 8 to 18 in. (20 to 46 cm). This space is a function of disposal room wall irregularities, container type, and sequence of emplacement. Bags of backfill will occupy some of this space. Space is required over the stacks of containers to assure adequate ventilation for waste handling operations. A minimum of 16 in. (41 cm) was specified in the Final Design Validation Report (Appendix D1, Chapter 12 of the WIPP RCRA Part B Permit Application (DOE, 1997)) to maintain air flow. Typically, the space above a stack of containers will be 36 to 48 in. (90 to 122 cm). However 18 in. (0.45 m) will contain backfill material consisting of bags of Magnesium Oxide (MgO). Figure A2-8 shows a typical container configuration, although this figure does not mix containers on any row. Such mixing, while inefficient, will be allowed to assure timely movement of waste into the underground. No aisle space will be maintained for personnel access to emplaced waste containers. No roof maintenance behind stacks of waste is planned.

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

Figure A2-12 is a flow diagram of the CH TRU mixed waste handling process.

A2-3 Waste Characterization

TRU mixed waste characterization is described in Permit Attachment C.

A2-4 Treatment Effectiveness

TRU mixed waste treatment, as defined in 20.4.1.101 NMAC (incorporating 40 CFR §260.10), for which a permit is required, will not be performed at the WIPP facility.

A2-5 Maintenance, Monitoring, and Inspection

A2-5a Maintenance

A2-5a(1) Ground-Control Program

The ground-control program at the WIPP facility will ensure that any room in an HWDU in which waste will be placed will be sufficiently supported to assure compliance with the applicable portions of the Land Withdrawal Act (**LWA**), which requires a regular review of roof-support plans and practices by the Mine Safety and Health Administration (**MSHA**). Support is installed to the requirements of 30 CFR §57, Subpart B.

A2-5b Monitoring

A2-5b(1) Groundwater Monitoring

Groundwater monitoring for the WIPP Underground HWDUs will be conducted in accordance with Part 5 and Permit Attachment L of this permit.

A2-5b(2) Geomechanical Monitoring

The geomechanical monitoring program at the WIPP facility is an integral part of the ground-control program (See Figure A2-13). HWDUs, drifts, and geomechanical test rooms will be monitored to provide confirmation of structural integrity. Geomechanical data on the performance of the repository shafts and excavated areas will be collected as part of the geotechnical field-monitoring program. The results of the geotechnical investigations will be reported annually. The report will describe monitoring programs and geomechanical data collected during the previous year.

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

The Geomechanical Monitoring System (**GMS**) provides in situ data to support the continuous assessment of the design for underground facilities. Specifically, the GMS provides for:

- Early detection of conditions that could affect operational safety
- Evaluation of disposal room closure that ensures adequate access
- Guidance for design modifications and remedial actions
- Data for interpreting the behavior of underground openings, in comparison with established design criteria

The instrumentation in Table A2-2 is available for use in support of the geomechanical program.

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

Remote polling of the geomechanical instrumentation will be performed at least once every month. This frequency may be increased to accommodate any changes that may develop.

The results from the remotely read instrumentation will be evaluated after each scheduled polling. Documentation of the results will be provided annually in the Geotechnical Analysis Report.

Data from remotely read instrumentation will be maintained as part of a geotechnical instrumentation system. The instrumentation system provides for data maintenance, retrieval, and presentation. The Permittees will retrieve the data from the instrumentation system and verify data accuracy by confirming the measurements were taken in accordance with applicable instructions and equipment calibration is known. Next, the Permittees will review the data after each polling to assess the performance of the instrument and of the excavation. Anomalous data will be investigated to determine the cause (instrumentation problem, error in recording, changing rock conditions). The Permittees will calculate various parameters such as the change between successive readings and deformation rates. This assessment will be reported to the Permittees' cognizant ground control engineer and operations personnel. The Permittees will investigate unexpected deformation to determine if remediation is needed.

The stability of an open panel excavation is generally determined by the rock deformation rate. The excavation may be unstable when there is a continuous increase in the deformation rate that cannot be controlled by the installed support system. The Permittees will evaluate the performance of the excavation. These evaluations assess the effectiveness of the roof support system and estimate the stand-up time of the excavation. If an open panel shows the trend is toward adverse (unstable) conditions, the results will be reported to determine if it is necessary to terminate waste disposal activities in the open panel. This report of the trend toward adverse conditions in an open HWDU will also be provided to the Secretary of the NMED within seven (7) calendar days of issuance of the report.

A2-5b(2)(b) System Experience

Much experience in the use of geomechanical instrumentation was gained as the result of performance monitoring of Panel 1, which began at the time of completion of the panel excavation in 1988. The monitoring system installed at that time involved simple measurements and observations (e.g., vertical and horizontal convergence rates, and visual inspections). Minimal maintenance of instrumentation is required, and the instrumentation is easily replaced if it malfunctions. Conditions throughout Panel 1 are well known. The monitoring program continues to provide data to compare the performance of Panel 1 with that established elsewhere in the underground. Panel 1 performance is characterized by the following:

- The development of bed separations and lateral shifts at the interfaces of the salt and the clays underlying the anhydrites "a" and "b."
- Room closures. A closure due only to the roof movement will be separated from the total closure.
- The behavior of the pillars.
- Fracture development in the roof and floor.
- Distribution of load on the support system.

Roof conditions are assessed from observation boreholes and extensometer measurements. Measurements of room closure, rock displacements, and observations of fracture development in the immediate roof beam are made and used to evaluate the performance of a panel. A description of the Panel 1 monitoring program was presented to the members of the Geotechnical Experts Panel (in 1991) who concurred that it was adequate to determine deterioration within the rooms and that it will provide early warning of deteriorating conditions.

The assessment and evaluation of the condition of WIPP excavations is an interactive, continuous process using the data from the monitoring programs. Criteria for corrective action are continually reevaluated and reassessed based on total performance to date. Actions taken are based on these analyses and planned utilization of the excavation. Because WIPP excavations are in a natural geologic medium, there is inherent variability from point to point. The principle adopted is to anticipate potential ground control requirements and implement them in a timely manner rather than to wait until a need arises.

A2-5b(3) Volatile Organic Compound Monitoring

The volatile organic compound monitoring for the WIPP Underground HWDUs will be conducted in accordance with Part 4 and Permit Attachment N of this permit.

A2-5c Inspection

The inspection of the WIPP Underground HWDUs will be conducted in accordance with Part 2 and Permit Attachment E of this permit.

References

DOE, 1997. Resource Conservation and Recovery Act Part B Permit Application, Waste Isolation Pilot Plant (WIPP), Carlsbad, New Mexico, Revision 6.5, 1997.

DOE, 2009. WIPP Hazardous Waste Facility Permit Amended Renewal Application, Carlsbad, New Mexico, September 2009.

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TABLES

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Table A2-1
CH TRU Mixed Waste Handling Equipment Capacities

Capacities for Equipment	
Facility Pallet	25,000 lbs.
Facility Transfer Vehicle	26,000 lbs.
Underground transporter	28,000 lbs.
Underground forklift	12,000 lbs.
Maximum Gross Weights of Containers	
Seven-pack of 55-gallon drums	7,000 lbs.
Four-pack of 85-gallon drums	4,500 lbs.
Three-pack of 100-gallon drums	3,000 lbs.
Ten-drum overpack	6,700 lbs.
Standard waste box	4,000 lbs.
Standard large box 2	10,500 lbs.
Shielded container	2,260 lbs.
Three-pack of shielded containers	7,000 lbs.
Maximum Net Empty Weights of Equipment	
TRUPACT-II	13,140 lbs.
HalfPACT	10,500 lbs.
TRUPACT-III	43,600 lbs.
Facility pallet	4,120 lbs.

Table A2-2
Instrumentation Used in Support of the Geomechanical Monitoring System

Instrument Type	Features	Parameter Measured	Range
Borehole Extensometer	The extensometer provides for monitoring the deformation parallel to the borehole axis. Units suitable for up to 5 measurements anchors in addition to the reference head. Maximum borehole depths shall be 50 feet.	Cumulative Deformation	0-2 inches
Borehole Television Camera	Closed circuit television may be used for monitoring areas otherwise inaccessible, such as boreholes or shafts.	Video Image	N/A
Convergence Points and Tape Extensometers	Mechanically anchored eyebolts to which a portable tape extensometer is attached.	Cumulative Deformation	2-50 feet
Convergence Meters	Includes wire and sonic meters. Mounted on rigid plates anchored to the rock surface.	Cumulative Deformation	2-50 feet
Inclinometers	Both vertical and horizontal inclinometers are used. Traversing type of system in which a probe is moved periodically through casing located in the borehole whose inclination is being measured.	Cumulative Deformation	0-30 degrees
Rock Bolt Load Cells	Spool type units suitable for use with rock bolts. Tensile stress is inferred from strain gauges mounted on the surface of the spool.	Load	0-300 kips
Earth Pressure Cells	Installed between concrete keys and rock. Preferred type is a hydraulic pressure plate connected to a vibrating wire transmitter.	Lithostatic Pressure	0-1000 psi
Piezometer Pressure Transducers	Located in shafts and of robust design and construction. Periodic checks on operability required.	Fluid Pressure	0-500 psi
Strain Gauges	Installed within the concrete shaft key. Suitably sealed for the environment. Two types used--surface mounted and embedded.	Cumulative Deformation	0-3000 µin/in (embedded) 0-2500 µin/in (surface)

Table A2-3
RH TRU Mixed Waste Handling Equipment Capacities

Capacities for Equipment	
41-Ton Forklift	82,000 lbs
Maximum Gross Weights of RH TRU Containers	
RH TRU Facility Canister	10,000 lbs
55-Gallon Drum	1,000 lbs
RH TRU Canister	8,000 lbs
Maximum Net Empty Weights of Equipment	
Facility Cask	67,700 lbs

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FIGURES

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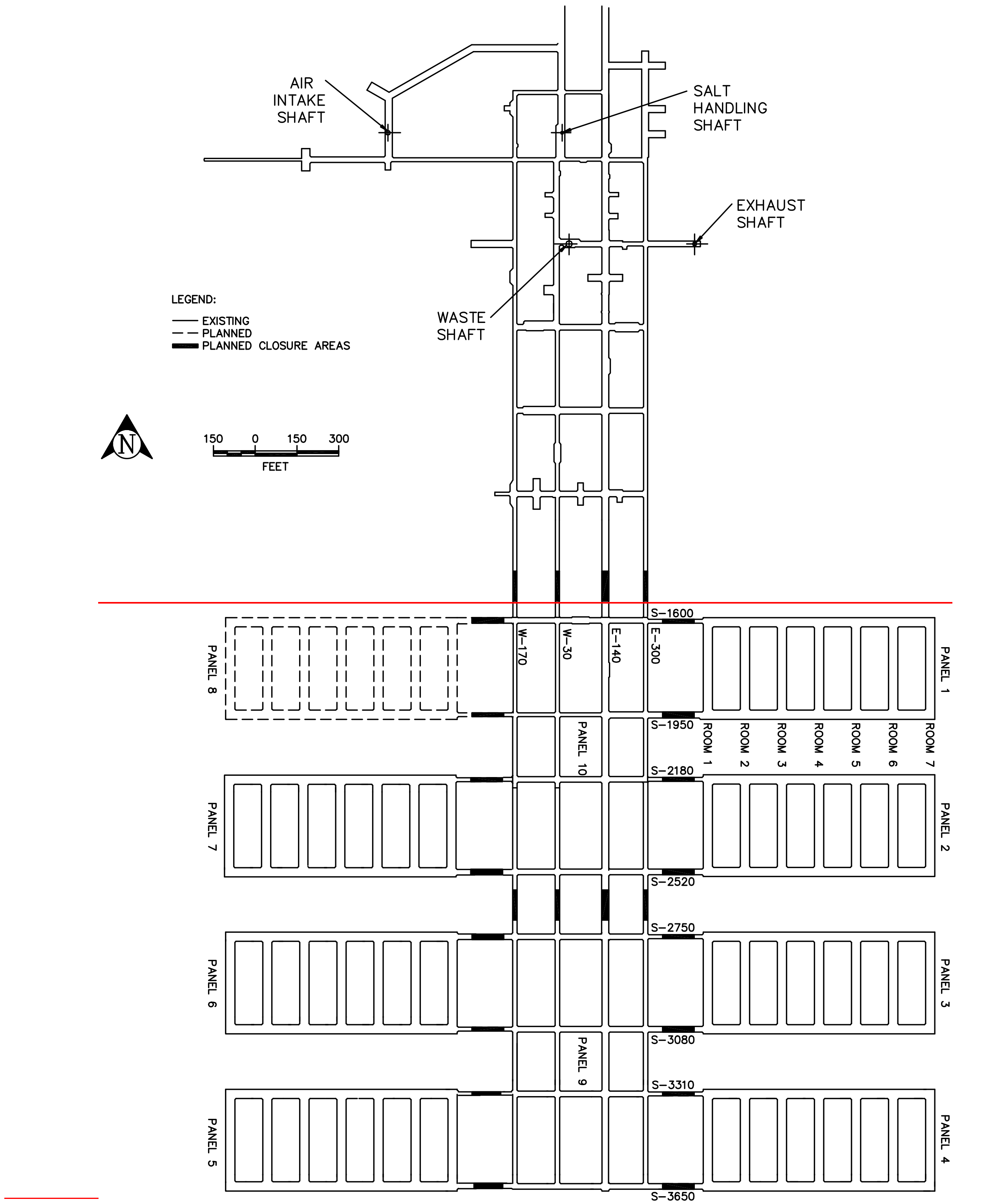
AIR
INTAKE
SHAFT
SALT
HANDLING
SHAFT
EXHAUST
SHAFT
WASTE
SHAFT
LEGEND:
EXISTING
PLANNED
PLANNED CLOSURE AREAS
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FEET
S-1600
S-1950
S-2180
S-2520
S-2750
S-3080
S-3310
S-3650
W-170
W-30
E-140
E-300
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ROOM 6
ROOM 7

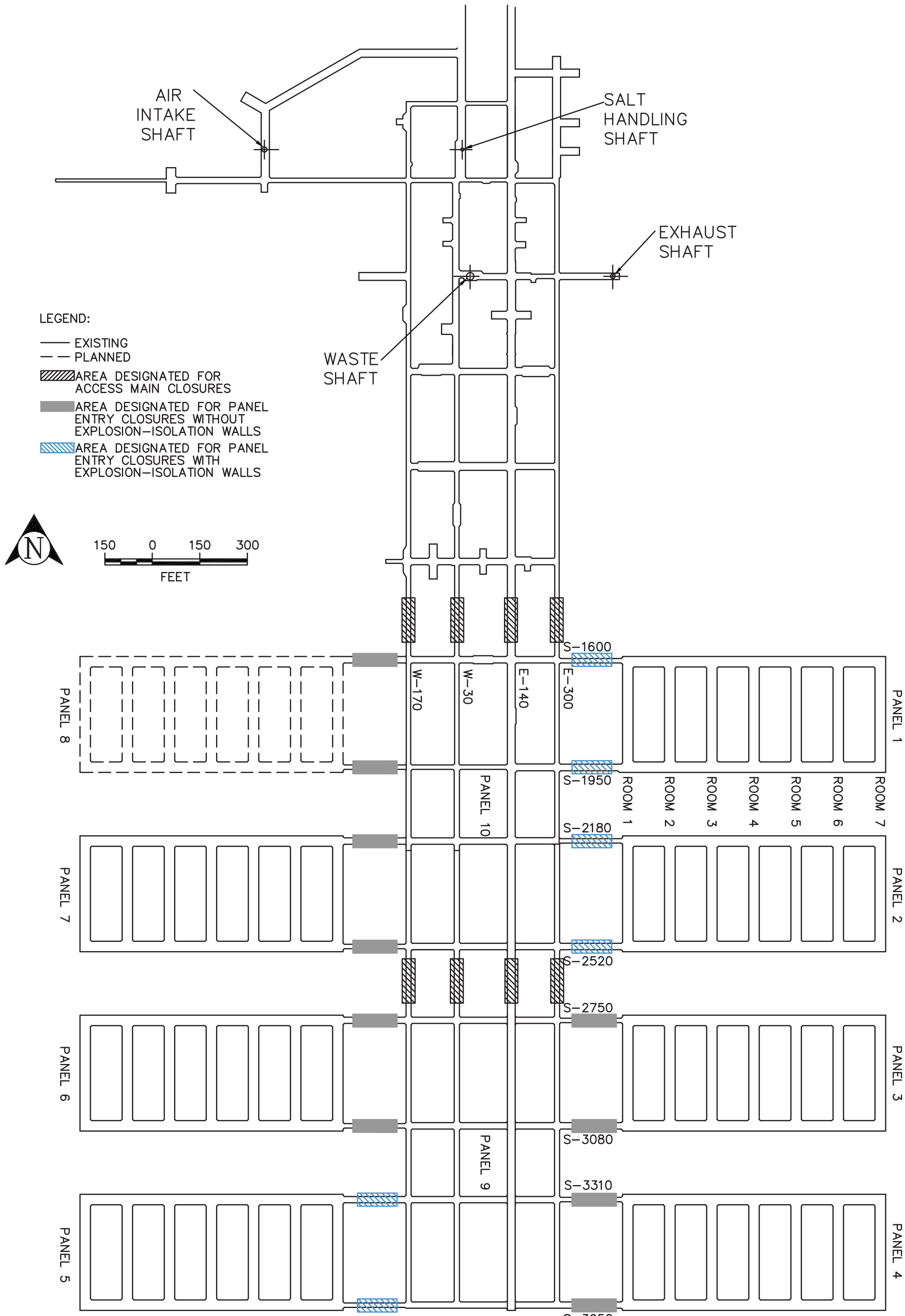


Figure A2-1
Repository Horizon

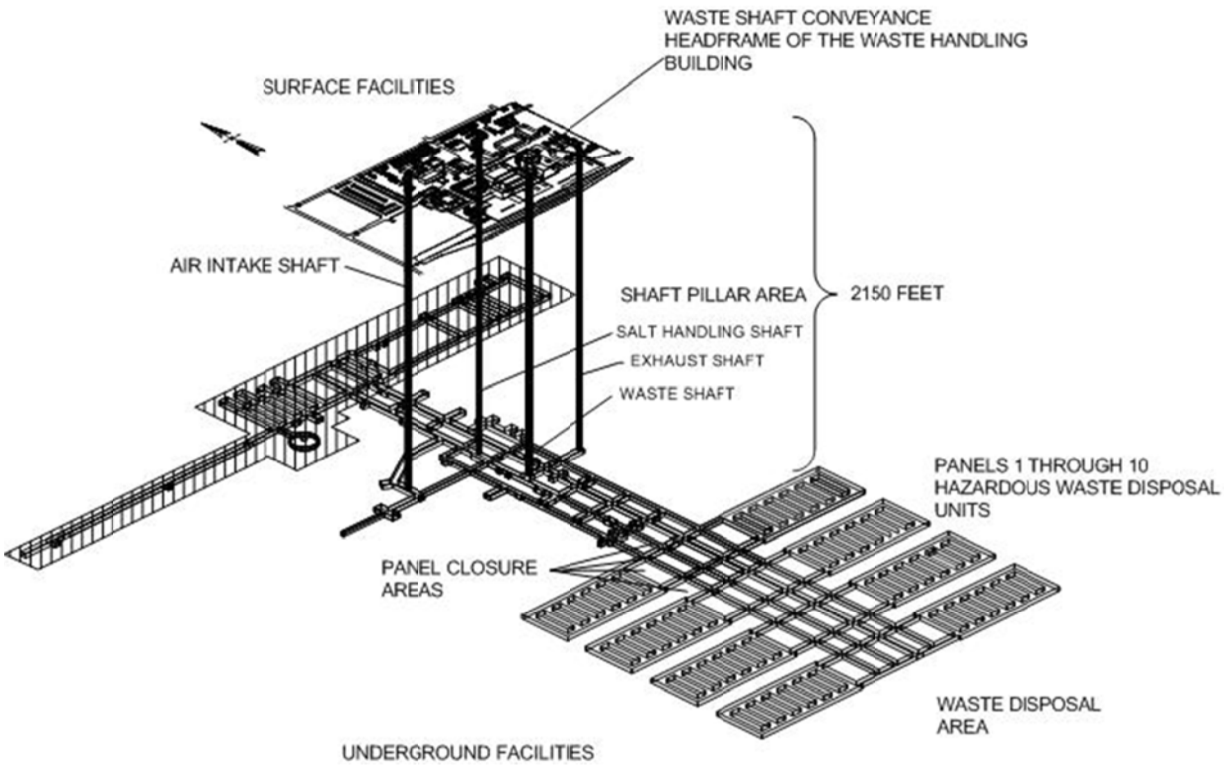


Figure A2-2
Spatial View of the Miscellaneous Unit and Waste Handling Facility

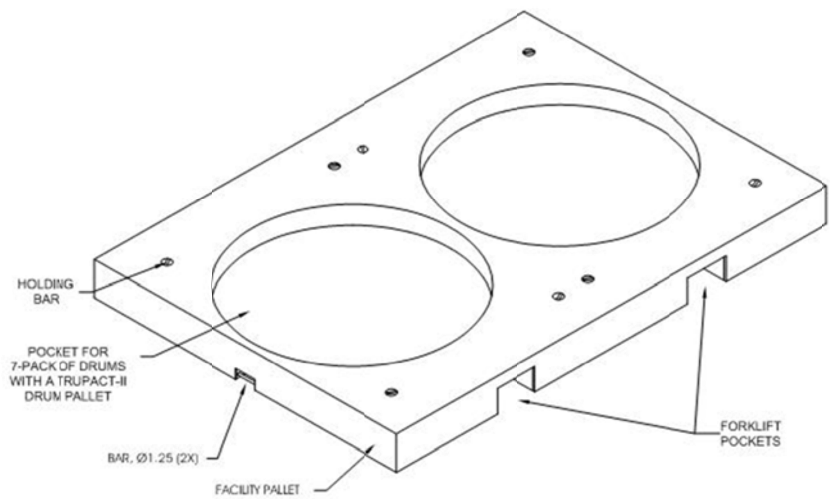


Figure A2-3
Facility Pallet for Seven-Pack of Drums

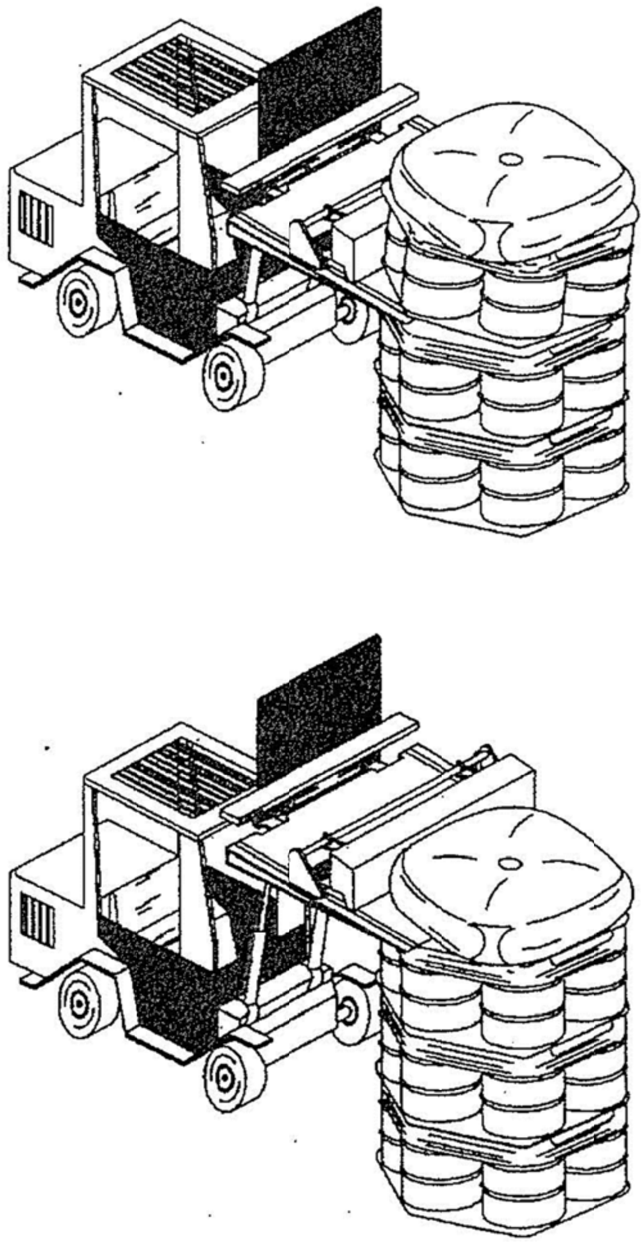


Figure A2-5
Typical Backfill Sacks Emplaced on Drum Stacks

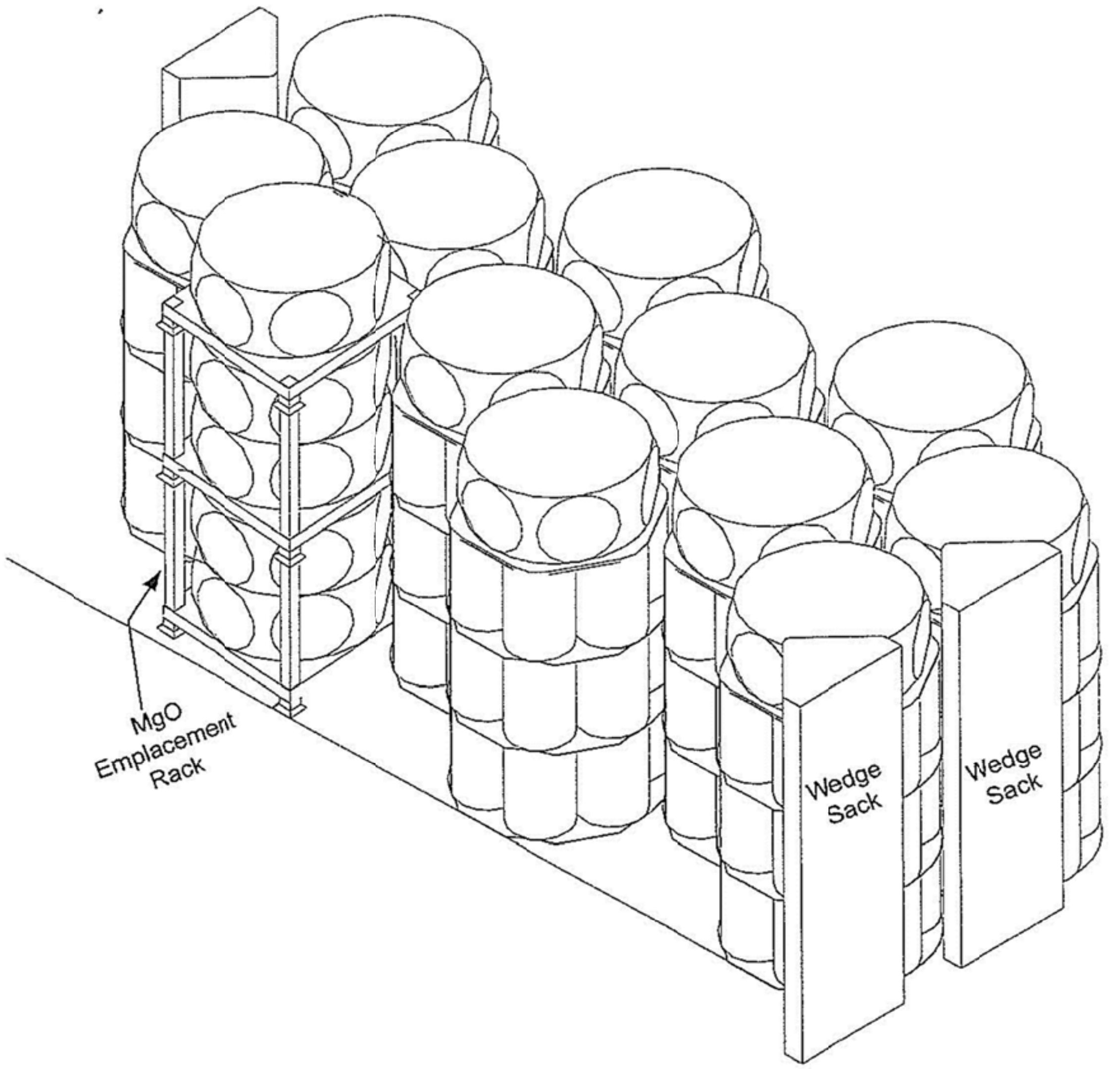


Figure A2-5a
Potential MgO Emplacement Configurations

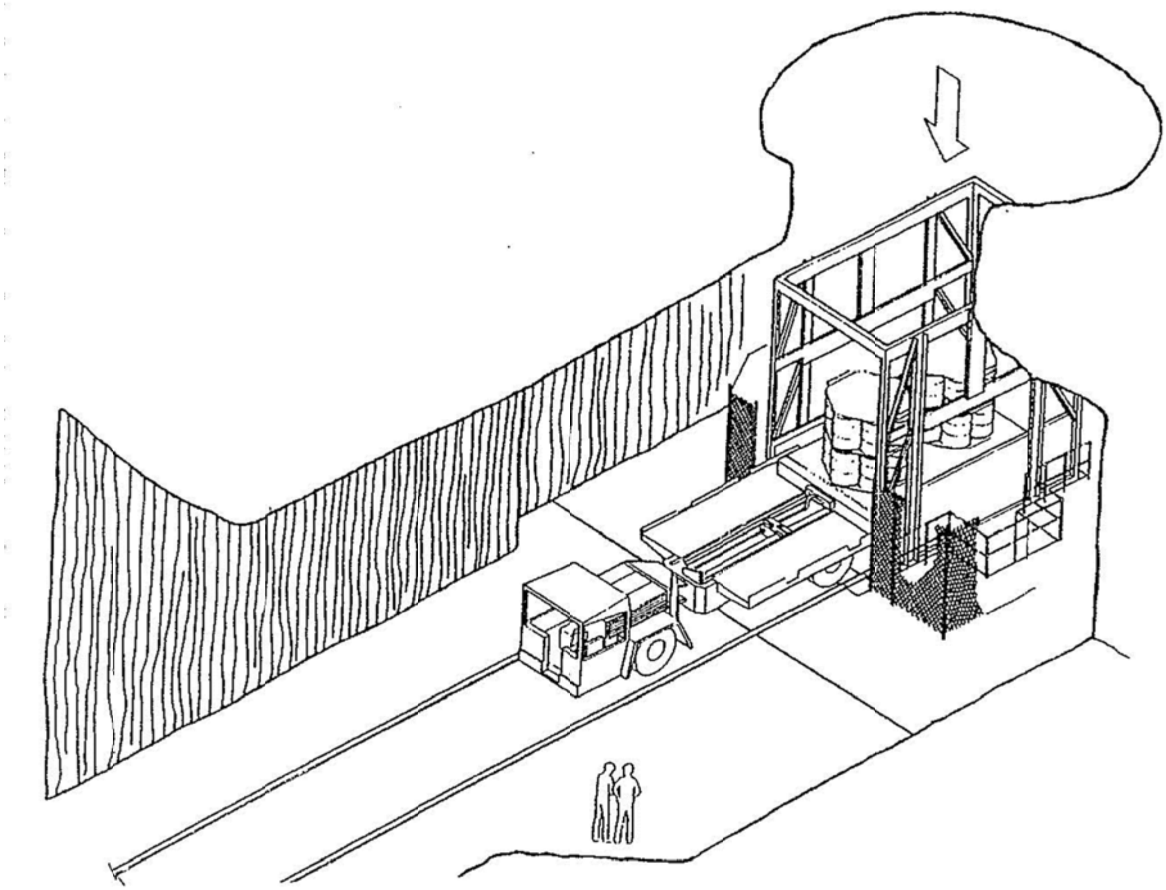


Figure A2-6
Waste Transfer Cage to Transporter

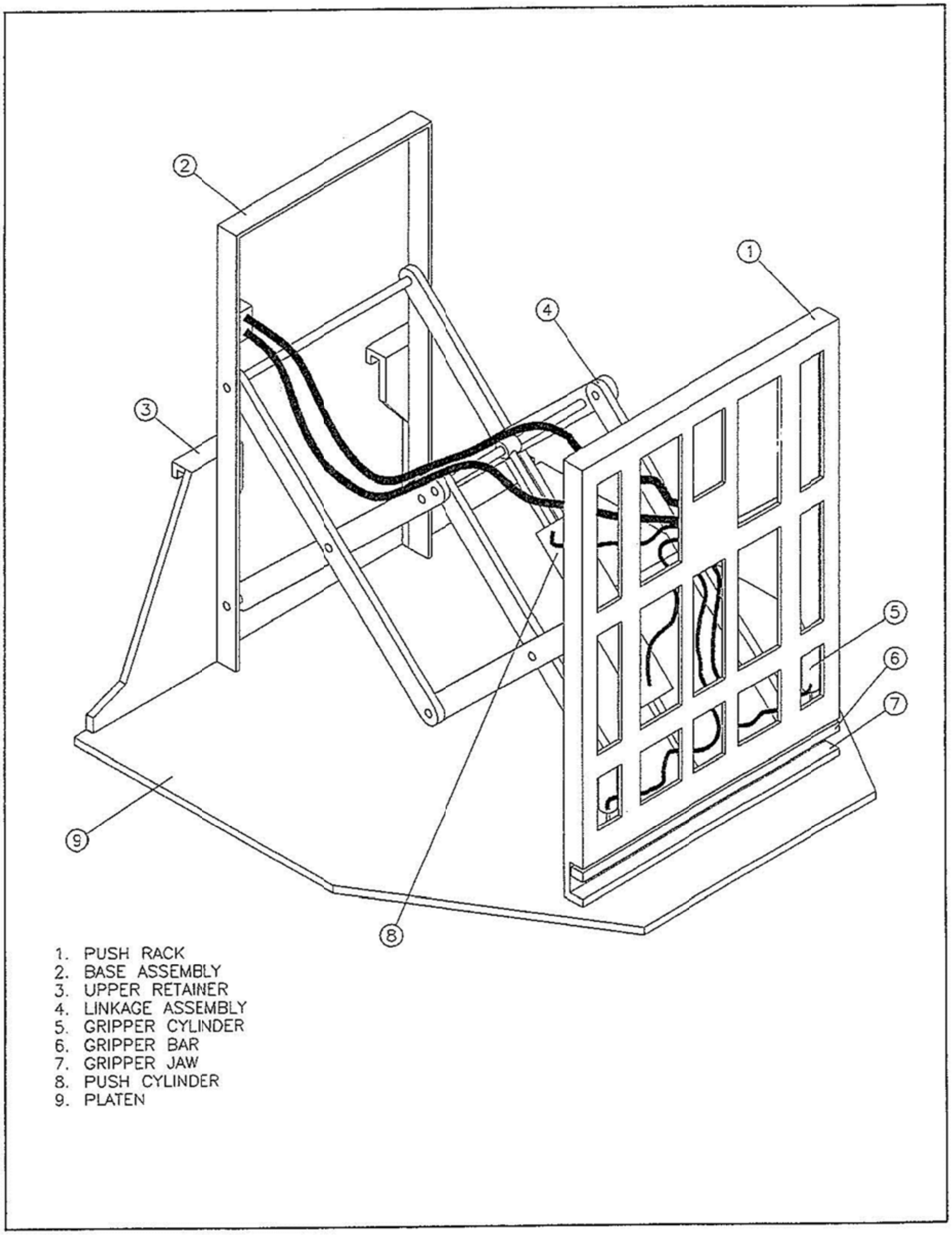


Figure A2-7
Push-Pull Attachment to Forklift to Allow Handling of Waste Containers

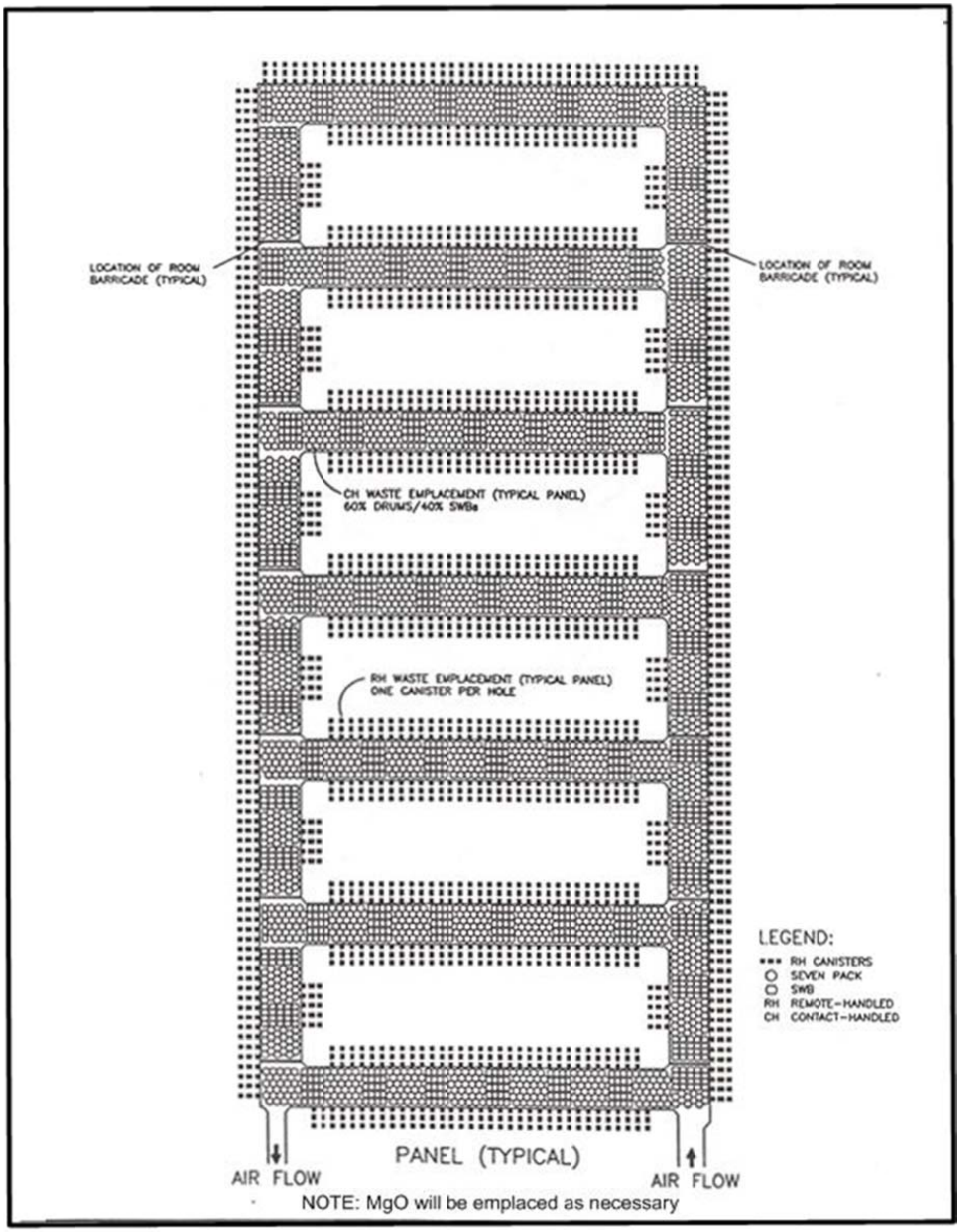


Figure A2-8
Typical RH and CH Transuranic Mixed Waste Container Disposal Configuration

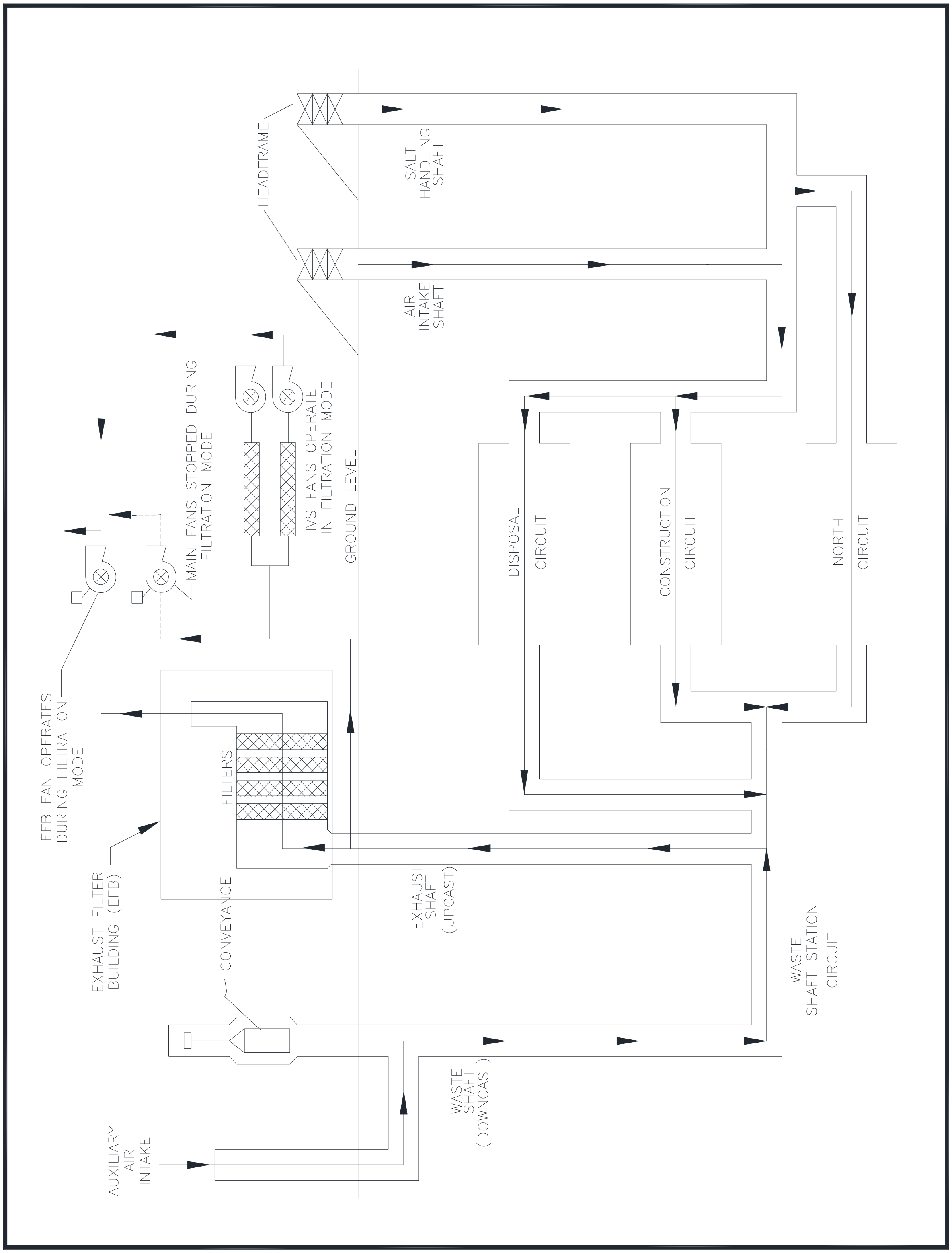


Figure A2-9a
Underground Ventilation System Airflow

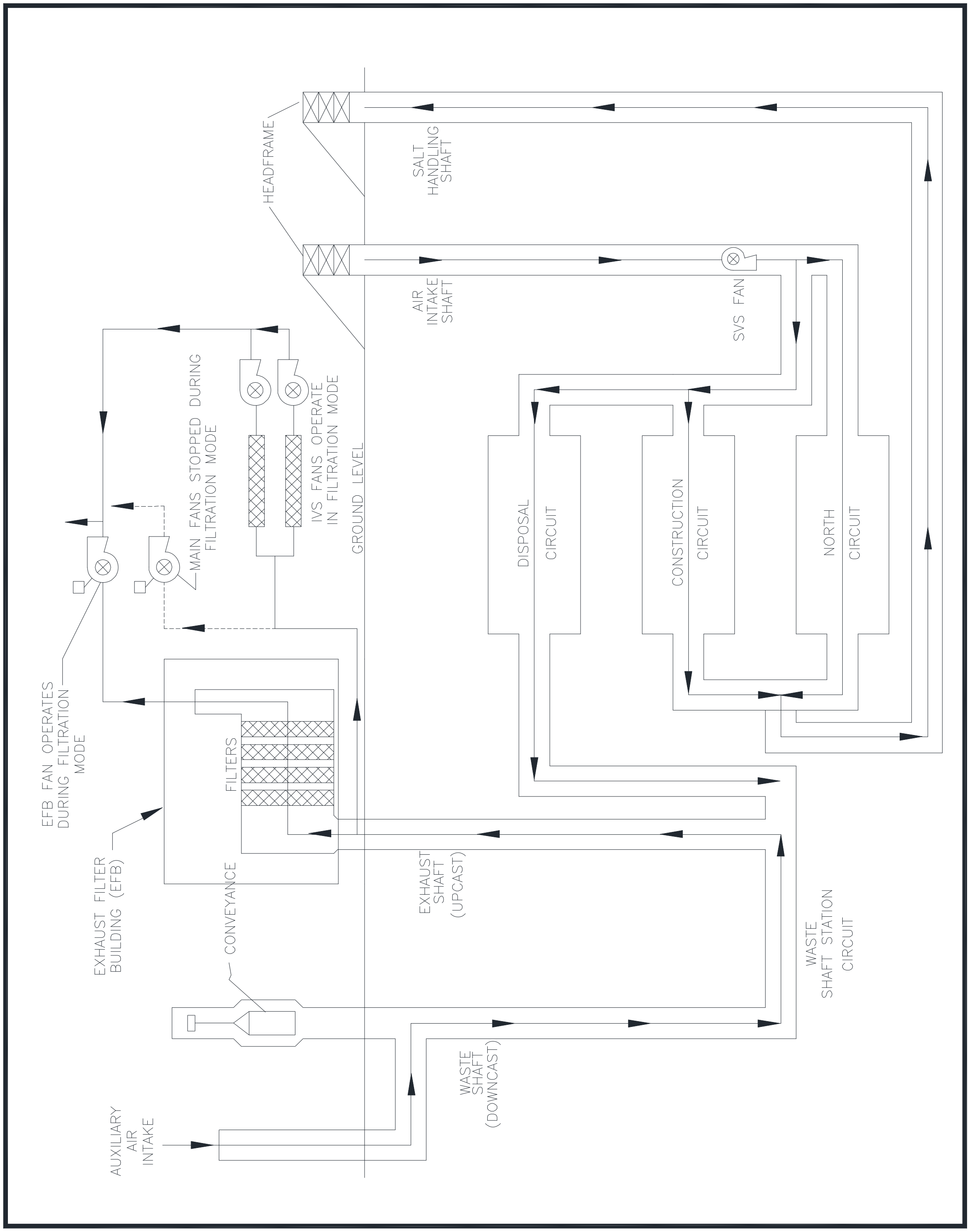


Figure A2-9b
Underground Ventilation System (with SVS)

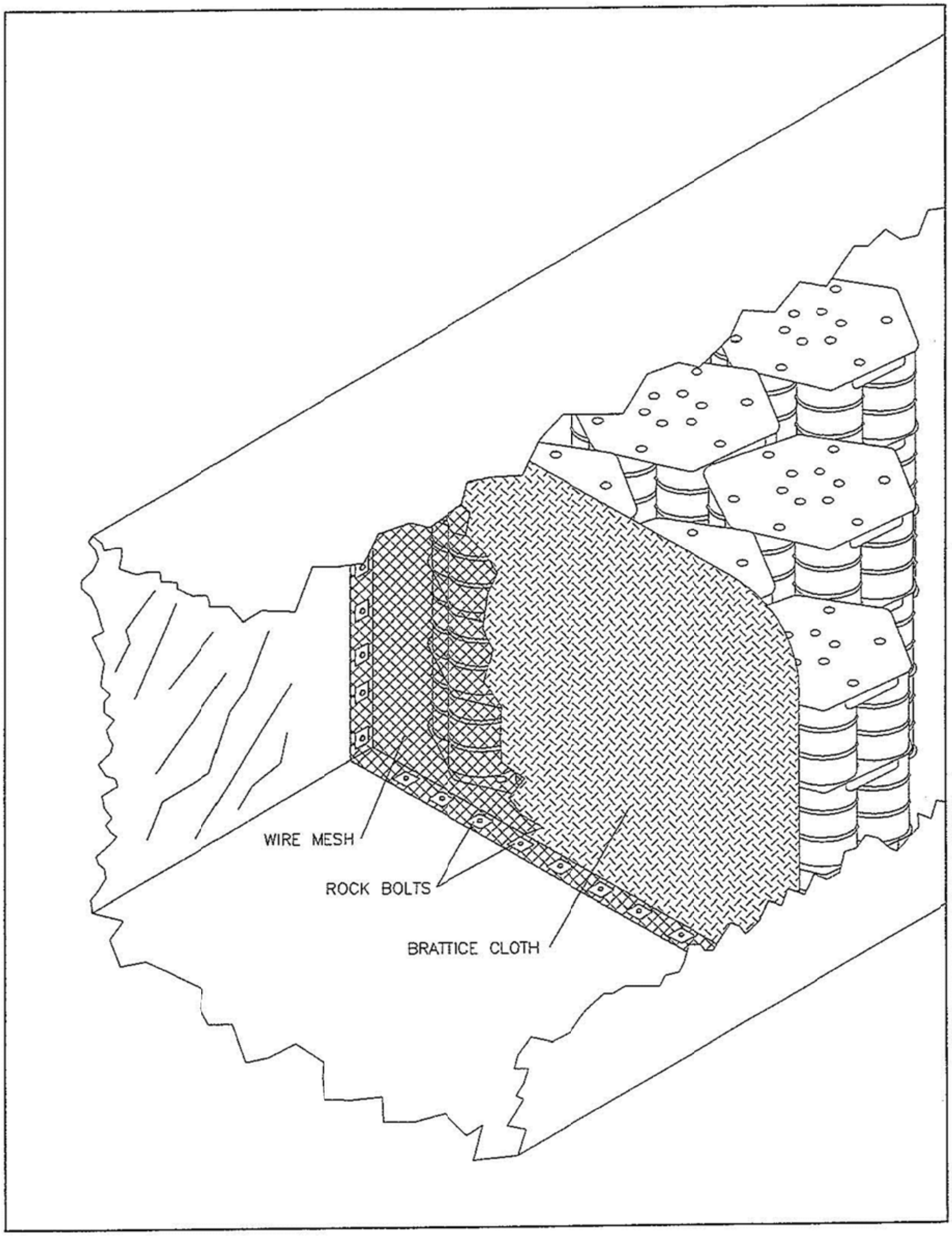
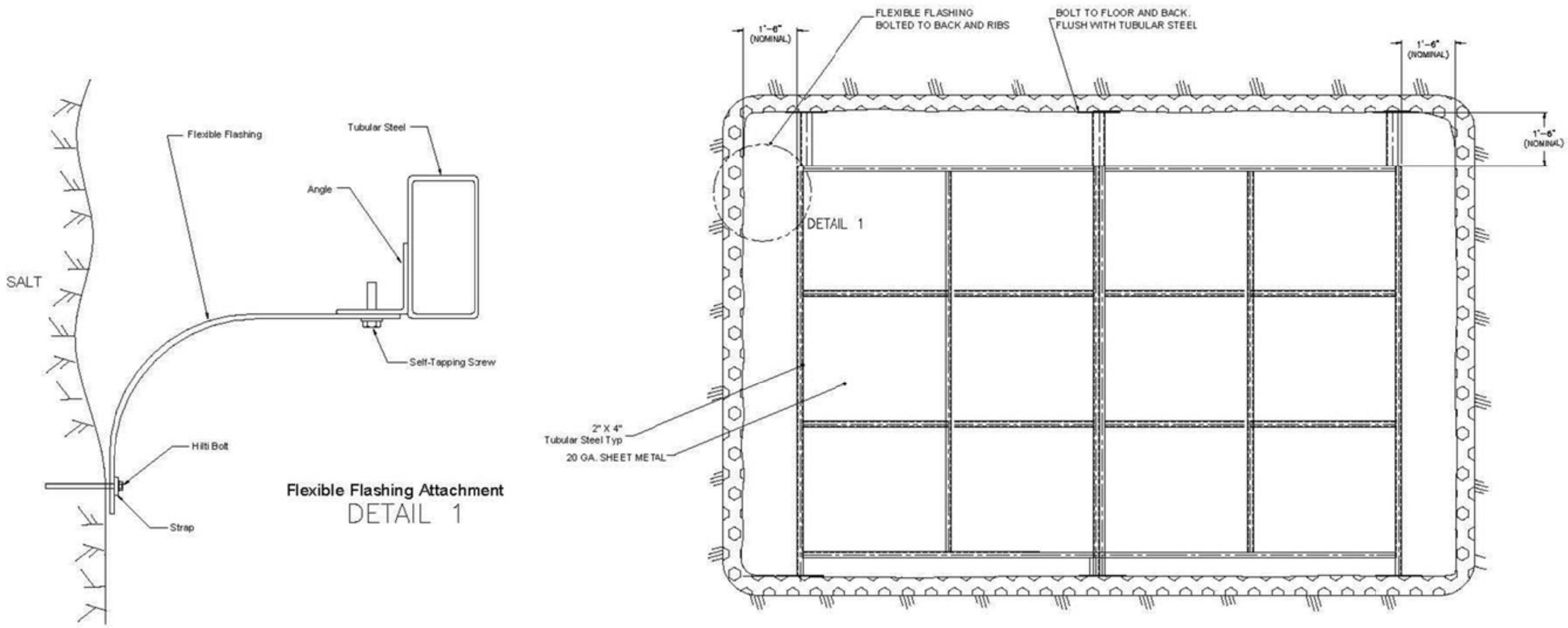


Figure A2-11
Typical Room Barricade



Not to Scale. All dimensions are nominal.

Figure A2-11a
Typical Bulkhead

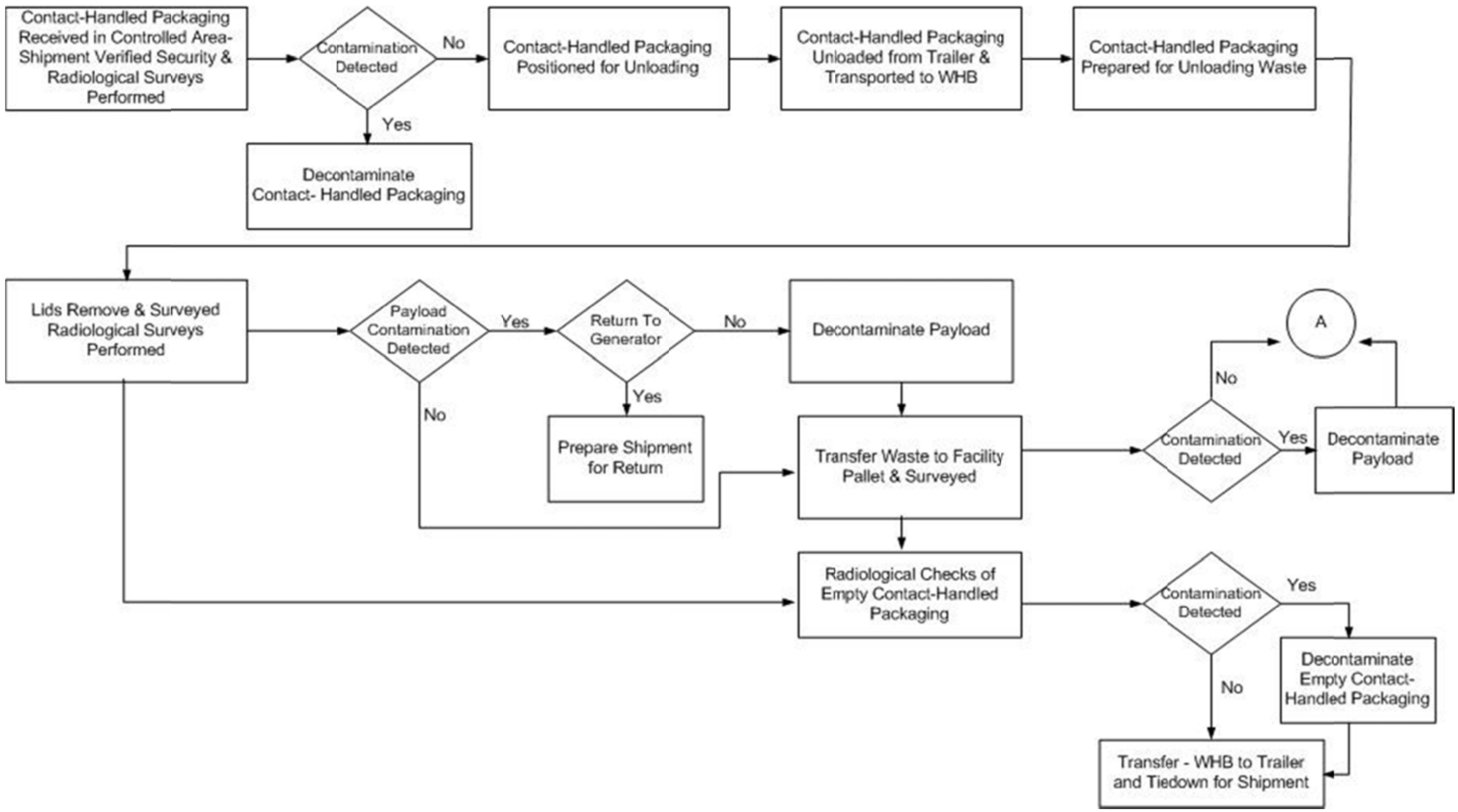


Figure A2-12
WIPP Facility Surface and Underground CH Transuranic Mixed Waste Process Flow Diagram

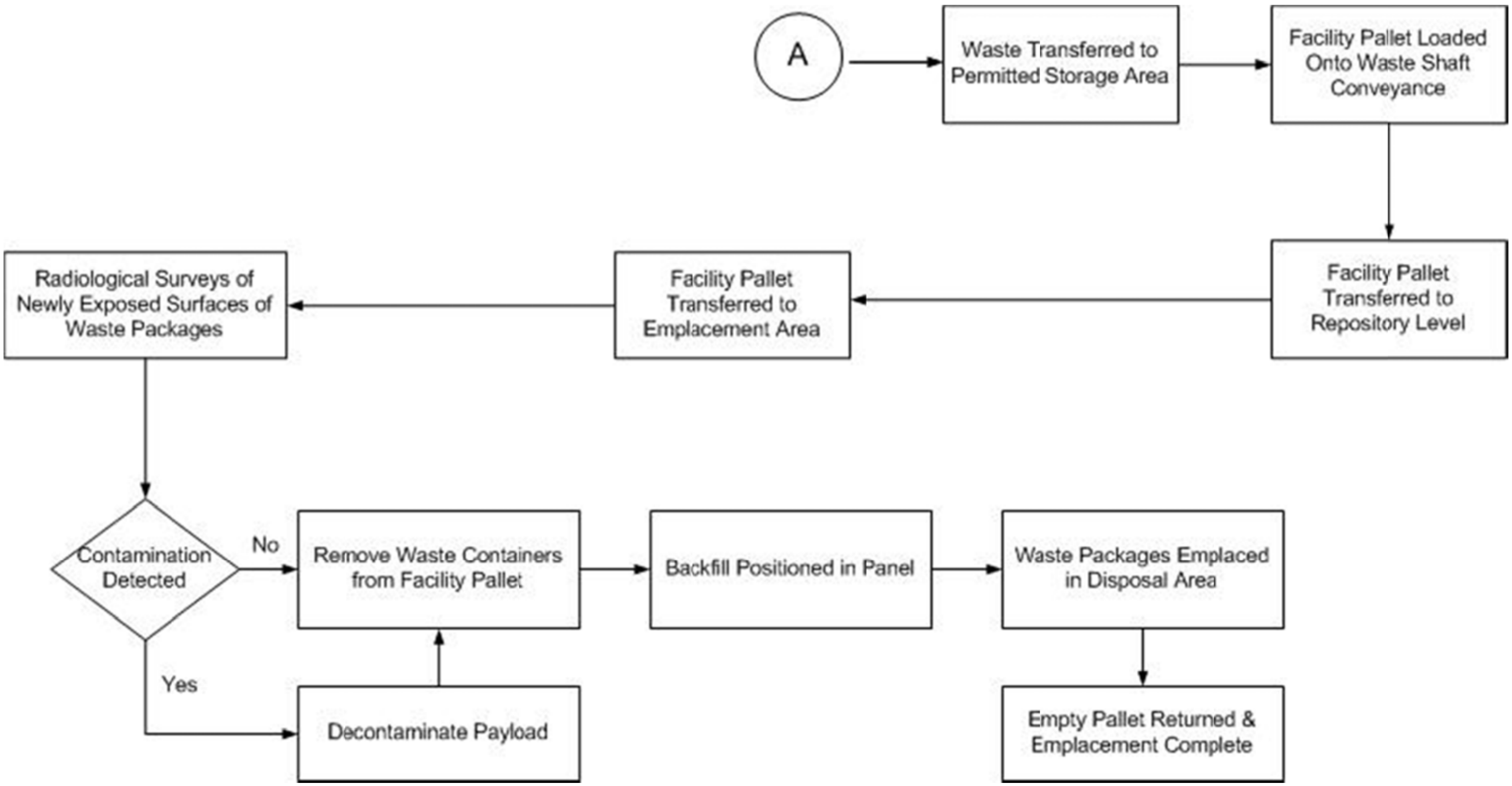


Figure A2-12
WIPP Facility Surface and Underground CH Transuranic Mixed Waste Process Flow Diagram (Continued)

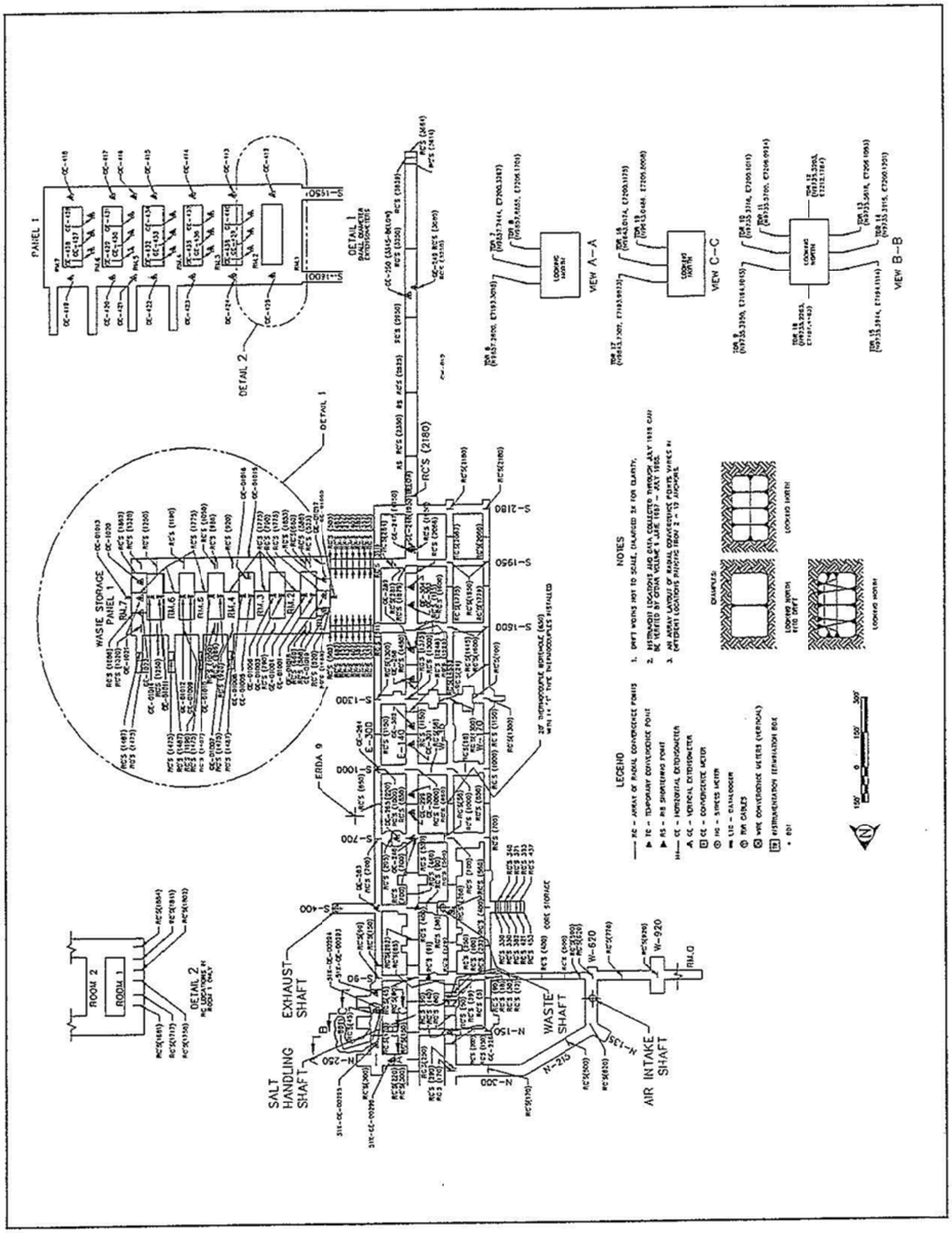


Figure A2-13
Layout and Instrumentation - As of 1/96

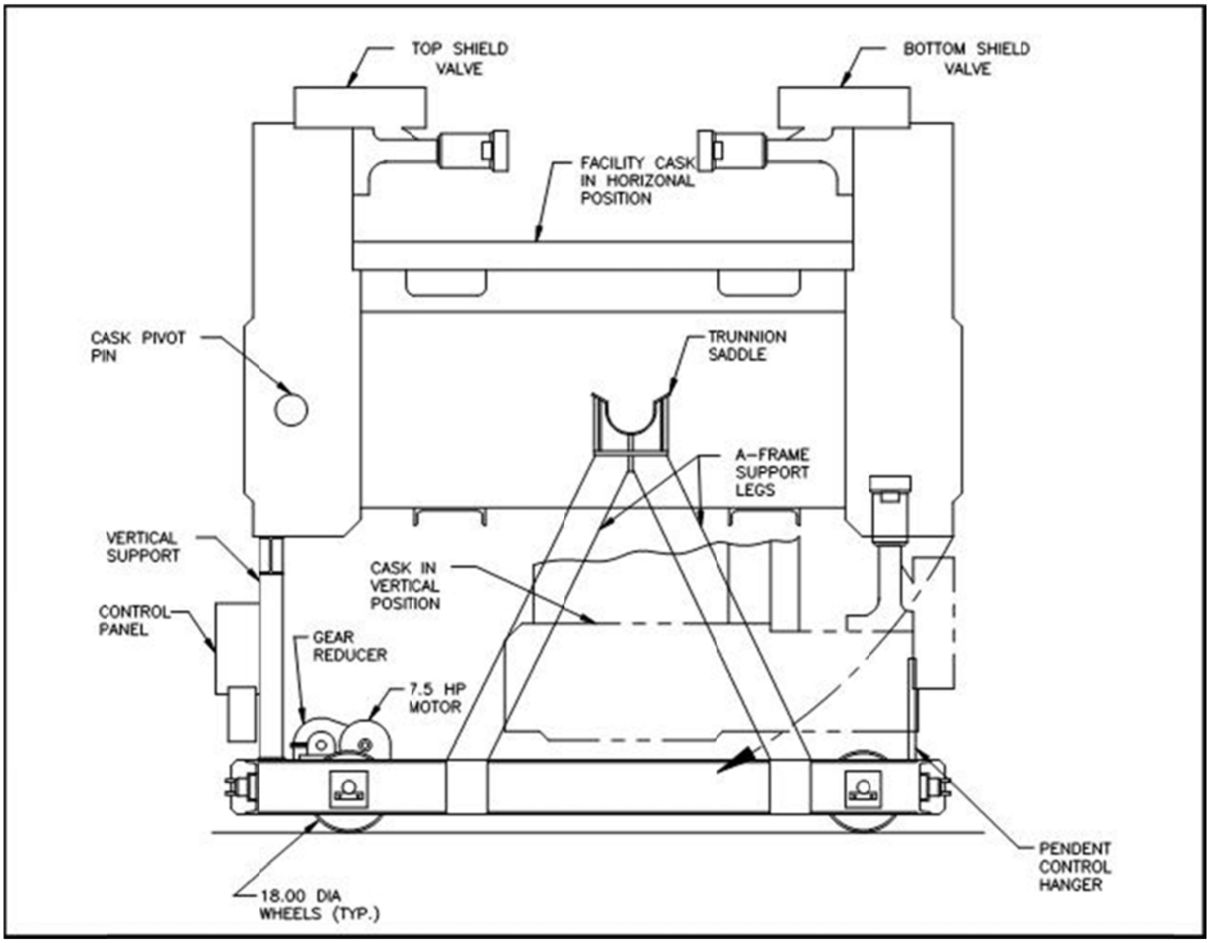


Figure A2-14
Facility Cask Transfer Car (Side View)

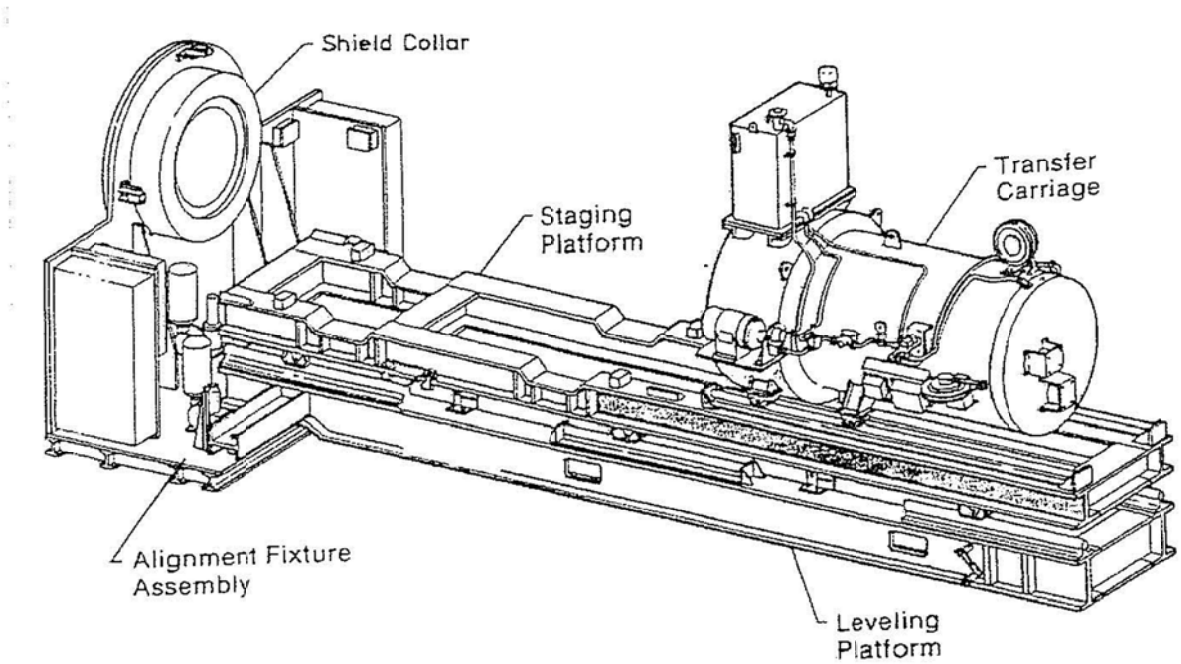


Figure A2-15
Typical Emplacement Equipment

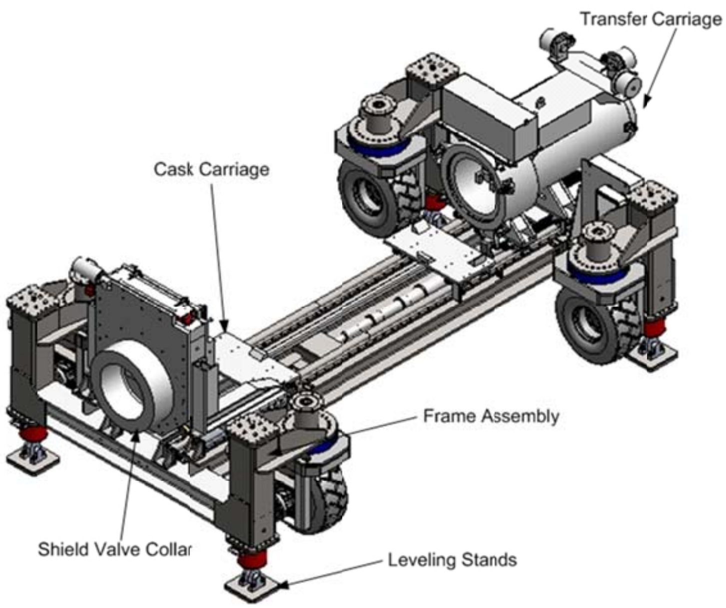


Figure A2-15a
Typical Emplacement Equipment

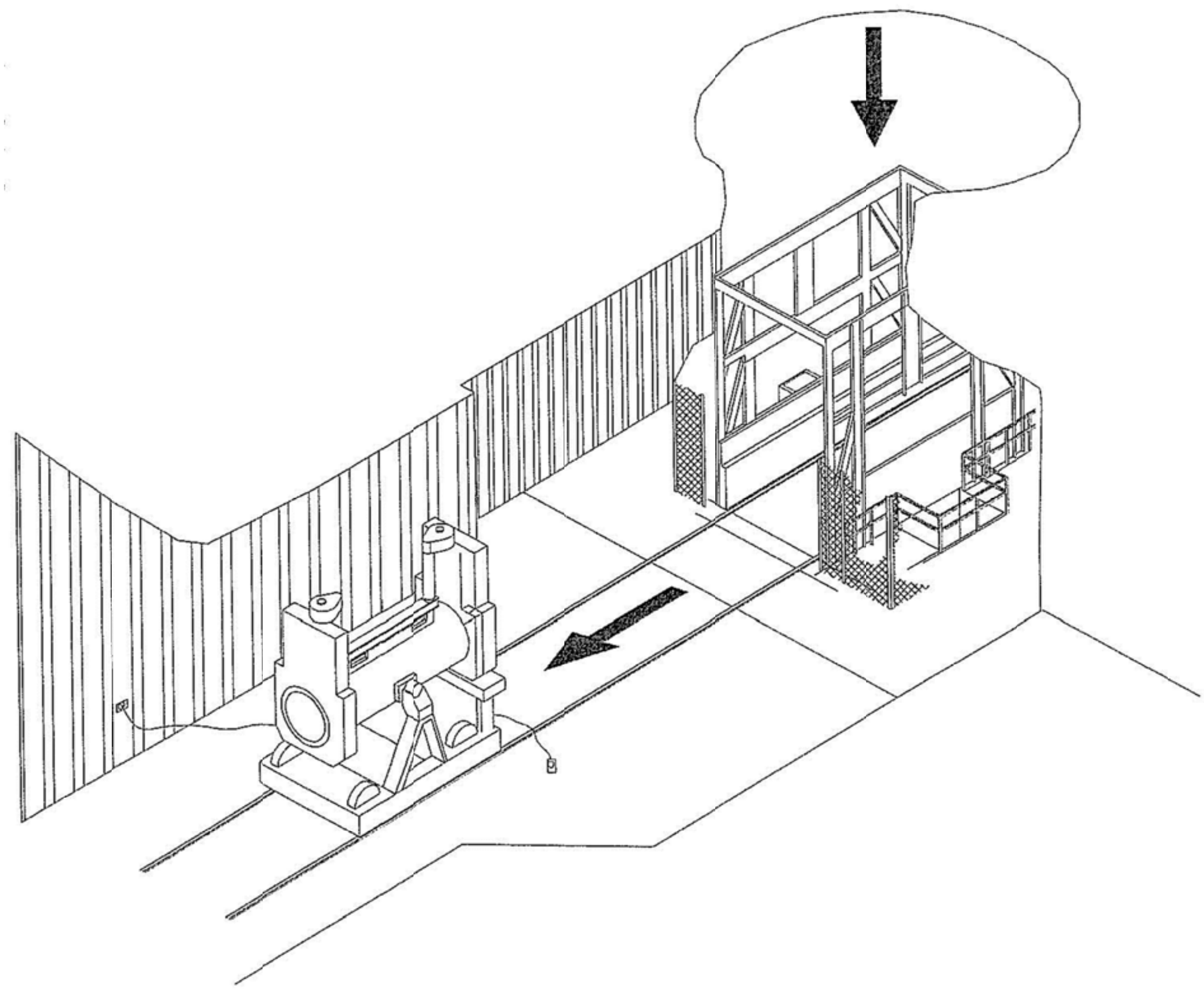


Figure A2-16
RH TRU Waste Facility Cask Unloading from Waste Shaft Conveyance

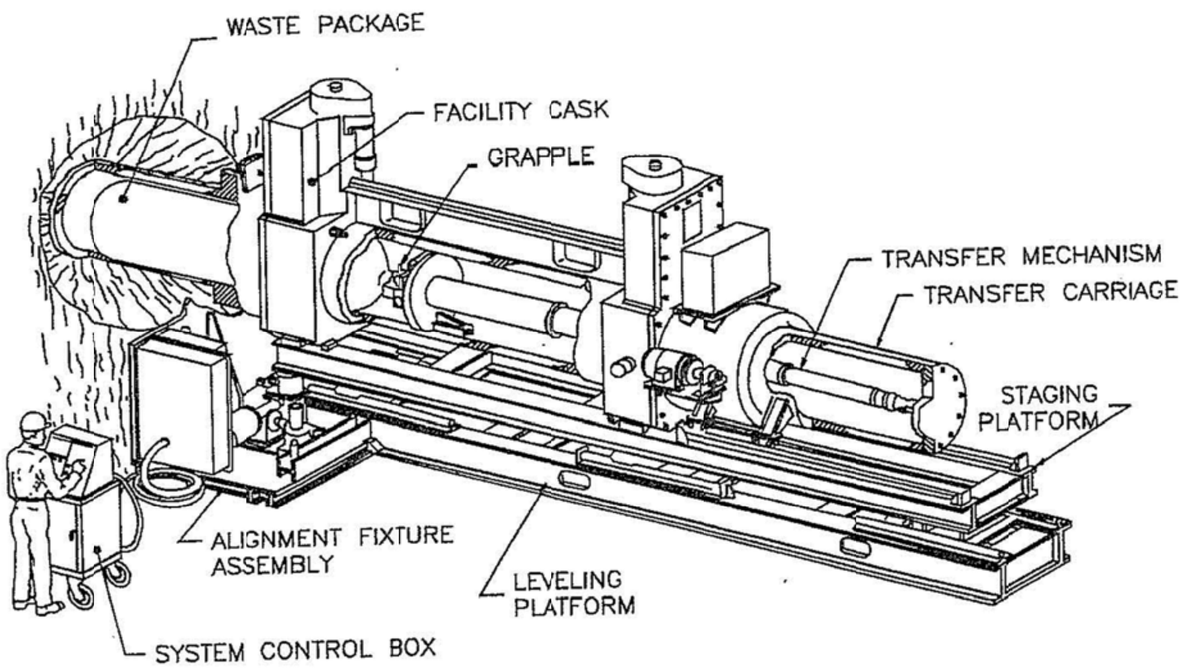


Figure A2-17
Facility Cask Installed on the Typical Emplacement Equipment

FACILITY CASK AGAINST SHIELD COLLAR, TRANSFER CARRIAGE RETRACTED, SHIELD PLUG CARRIAGE ON STAGING PLATFORM, SHIELD PLUG BEING INSTALLED

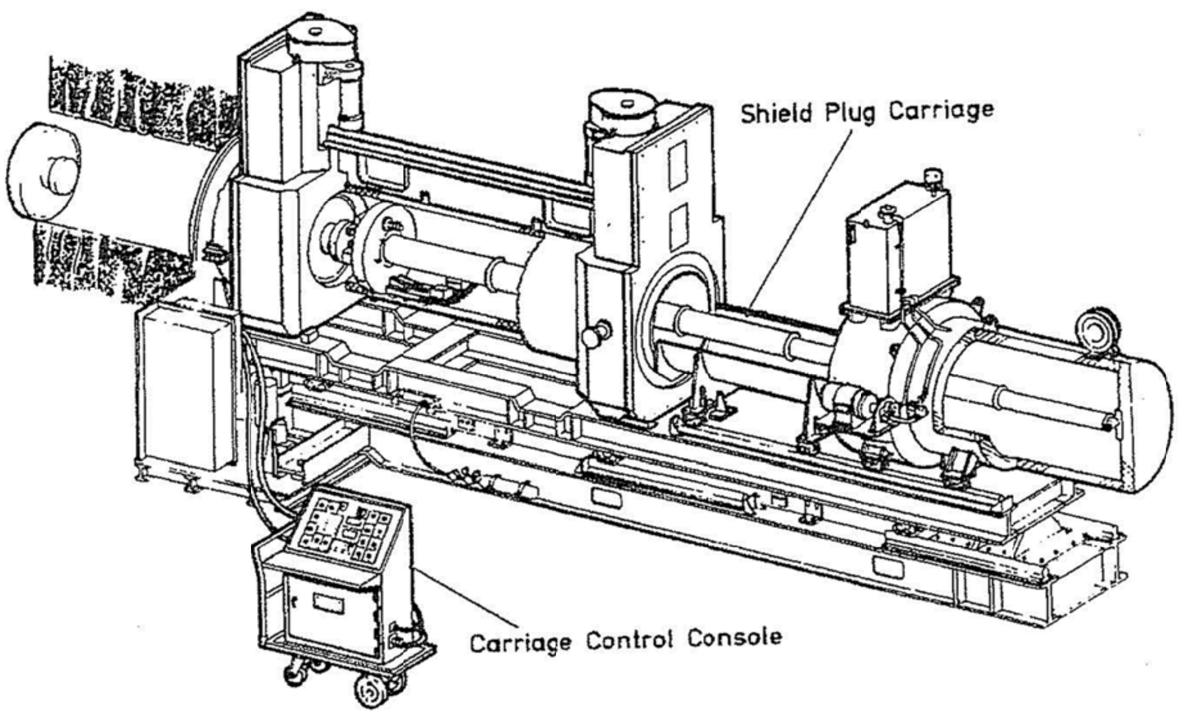
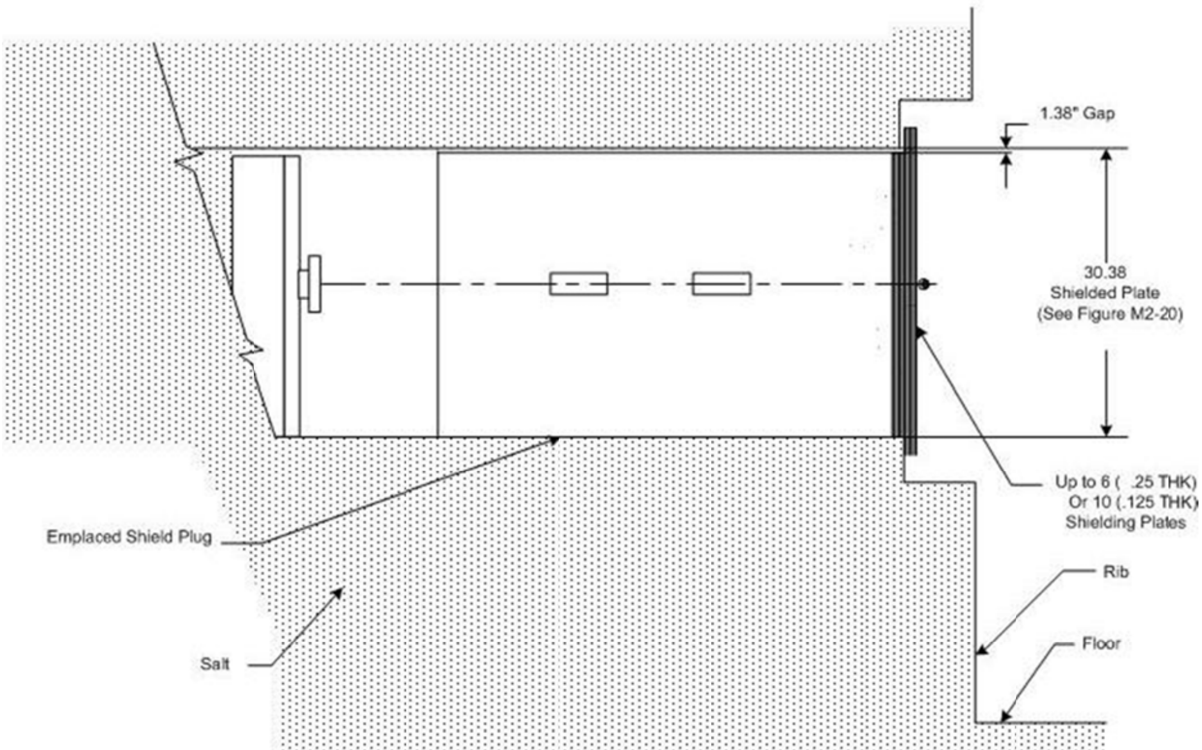


Figure A2-18
Installing Shield Plug



Section of Bore Hole Showing The Shield and
Supplemental Shielding Plate(s)

Figure A2-19
Shield Plug Supplemental Shielding Plate(s)

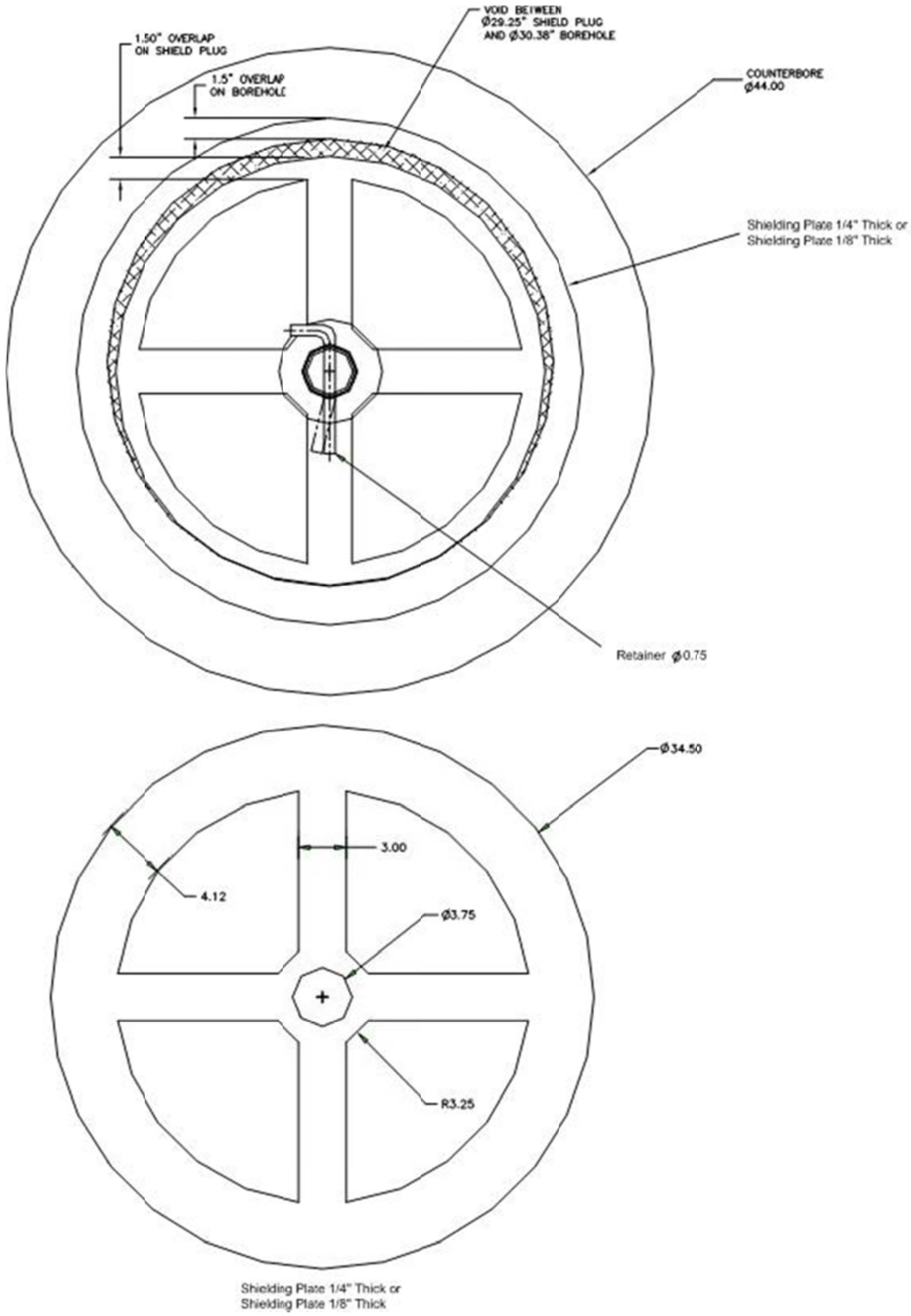
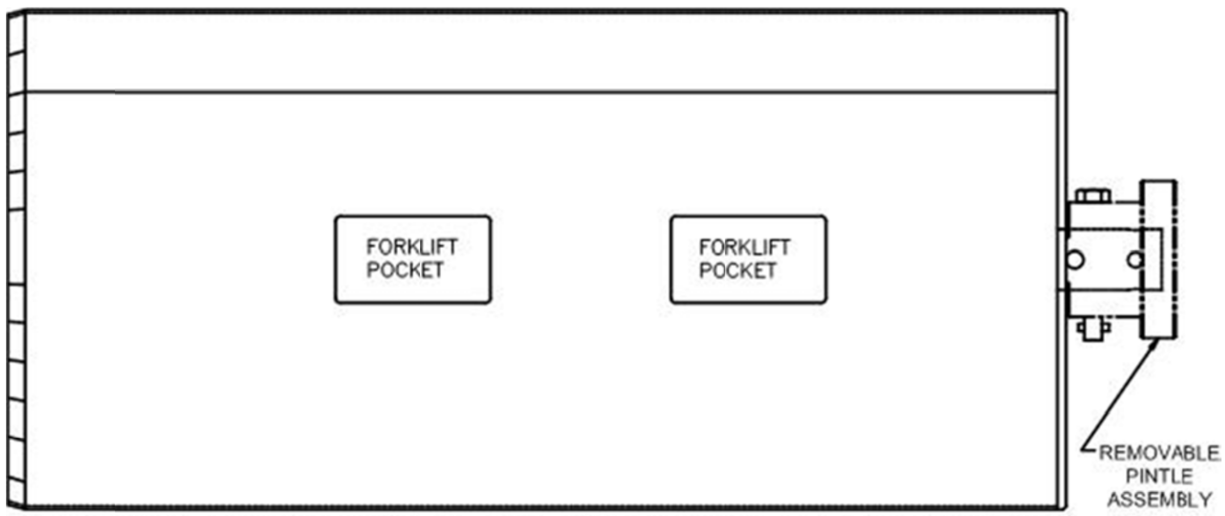


Figure A2-20
Shielding Layers to Supplement RH Borehole Shield Plugs



TYPICAL DIMENSION: APPROXIMATELY 29 INCHES DIAMETER X 61 INCHES SHIELDING LENGTH

Composition: Cylindrical steel shell filled with concrete
Weight: Approximately 3750 pounds

Figure A2-21
Shield Plug Configuration

ATTACHMENT A3

~~DRAWING NUMBER 51-W-214-W~~
~~UNDERGROUND FACILITIES~~ TYPICAL DISPOSAL PANEL

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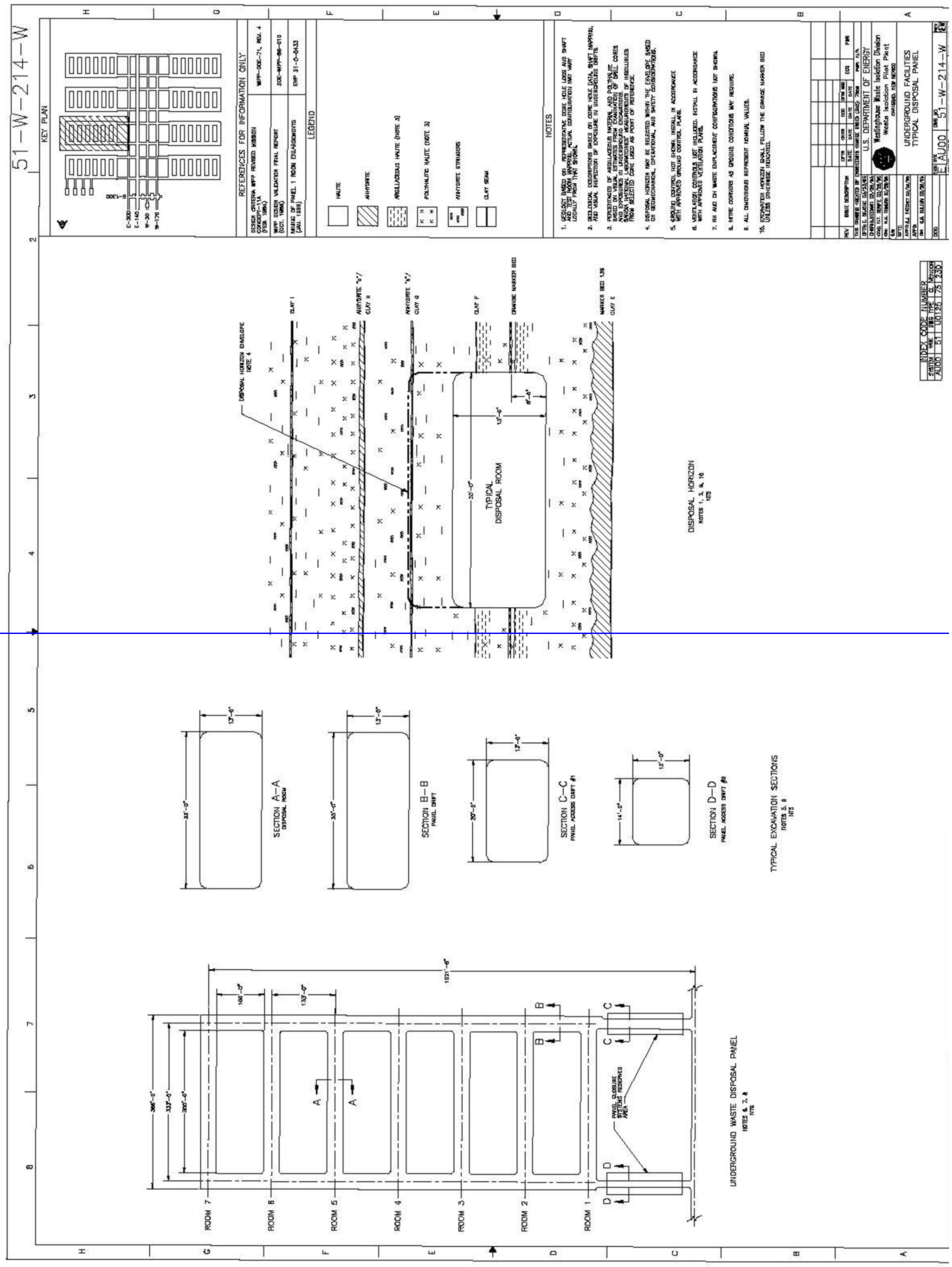
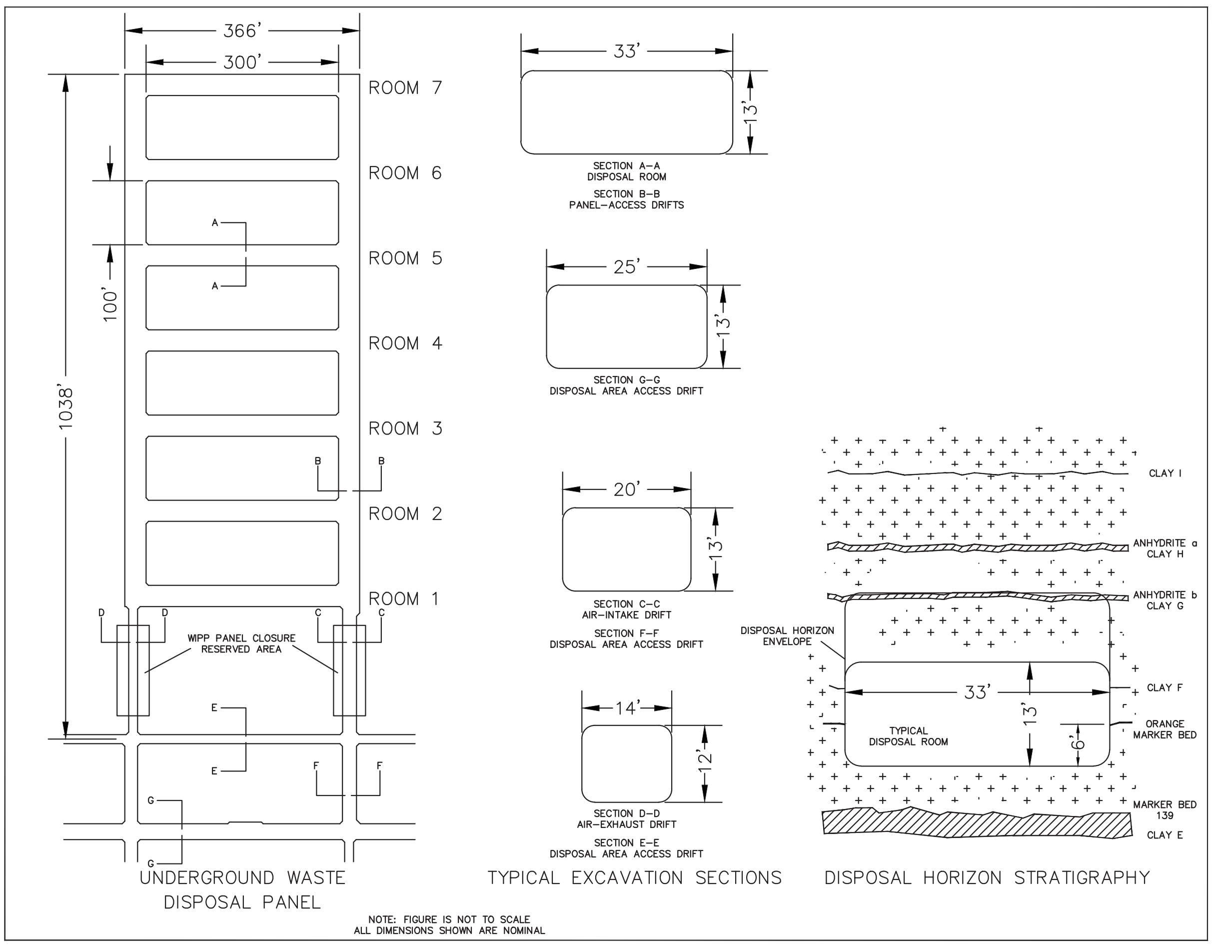

51-W-214-W
KEY PLAN
REFERENCES FOR INFORMATION ONLY
LEGEND
NOTES
TYPICAL DISPOSAL ROOM
DISPOSAL HORIZON
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
TYPICAL EXCAVATION SECTIONS
UNDERGROUND WASTE DISPOSAL PANEL
ROOM 7
ROOM 6
ROOM 5
ROOM 4
ROOM 3
ROOM 2
ROOM 1
U.S. DEPARTMENT OF ENERGY
UNDERGROUND FACILITIES
TYPICAL DISPOSAL PANEL



~~Drawing 51-W-214-W Underground Facilities~~ Typical Disposal Panel

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ATTACHMENT B

HAZARDOUS WASTE PERMIT APPLICATION PART A

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ATTACHMENT B

HAZARDOUS WASTE PERMIT APPLICATION PART A

TABLE OF CONTENTS

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OMB# 2050-0024; Expires 01/31/2017

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**

1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ■ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ■ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment # 32) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of >1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** N M 4 8 9 0 1 3 9 0 8 8
3. Site Name	**Name:** Waste Isolation Pilot Plant
4. Site Location Information	**Street Address:** 30 miles east of Carlsbad on Jal Highway **City, Town, or Village:** Carlsbad — **County:** Eddy **State:** NM — **Country:** USA — **Zip Code:** 88221
5. Site Land Type	☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
6. NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 5 6 2 2 1 **C.** **B.** **D.**
7. Site Mailing Address	**Street or P.O. Box:** P.O. Box 3090 **City, Town, or Village:** Carlsbad **State:** NM — **Country:** USA — **Zip Code:** 88221
8. Site Contact Person	**First Name:** Todd — **MI:** A — **Last:** Shrader **Title:** Manager, Carlsbad Field Office (CBFO) **Street or P.O. Box:** P.O. Box 3090 **City, Town or Village:** Carlsbad **State:** NM — **Country:** USA — **Zip Code:** 88221 **Email:** Todd.Shrader@cbfo.doe.gov **Phone:** (575) 234-7300 — **Ext.:** — **Fax:** (575) 234-7027
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** U.S. Department of Energy — **Date Became Owner:** 05/18/1981 **Owner Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** P.O. Box 3090 **City, Town, or Village:** Carlsbad — **Phone:** (575) 234-7300 **State:** NM — **Country:** USA — **Zip Code:** 88221 **B. Name of Site's Operator:** U.S. Department of Energy — **Date Became Operator:** 05/18/1981 **Operator Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

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EPA ID Number | N | M | 4 | 8 | 9 | 0 | 1 | 3 | 9 | 0 | 8 | 8 | OMB#: 2050-0024; Expires 01/31/2017

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y ☑ N ☐ **1. Generator of Hazardous Waste**
If "Yes," mark only one of the following – a, b, or c.

☑ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs/mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs/mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs/mo) of acute hazardous spill cleanup material.

☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs/mo) of non-acute hazardous waste.

☐ c. CESQG: Less than 100 kg/mo (220 lbs/mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities in 2-10.

Y ☐ N ☑ **2. Short-Term Generator** (generate from a short-term or one-time event and not from on-going processes). If "Yes," provide an explanation in the Comments section.

Y ☐ N ☑ **3. United States Importer of Hazardous Waste**

Y ☑ N ☐ **4. Mixed Waste (hazardous and radioactive) Generator**

Y ☐ N ☑ **5. Transporter of Hazardous Waste**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☑ N ☐ **6. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y ☐ N ☑ **7. Recycler of Hazardous Waste**

Y ☐ N ☑ **8. Exempt Boiler and/or Industrial Furnace**
If "Yes," mark all that apply.

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☑ **9. Underground Injection Control**

Y ☑ N ☐ **10. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☐ N ☑ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes," mark all that apply.**

a. Batteries ☐
b. Pesticides ☐
c. Mercury containing equipment ☐
d. Lamps ☐
e. Other (specify) ______________ ☐
f. Other (specify) ______________ ☐
g. Other (specify) ______________ ☐

Y ☐ N ☑ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☑ **1. Used Oil Transporter**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☐ N ☑ **2. Used Oil Processor and/or Re-refiner**
If "Yes," mark all that apply.

☐ a. Processor

☐ b. Re-refiner

Y ☐ N ☑ **3. Off-Specification Used Oil Burner**

Y ☐ N ☑ **4. Used Oil Fuel Marketer**
If "Yes," mark all that apply.

☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner

☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

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D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

- You can ONLY Opt into Subpart K if:
  - you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
  - you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y☐ N☐ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

☐ **a. College or University**

☐ **b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university**

☐ **c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university**

Y☐ N☐ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D004	D019	D033	F001	P030	U043	U108
D005	D021	D034	F002	P098	U044	U122
D006	D022	D035	F003	P099	U052	U133
D007	D026	D036	F004	P106	U070	U134
D008	D027	D037	F005	P120	U072	U151
D009	D028	D038	F006	U002	U078	U154
D010	D029	D039	F007	U003	U079	U159
D011	D030	D040	F009	U019	U103	U196
D018	D032	D043	P015	U037	U105	More Codes Attch.

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

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EPA ID Number NM4890139088

Additional Hazardous Waste Numbers from Section 11						
U209						
U210						
U220						
U226						
U228						
U239						

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EPA ID Number | N | M | 4 | 8 | 9 | 0 | 1 | 3 | 9 | 0 | 8 | 8 |

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12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☑ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes," you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my 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 my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
Original Signature on File	Todd A. Shrader, Manager-CBFO	06/12/2017
Original Signature on File	Bruce C. Covert, Project Mgr-NWP	06/12/2017

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United States Environmental Protection Agency
HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** Todd	**MI:** A	**Last Name:** Shrader
	Contact Title: Manager, Carlsbad Field Office		
	Phone: (575)234-7300	**Ext.:**	**Email:** Todd.Shrader@cbfo.doe.gov
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** P.O. Box 3090		
	City, Town, or Village: Carlsbad		
	State: NM		
	Country: USA	**Zip Code:** 88221	
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** P.O. Box 3090		
	City, Town, or Village: Carlsbad		
	State: NM	**Phone:** (575)234-7300	
	Country: USA	**Zip Code:** 88221	
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** 05/18/1981		

5. Other Environmental Permits

A. Facility Type (*Enter code*)	B. Permit Number	C. Description
		See Permit Attachment B, Appendix B1

6. Nature of Business: The Waste Isolation Pilot Plant (WIPP) is a U.S. Department of Energy facility which entails receiving, unloading, and transferring radioactive-mixed waste from the surface of the site to the underground hazardous waste management units. Waste will be emplaced in an underground geologic repository horizon located in a deep-bedded salt formation approximately 2,150 feet beneath the surface.

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7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
Disposal		
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
Storage		
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Buildng Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
Treatment		
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour
Treatment (Continued)		**(for T81 – T94)**
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
Miscellaneous (Subpart X)		
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	G	Short Tons Per Hour	D	Cubic Yards	Y
Gallons Per Hour	E	Short Tons Per Day	N	Cubic Meters	C
Gallons Per Day	U	Metric Tons Per Hour	W	Acres	B
Liters	L	Metric Tons Per Day	S	Acre-feet	A
Liters Per Hour	H	Pounds Per Hour	J	Hectares	Q
Liters Per Day	V	Kilograms Per Hour	X	Hectare-meter	F
		Million BTU Per Hour	X	BTU Per Hour	I

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7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. PROCESS DESIGN CAPACITY (2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	1	S	0	2	533.788	G	001	
	1	X	0	4	175600.00	C	010	
	2	S	0	1	194.1	C	001	
	3	S	0	1	242.0	C	001	
	4							
	5							
	6							
	7							
	8							
	9							
1	0							
1	1							
1	2							
1	3							

Note: *If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.*

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	2	T	0	4	100.00	U	001	

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9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

A. **EPA HAZARDOUS WASTE NUMBER** – Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. **ESTIMATED ANNUAL QUANTITY** – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. **UNIT OF MEASURE** – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. **PROCESSES**

1. **PROCESS CODES:**

For listed hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. Enter the first two as described above.
2. Enter "000" in the extreme right box of Item 9.D(1).
3. Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.

2. **PROCESS DESCRIPTION:** If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.
2. In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)									D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

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9. Description of Hazardous Wastes *(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)	D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
1	F001	1891	M	X04 S01 S01	
2	F002	1860	M	X04 S01 S01	
3	F003	1593	M	X04 S01 S01	
4	F004	26	M	X04 S01 S01	
5	F005	1829	M	X04 S01 S01	
6	F006	915	M	X04 S01 S01	
7	F007	915	M	X04 S01 S01	
8	F009	915	M	X04 S01 S01	
9	D004	903	M	X04 S01 S01	
10	D005	484	M	X04 S01 S01	
11	D006	1819	M	X04 S01 S01	
12	D007	1248	M	X04 S01 S01	
13	D008	3246	M	X04 S01 S01	
14	D009	1727	M	X04 S01 S01	
15	D010	186	M	X04 S01 S01	
16	D011	1090	M	X04 S01 S01	
17	D018	749	M	X04 S01 S01	
18	D019	761	M	X04 S01 S01	
19	D021	26	M	X04 S01 S01	
20	D022	1098	M	X04 S01 S01	
21	D026	609	M	X04 S01 S01	
22	D027	26	M	X04 S01 S01	
23	D028	449	M	X04 S01 S01	
24	D029	478	M	X04 S01 S01	
25	D030	26	M	X04 S01 S01	
26	D032	26	M	X04 S01 S01	
27	D034	26	M	X04 S01 S01	
28	D035	139	M	X04 S01 S01	
29	D036	26	M	X04 S01 S01	
30	D037	26	M	X04 S01 S01	
31	D038	26	M	X04 S01 S01	
32	D039	26	M	X04 S01 S01	
33	D040	140	M	X04 S01 S01	
34	D043	26	M	X04 S01 S01	
35	P015	945	M	X04 S01 S01	
36	U002	344	M	X04 S01 S01	

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9. Description of Hazardous Wastes *(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D.1)
3	7	U	0	1	9	344	M	X	0	4	S	0	1	S	0	1	
3	8	U	0	3	7	344	M	X	0	4	S	0	1	S	0	1	
3	9	U	0	4	3	344	M	X	0	4	S	0	1	S	0	1	
4	0	U	0	4	4	344	M	X	0	4	S	0	1	S	0	1	
4	1	U	0	5	2	344	M	X	0	4	S	0	1	S	0	1	
4	2	U	0	7	0	344	M	X	0	4	S	0	1	S	0	1	
4	3	U	0	7	2	344	M	X	0	4	S	0	1	S	0	1	
4	4	U	0	7	8	344	M	X	0	4	S	0	1	S	0	1	
4	5	U	0	7	9	344	M	X	0	4	S	0	1	S	0	1	
4	6	U	1	0	5	344	M	X	0	4	S	0	1	S	0	1	
4	7	U	1	2	2	344	M	X	0	4	S	0	1	S	0	1	
4	8	U	1	3	3	344	M	X	0	4	S	0	1	S	0	1	
4	9	U	1	5	1	344	M	X	0	4	S	0	1	S	0	1	
5	0	U	1	5	4	344	M	X	0	4	S	0	1	S	0	1	
5	1	U	1	5	9	344	M	X	0	4	S	0	1	S	0	1	
5	2	U	1	9	6	344	M	X	0	4	S	0	1	S	0	1	
5	3	U	2	0	9	344	M	X	0	4	S	0	1	S	0	1	
5	4	U	2	1	0	344	M	X	0	4	S	0	1	S	0	1	
5	5	U	2	2	0	344	M	X	0	4	S	0	1	S	0	1	
5	6	U	2	2	6	344	M	X	0	4	S	0	1	S	0	1	
5	7	U	2	2	8	344	M	X	0	4	S	0	1	S	0	1	
5	8	U	2	3	9	344	M	X	0	4	S	0	1	S	0	1	
5	9	P	1	2	0	344	M	X	0	4	S	0	1	S	0	1	
6	0	U	1	3	4	344	M	X	0	4	S	0	1	S	0	1	
6	1	D	0	3	3	344	M	X	0	4	S	0	1	S	0	1	
6	2	P	0	3	0	344	M	X	0	4	S	0	1	S	0	1	
6	3	P	0	9	8	344	M	X	0	4	S	0	1	S	0	1	
6	4	P	0	9	9	344	M	X	0	4	S	0	1	S	0	1	
6	5	P	1	0	6	344	M	X	0	4	S	0	1	S	0	1	
6	6	U	0	0	3	344	M	X	0	4	S	0	1	S	0	1	
6	7	U	1	0	3	344	M	X	0	4	S	0	1	S	0	1	
6	8	U	1	0	8	344	M	X	0	4	S	0	1	S	0	1	

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10. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

11. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

12. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas (see instructions for more detail).

13. Comments

See narrative to RCRA Subtitle C Site Identification Form, Section 7. PROCESS - CODES AND DESIGN CAPACITIES (continued).

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7. PROCESS—CODES AND DESIGN CAPACITIES (continued)

The Waste Isolation Pilot Plant (WIPP) geologic repository is defined as a “miscellaneous unit” under 40 CFR §260.10. “Miscellaneous unit” means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of and that is not a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, containment building, boiler, industrial furnace, or underground injection well with appropriate technical standards under 40 CFR Part 146, corrective action management unit, or unit eligible for research, development, and demonstration permit under 40 CFR §270.65. The WIPP is a geologic repository designed for the disposal of defense-generated transuranic (TRU) waste. Some of the TRU wastes disposed of at the WIPP contain hazardous wastes as co-contaminants. More than half the waste to be disposed of at the WIPP also meets the definition of debris waste. The debris categories include manufactured goods, biological materials, and naturally occurring geological materials. Approximately 120,000 cubic meters (m^3) of the 175,600 m^3 of WIPP wastes is categorized as debris waste. The geologic repository has been divided into ten discrete hazardous waste management units (HWMU) which are being permitted under 40 CFR Part 264, Subpart X.

During the Disposal Phase of the facility, which is expected to last 25 years, the total amount of waste received from off-site generators and any derived waste will be limited to 175,600 m^3 of TRU waste of which up to 7,080 m^3 may be remote-handled (RH) TRU mixed waste. For purposes of this application, all TRU waste is managed as though it were mixed.

The process design capacity for the miscellaneous unit (composed of ten underground HWMUs in the geologic repository) shown in Section 7 B, is for the maximum amount of waste that may be received from off-site generators plus the maximum expected amount of derived wastes that may be generated at the WIPP facility. In addition, two HWMUs have been designated as container storage units (S01) in Section 7 B. One is inside the Waste Handling Building (WHB) and consists of the contact-handled (CH) bay, waste shaft conveyance loading room, waste shaft conveyance entry room, RH bay, cask unloading room, hot cell, transfer cell, and facility cask loading room. This HWMU will be used for waste receipt, handling, and storage (including storage of derived waste) prior to emplacement in the underground geologic repository. No treatment or disposal will occur in this S01 HWMU. The capacity of this S01 unit for storage is 194.1 m^3, based on 36 ten-drum overpacks on 18 facility pallets, four CH Packages at the TRUDOCKs, one standard waste box of derived waste, two loaded casks and one 55-gallon drum of derived waste in the RH Bay, one loaded cask in the Cask Unloading Room, 13 55-gallon drums in the Hot Cell, one canister in the Transfer Cell and one canister in the Facility Cask Unloading Room. The second S01 HWMU is the parking area outside the WHB where the Contact- and Remote-Handled Package trailers and the road cask trailers will be parked awaiting waste handling operations. The capacity of this unit is 50 Contact-Handled Packages and twelve Remote-Handled Packages with a combined volume of 242 m^3. The HWMUs are shown in Figures B3-2, B3-3, and B3-4.

During the ten year period of the permit, up to 148,500 m^3 of CH TRU mixed waste could be emplaced in Panels 1 to 8 and up to 2,635 m^3 of RH TRU mixed waste could be emplaced in

Panels 4 to 8. Panels 9 and 10 will be constructed under the initial term of this permit. These latter areas will not receive waste for disposal under this permit.

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RCRA PART A APPLICATION CERTIFICATION

The U.S. Department of Energy (DOE), through its Carlsbad Field Office, has signed as "owner and operator," and Nuclear Waste Partnership LLC, the Management and Operating Contractor (MOC), has signed this application for the permitted facility as "co-operator."

The DOE has determined that dual signatures best reflect the actual apportionment of Resource Conservation and Recovery Act (RCRA) responsibilities as follows:

> The DOE's RCRA responsibilities are for policy, programmatic directives, funding and scheduling decisions, Waste Isolation Pilot Plant (WIPP) requirements of DOE generator sites, auditing, and oversight of all other parties engaged in work at the WIPP, as well as general oversight.
>
> The MOC's RCRA responsibilities are for certain day-to-day operations (in accordance with general directions given by the DOE and in the Management and Operating Contract as part of its general oversight responsibility), including, but not limited to, the following: certain waste handling, monitoring, record keeping, certain data collection, reporting, technical advice, and contingency planning.
>
> For purposes of the certification required by Title 20 of the New Mexico Administrative Code, Chapter 4, Part 1 (20.4.1 NMAC), Subpart IX, §270.11(d), the DOE's and the MOC's representatives certify, under penalty of law that this document and all attachments were prepared under their direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on their 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 their knowledge and belief, true, accurate, and complete for their respective areas of responsibility. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner and Operator Signature:	*Original signed by Todd A. Shrader*
Title:	Manager, Carlsbad Field Office
for:	U.S. Department of Energy
Date:	06/12/2017
Co-Operator Signature:	*Original signed by Bruce C. Covert*
Title:	Project Manager
for:	Nuclear Waste Partnership LLC
Date:	06/12/2017

APPENDIX B1
OTHER ENVIRONMENTAL PERMITS

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Active Environmental Permits and Approvals for the Waste Isolation Pilot Plant as of June 2017

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
1.	Department of the Interior, Bureau of Land Management	Right-of-Way for Water Pipeline	NM053809	08/17/83 (Transferred 05/15/06 to City of Carlsbad)	In Perpetuity	Active
2.	Department of the Interior, Bureau of Land Management	Right-of-Way for the North Access Road	NM055676	08/23/83	In Perpetuity	Active
3.	Department of the Interior, Bureau of Land Management	Right-of-Way for Railroad	NM055699	09/27/83	In Perpetuity	Active
4.	Department of the Interior, Bureau of Land Management	Right-of-Way for Dosimetry and Aerosol Sampling Sites	NM063136	07/03/86	12/31/40	Active
5.	Department of the Interior, Bureau of Land Management	Right-of-Way for Seven Subsidence Monuments	NM065801	11/07/86	None	Active
6.	Department of the Interior, Bureau of Land Management	Right-of-Way for Aerosol Sampling Site	NM077921	08/18/89	08/18/19	Active
7.	Department of the Interior, Bureau of Land Management	Right-of-Way for 2 Survey Monuments	NM082245	12/13/89	12/13/19	Active
8.	Department of the Interior, Bureau of Land Management	Right-of-Way for telephone cable	NM046092	09/04/81 (Valor Telecom of NM LLC)	09/04/11	Active Renewal In Process
9.	Department of the Interior, Bureau of Land Management	Right-of-Way for SPS 115 KV Powerline	NM043203	10/19/81 (Southwestern Public Service)	12/31/40	Active
10.	Department of the Interior, Bureau of Land Management	Right-of-Way for South Access Road	NM123703	01/27/10	12/31/39	Active
11.	Department of the Interior, Bureau of Land Management	Right-of-Way for Duval telephone line	NM060174	03/08/85 (Valor Telecom of NM LLC)	03/08/35	Active
12.	Department of the Interior, Bureau of Land Management	Right-of-Way for groundwater monitor wells/pads	NM108365	08/30/02	08/30/32	Active

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
13.	Department of the Interior, Bureau of Land Management	Right-of-Way for Monitoring Well C-2664 (Cabin Baby)	NM107944	04/23/02	04/23/32	Active
14.	Department of the Interior, Bureau of Land Management	Right-of-Way for Wells C-2725 (H-4A), C-2775 (H-4B), & C-2776 (H-4C)	NM-6-5 Cooperative Agreement	04/27/78	None	Active
15.	Department of the Interior, Bureau of Land Management	Right-of-Way for Monitoring Wells C-2723 (WIPP-25), C-2724 (WIPP-26), C-2722 (WIPP-27), C-2636 (WIPP-28), C-2743 (WIPP-29), & C-2727 (WIPP-30)	NM-6-5 Cooperative Agreement	07/14/78	None	Active
16.	New Mexico State Land Office Commissioner of Public Lands	Right-of-Way easement for accessing state trust lands in Eddy & Lea Counties	RW-25430	09/28/04	09/27/16	Inactive
17.	Department of Interior, Bureau of Land Management	Right of Way for Valor Telecom	NM113339	08/09/05 (Valor Telecom Inc)	12/31/34	Active
18.	Department of Interior, Bureau of Land Management	Right of Way for South Access Road Fence	NM094304	03/15/95	None	Active
19.	New Mexico State Land Office Commissioner of Public Lands	Right-of-Way for High Volume Air Sampler	RW-22789	10/03/85	10/03/20	Active
20.	New Mexico Environment Department Groundwater Quality Bureau	Discharge Permit	DP-831	07/29/14	07/29/19	Active
21.	New Mexico Environment Department Air Quality Bureau	Operating Permit for two backup diesel generators	310-M-2	12/07/93	None	Active
22.	New Mexico Environment Department-Petroleum Storage Tank Bureau	Storage Tank Registration Certificate	Registration Number 1767 Facility Number 31539	07/01/16	06/30/17	Active
23.	Office of New Mexico State Engineer	Monitoring Well Exhaust Shaft Exploratory Borehole	C-2801	02/23/01	None	Inactive

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
24.	Office of New Mexico State Engineer	Monitoring Well Exhaust Shaft Exploratory Borehole	C-2802	02/23/01	None	Inactive
25.	Office of New Mexico State Engineer	Monitoring Well Exhaust Shaft Exploratory Borehole	C-2803	02/23/01	None	Inactive
26.	Office of New Mexico State Engineer	Monitoring Well	C-2811	03/02/02	None	Active
27.	Office of New Mexico State Engineer	Appropriation: WQSP-1 Well	C-2413	10/21/96	None	Active
28.	Office of New Mexico State Engineer	Appropriation: WQSP-2 Well	C-2414	10/21/96	None	Active
29.	Office of New Mexico State Engineer	Appropriation: WQSP-3 Well	C-2415	10/21/96	None	Active
30.	Office of New Mexico State Engineer	Appropriation: WQSP-4 Well	C-2416	10/21/96	None	Active
31.	Office of New Mexico State Engineer	Appropriation: WQSP-5 Well	C-2417	10/21/96	None	Active
32.	Office of New Mexico State Engineer	Appropriation: WQSP-6 Well	C-2418	10/21/96	None	Active
33.	Office of New Mexico State Engineer	Appropriation: WQSP-6a Well	C-2419	10/21/96	None	Active
34.	Office of New Mexico State Engineer	Monitoring Well AEC-7	C-2742	11/06/00	None	P&A
35.	Office of New Mexico State Engineer	Monitoring Well AEC-8	C-2744	11/06/00	None	P&A
36.	Office of New Mexico State Engineer	Monitoring Well Cabin Baby	C-2664	07/30/99	None	Active
37.	Office of New Mexico State Engineer	Monitoring Well DOE-1	C-2757	11/06/00	None	P&A
38.	Office of New Mexico State Engineer	Monitoring Well DOE-2	C-2682	04/17/00	None	Active
39.	Office of New Mexico State Engineer	Monitoring Well ERDA-9	C-2752	11/06/00	None	Active
40.	Office of New Mexico State Engineer	Monitoring Well H-1	C-2765	11/06/00	None	P&A

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
41.	Office of New Mexico State Engineer	Monitoring Well H-2A	C-2762	11/06/00	None	P&A
42.	Office of New Mexico State Engineer	Monitoring Well H-2B1	C-2758	11/06/00	None	Active
43.	Office of New Mexico State Engineer	Monitoring Well H-2B2	C-2763	11/06/00	None	Active
44.	Office of New Mexico State Engineer	Monitoring Well H-2C	C-2759	11/06/00	None	P&A
45.	Office of New Mexico State Engineer	Monitoring Well H-3B1	C-2764	11/06/00	None	Active
46.	Office of New Mexico State Engineer	Monitoring Well H-3B2	C-2760	11/06/00	None	Active
47.	Office of New Mexico State Engineer	Monitoring Well H-3B3	C-2761	11/06/00	None	P&A
48.	Office of New Mexico State Engineer	Monitoring Well H-3D	C-3207	11/06/00	None	Active
49.	Office of New Mexico State Engineer	Monitoring Well H-4A	C-2725	11/06/00	None	P&A
50.	Office of New Mexico State Engineer	Monitoring Well H-4B	C-2775	11/06/00	None	P&A
51.	Office of New Mexico State Engineer	Monitoring Well H-4C	C-2776	11/06/00	None	Active
52.	Office of New Mexico State Engineer	Monitoring Well H-5A	C-2746	11/06/00	None	P&A
53.	Office of New Mexico State Engineer	Monitoring Well H-5B	C-2745	11/06/00	None	Active
54.	Office of New Mexico State Engineer	Monitoring Well H-5C	C-2747	11/06/00	None	Active
55.	Office of New Mexico State Engineer	Monitoring Well H-6A	C-2751	11/06/00	None	P&A

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
56.	Office of New Mexico State Engineer	Monitoring Well H-6B	C-2749	11/06/00	None	P&A
57.	Office of New Mexico State Engineer	Monitoring Well H-6C	C-2750	11/06/00	None	Active
58.	Office of New Mexico State Engineer	Monitoring Well H-7A	C-2694	04/17/00	None	P&A
59.	Office of New Mexico State Engineer	Monitoring Well H-7B1	C-2770	11/06/00	None	Active
60.	Office of New Mexico State Engineer	Monitoring Well H-7B2	C-2771	11/06/00	None	P&A
61.	Office of New Mexico State Engineer	Monitoring Well H-8A	C-2780	11/06/00	None	Active
62.	Office of New Mexico State Engineer	Monitoring Well H-9A	C-2785	11/06/00	None	P&A
63.	Office of New Mexico State Engineer	Monitoring Well H-9B	C-2783	11/06/00	None	P&A
64.	Office of New Mexico State Engineer	Monitoring Well H-9C	C-2784	11/06/00	None	Active
65.	Office of New Mexico State Engineer	Monitoring Well H-10A	C-2779	11/06/00	None	Active
66.	Office of New Mexico State Engineer	Monitoring Well H-10B	C-2778	11/06/00	None	P&A
67.	Office of New Mexico State Engineer	Monitoring Well H-10C	C-2695	04/17/00	None	P&A
68.	Office of New Mexico State Engineer	Monitoring Well H-11B1	C-2767	11/06/00	None	P&A
69.	Office of New Mexico State Engineer	Monitoring Well H-11B2	C-2687	04/17/00	None	Active
70.	Office of New Mexico State Engineer	Monitoring Well H-11B3	C-2768	11/06/00	None	P&A

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
71.	Office of New Mexico State Engineer	Monitoring Well H-11B4	C-2769	11/06/00	None	P&A
72.	Office of New Mexico State Engineer	Monitoring Well H-12	C-2777	11/06/00	None	P&A
73.	Office of New Mexico State Engineer	Monitoring Well H-14	C-2766	11/06/00	None	Active
74.	Office of New Mexico State Engineer	Monitoring Well H-15	C-2685	04/17/00	None	Active
75.	Office of New Mexico State Engineer	Monitoring Well H-16	C-2753	11/06/00	None	Active
76.	Office of New Mexico State Engineer	Monitoring Well H-17	C-2773	11/06/00	None	Active
77.	Office of New Mexico State Engineer	Monitoring Well H-18	C-2683	04/17/00	None	Active
78.	Office of New Mexico State Engineer	Monitoring Well H-19B0	C-2420	01/25/95	None	Active
79.	Office of New Mexico State Engineer	Monitoring Well H-19B1	C-2420	01/25/95	None	Active
80.	Office of New Mexico State Engineer	Monitoring Well H-19B2	C-2421	01/25/95	None	Active
81.	Office of New Mexico State Engineer	Monitoring Well H-19B3	C-2422	01/25/95	None	Active
82.	Office of New Mexico State Engineer	Monitoring Well H-19B4	C-2423	01/25/95	None	Active
83.	Office of New Mexico State Engineer	Monitoring Well H-19B5	C-2424	01/25/95	None	Active
84.	Office of New Mexico State Engineer	Monitoring Well H-19B6	C-2425	01/25/95	None	Active
85.	Office of New Mexico State Engineer	Monitoring Well H-19B7	C-2426	01/25/95	None	Active

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
86.	Office of New Mexico State Engineer	Monitoring Well P-14	C-2637	01/02/99	None	P&A
87.	Office of New Mexico State Engineer	Monitoring Well P-15	C-2686	04/17/00	None	P&A
88.	Office of New Mexico State Engineer	Monitoring Well P-17	C-2774	11/06/00	None	P&A
89.	Office of New Mexico State Engineer	Monitoring Well P-18	C-2756	11/06/00	None	P&A
90.	Office of New Mexico State Engineer	Monitoring Well WIPP-12	C-2639	01/12/99	None	P&A
91.	Office of New Mexico State Engineer	Monitoring Well WIPP-13	C-2748	11/06/00	None	Active
92.	Office of New Mexico State Engineer	Monitoring Well WIPP-18	C-2684	04/17/00	None	Active
93.	Office of New Mexico State Engineer	Monitoring Well WIPP-19	C-2755	11/06/00	None	Active
94.	Office of New Mexico State Engineer	Monitoring Well WIPP-21	C-2754	11/06/00	None	P&A
95.	Office of New Mexico State Engineer	Monitoring Well WIPP-25	C-2723	07/26/00	None	P&A
96.	Office of New Mexico State Engineer	Monitoring Well WIPP-26	C-2724	11/06/00	None	P&A
97.	Office of New Mexico State Engineer	Monitoring Well WIPP-27	C-2722	11/06/00	None	P&A
98.	Office of New Mexico State Engineer	Monitoring Well WIPP28	C-2636	01/12/99	None	P&A
99.	Office of New Mexico State Engineer	Monitoring Well WIPP-29	C-2743	11/06/00	None	P&A
100.	Office of New Mexico State Engineer	Monitoring Well WIPP-30	C-2727	08/04/00	None	P&A

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
101.	Office of New Mexico State Engineer	Monitoring Well H-6BR	C-3362	12/27/07	None	Active
102.	Office of New Mexico State Engineer	Monitoring Well H-15R	C-3361	12/27/07	None	Active
103.	Office of New Mexico State Engineer	Monitoring Well SNL-2	C-2948	02/14/03	None	Active
104.	Office of New Mexico State Engineer	Monitoring Well SNL-9	C-2950	02/14/03	None	Active
105.	Office of New Mexico State Engineer	Monitoring Well SNL-12	C-2954	02/25/03	None	Active
106.	Office of New Mexico State Engineer	Monitoring Well SNL-1	C-2953	02/25/03	None	Active
107.	Office of New Mexico State Engineer	Monitoring Well SNL-3	C-2949	02/14/03	None	Active
108.	Office of New Mexico State Engineer	Monitoring Well SNL-5	C-3002	10/01/03	None	Active
109.	Office of New Mexico State Engineer	Monitoring Well IMC-461	C-3015	11/25/03	None	Active
110.	Office of New Mexico State Engineer	Monitoring Well SNL-10	C-3221	07/26/05	None	Active
111.	Office of New Mexico State Engineer	Monitoring Well SNL-16	C-3220	07/26/05	None	Active
112.	Office of New Mexico State Engineer	Monitoring Well SNL-17	C-3222	07/26/05	None	Active
113.	US Environmental Protection Agency Region 6	Conditions of Approval for Disposal of PCB/TRU and PCB/TRU Mixed Waste at the US Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) Carlsbad, New Mexico	N/A	04/30/08	04/30/18	Active
114.	US Fish and Wildlife Service	Special Purpose – Relocate	MB155189-0	05/01/17	12/31/20	Active
115.	New Mexico Department of Game and Fish	Biotic Collection Permit	Authorization # 3293	02/02/17	12/31/19	Active
116.	Office of New Mexico State Engineer	Monitoring Well H-4bR	C-3404	01/13/09	None	Active
117.	Office of New Mexico State Engineer	Monitoring Well H-9bR	C-2783-POD2	07/14/10	None	Active

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
118.	Office of New Mexico State Engineer	Monitoring Well C-2737	C-2737	09/27/00	None	Active
119.	Office of New Mexico State Engineer	Monitoring Well WIPP-11	C3112	12/27/07	None	Active
120.	Office of New Mexico State Engineer	Monitoring Well SNL-6	C-3151	02/10/05	None	Active
121.	Office of New Mexico State Engineer	Monitoring Well SNL-8	C-3150	02/10/05	None	Active
122.	Office of New Mexico State Engineer	Monitoring Well SNL-13	C-3139	12/17/04	None	Active
123.	Office of New Mexico State Engineer	Monitoring Well SNL-14	C-3140	12/17/04	None	Active
124.	Office of New Mexico State Engineer	Monitoring Well SNL-15	C-3152	02/10/05	None	Active
125.	Office of New Mexico State Engineer	Monitoring Well SNL-18	C-3233	10/06/05	None	Active
126.	Office of New Mexico State Engineer	Monitoring Well SNL-19	C-3234	10/06/05	None	Active
127.	Department of the Interior, Bureau of Land Management	Right-of-Way grant for SNL-18 and SNL-19 well pads	NM115315	03/21/06	12/31/35	Active
128.	Department of the Interior, Bureau of Land Management	Right-of-Way grant for SNL-11 and SNL-5	NM110735	10/17/03	10/17/33	Active
129.	Department of the Interior, Bureau of Land Management	Right-of-Way grant for SNL-12 well pad	NM109176	04/15/03	04/15/33	Active
130.	Department of the Interior, Bureau of Land Management	Right-of-Way grant for SNL-9 well pad	NM109175	04/15/03	04/15/33	Active
131.	Department of the Interior, Bureau of Land Management	Right-of-Way grant for SNL-2 well pad	NM109174	04/15/03	04/15/33	Active
132.	Department of the Interior, Bureau of Land Management	Right-of-Way grant for SNL-1 Access Road	NM109177	06/17/03	06/17/33	Active
133.	Department of the Interior, Bureau of Land Management	Right-of-Way for SPS 69KV Electric Distribution line	NM091163	12/16/94 (Southwestern Public Service)	12/15/24	Active

	Granting Agency	Type of Permit	Permit/Right of Way Number	Granted/ Submitted *	Expiration	Current Permit Status
134.	Office of New Mexico State Engineer	Monitor Well H-11b4R	C-2769-POD2	05/16/11	None	Active
135.	Office of New Mexico State Engineer	Monitor Well AEC-7R	C-3635	04/24/13	None	Active
136.	New Mexico State Land Office Commissioner of Public Lands	Right-of-Way easement for SNL-1 Access Road	RW-28535	08/27/03	08/27/38	Active
137.	New Mexico State Land Office Commissioner of Public Lands	Right-of-Way easement for SNL-3 Access Road	RW-28537	08/27/03	08/27/38	Active
138	Office of New Mexico State Engineer	Monitor Well H-12R	C-3749 POD1	06/24/14	None	Active
139	Department of the Interior, Bureau of Land Management	Right-of-Way grant for H-12R Access Road and well pad	NM-131916	06/19/14	12/31/43	Active
140	Office of New Mexico State Engineer	Monitor Well H-10cR	C-3851	07/09/15	None	Active

*Non DOE grantee is noted
P&A=Plugged and Abandoned

(APPENDIX B2
MAPS

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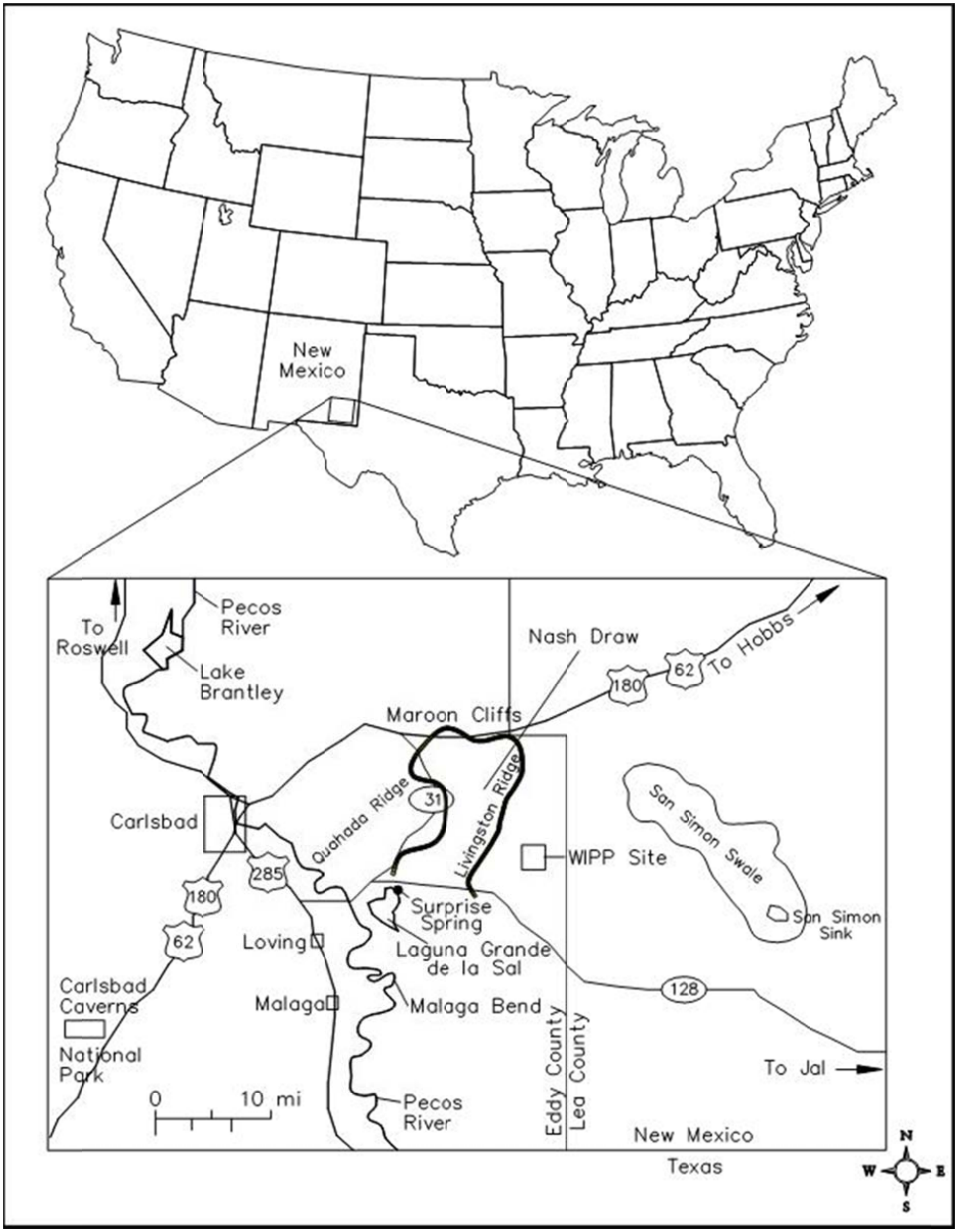

Figure B2-1
General Location of the WIPP Facility

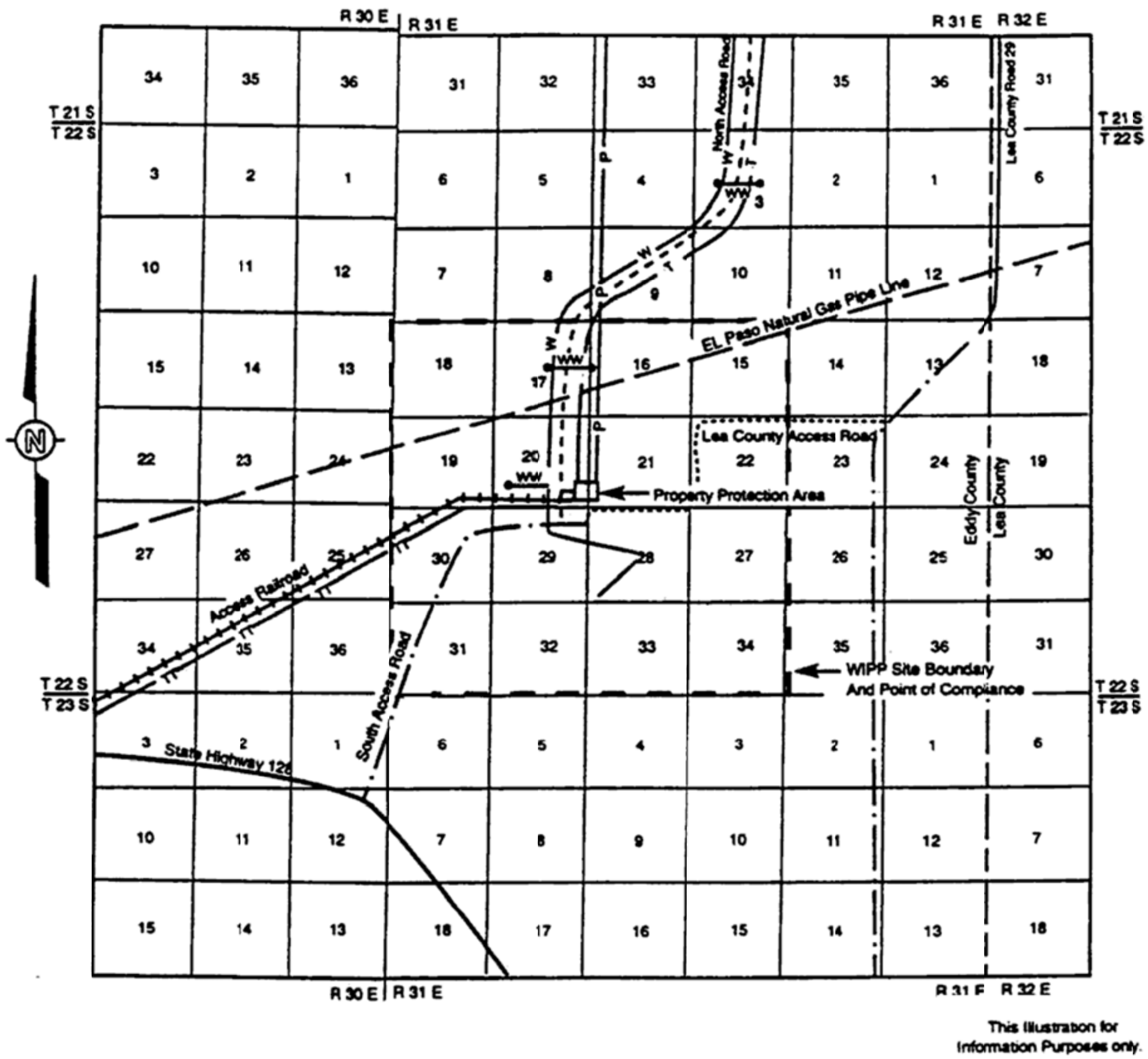

Figure B2-2
Planimetric Map-WIPP Facility Boundaries

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.
- Stock Water Tanks and Tap Lines Connected to the Main WIPP Waterline.
- 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 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.
- El Paso Natural 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.
- U.S. DOE Right of Way for Access Roads Includes Right of Way Number NM-123703 for the South Access Road which is 140 Feet Wide.

NOTES

1. The Property Protection Area is a fenced area of approximately 35 acres. It contains all surface facilities with the exception of salt storage piles, parking lot, landfill and waste water stabilization lagoons.

2. Zone II overlies the maximum extent of the Area available for underground development.

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

Replace this page with the Topographic Map from the earlier version of the draft Permit

Figure B2-3
Topographic Map

APPENDIX B3
FACILITIES

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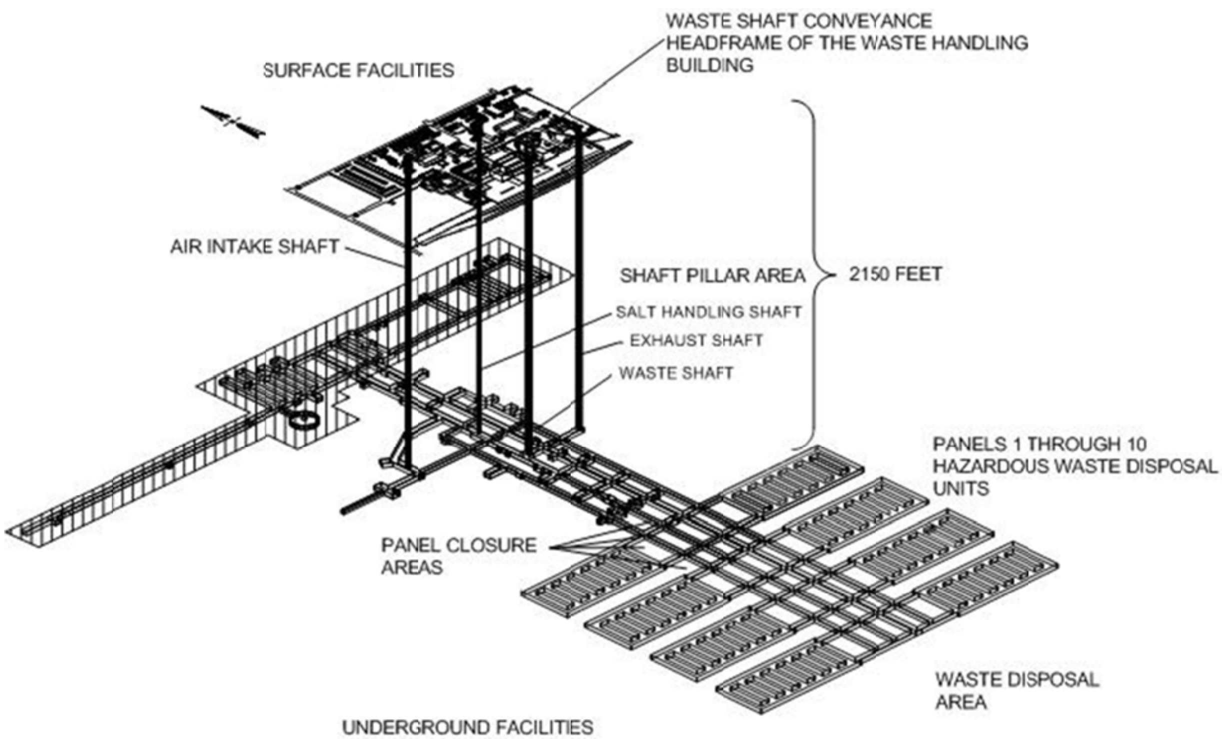
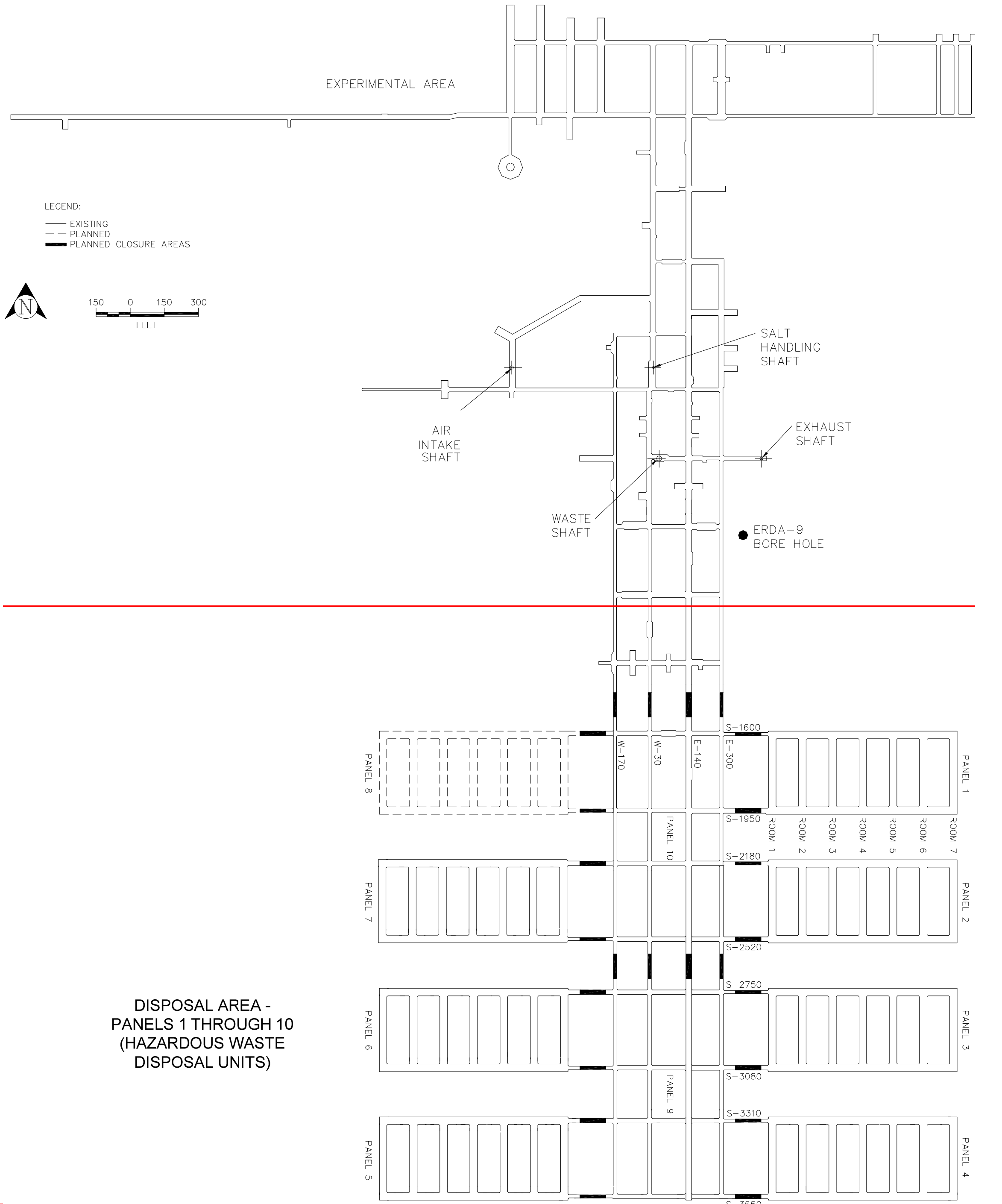


Figure B3-1
Spatial View of the WIPP Facility


EXPERIMENTAL AREA
LEGEND:
EXISTING
PLANNED
PLANNED CLOSURE AREAS
N
150 0 150 300
FEET
SALT HANDLING SHAFT
AIR INTAKE SHAFT
EXHAUST SHAFT
WASTE SHAFT
ERDA-9 BORE HOLE
S-1600
W-170
W-30
E-140
E-300
PANEL 8
PANEL 1
S-1950
PANEL 10
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7
S-2180
PANEL 7
PANEL 2
S-2520
S-2750
PANEL 6
PANEL 3
S-3080
PANEL 9
S-3310
PANEL 5
PANEL 4
S-3650
DISPOSAL AREA -
PANELS 1 THROUGH 10
(HAZARDOUS WASTE
DISPOSAL UNITS)

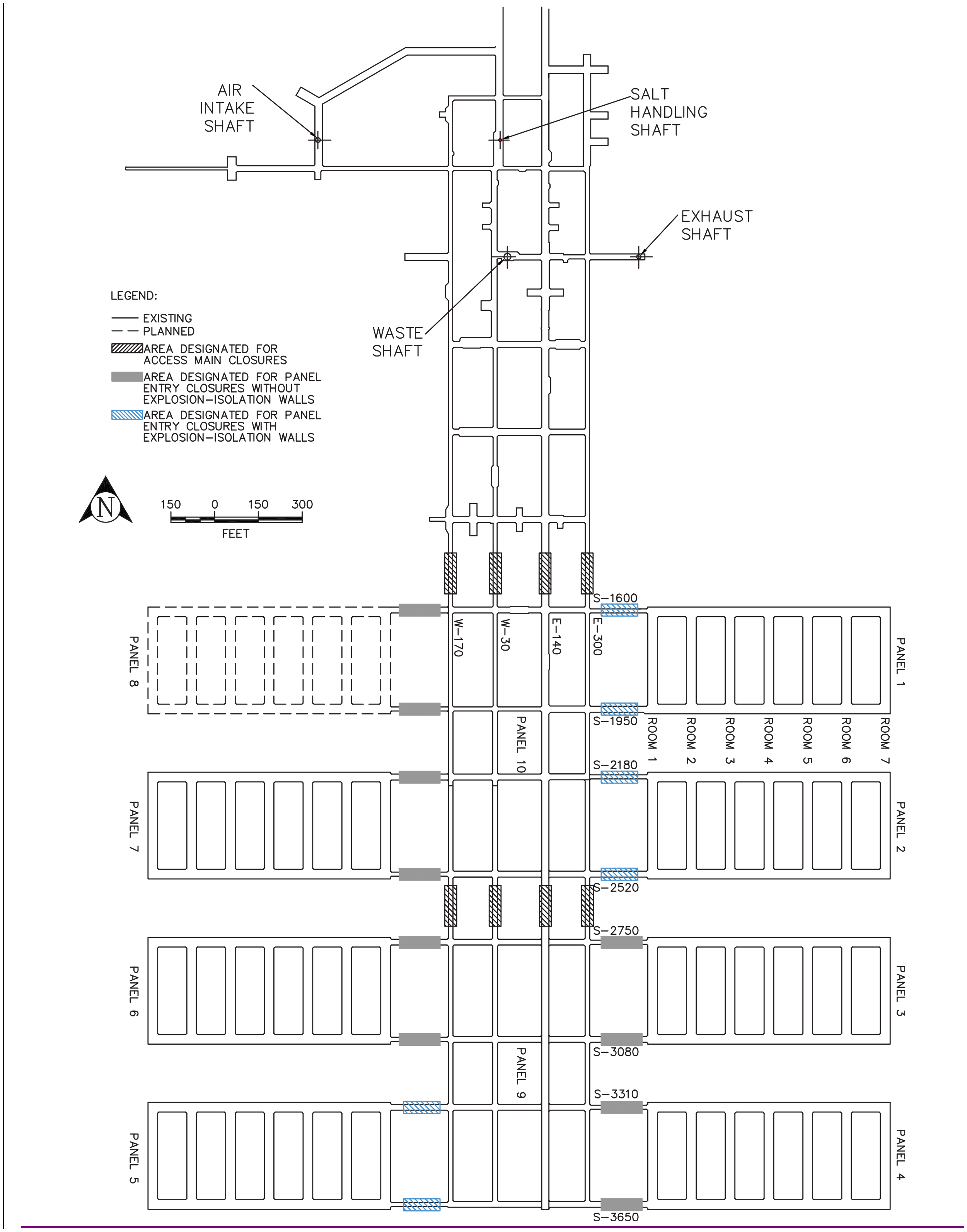


Figure B3-2
Repository Horizon

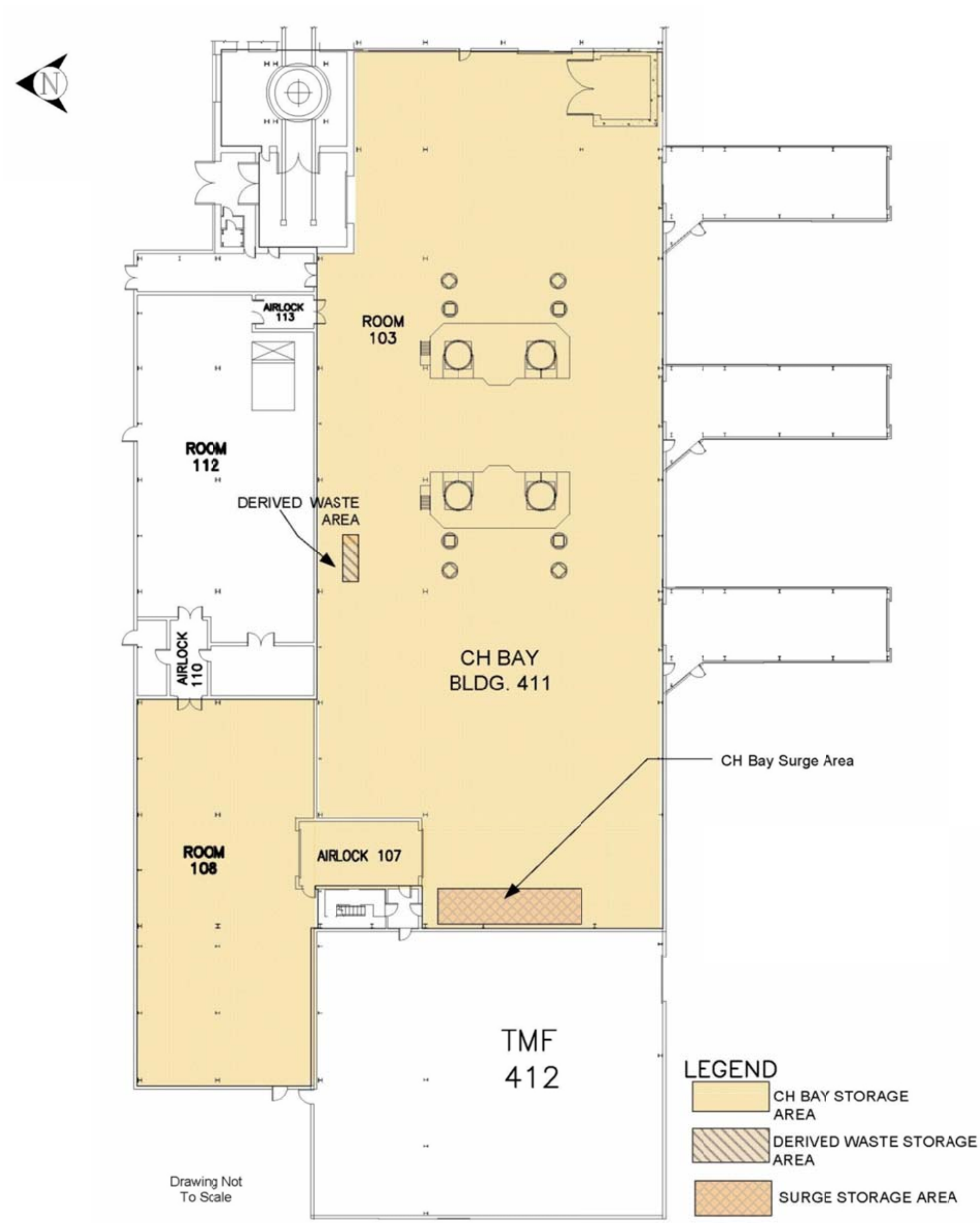


Figure B3-3
Waste Handling Building - CH TRU Mixed Waste Container Storage and Surge Areas

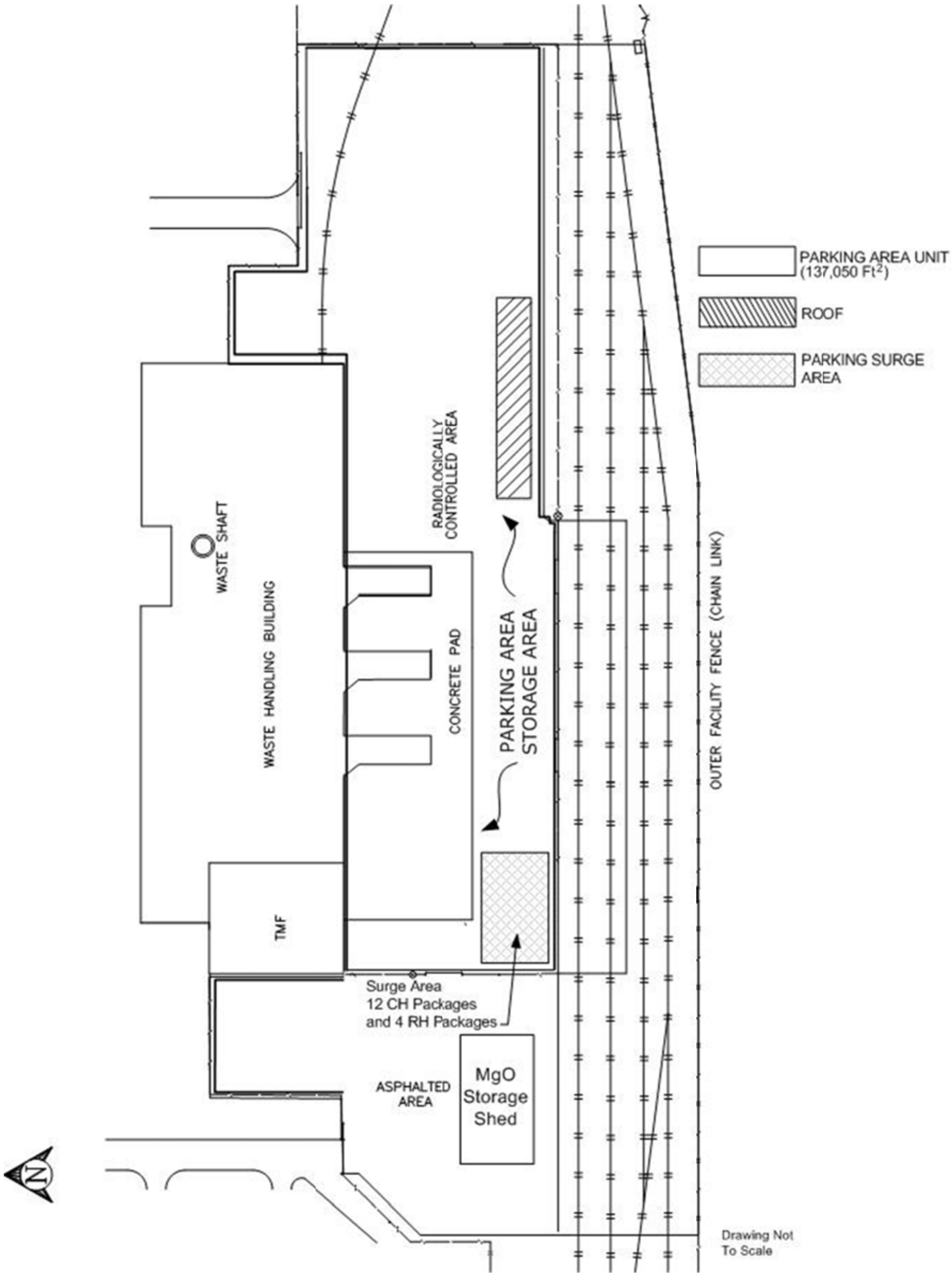


Figure B3-4
Parking Area-Container Storage and Surge Areas

APPENDIX B4
PHOTOGRAPHS

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Figure B4-1
Aerial Photograph of the Waste Isolation Pilot Plant

Figure B4-2
Underground - Panel One - Waste Disposal Room

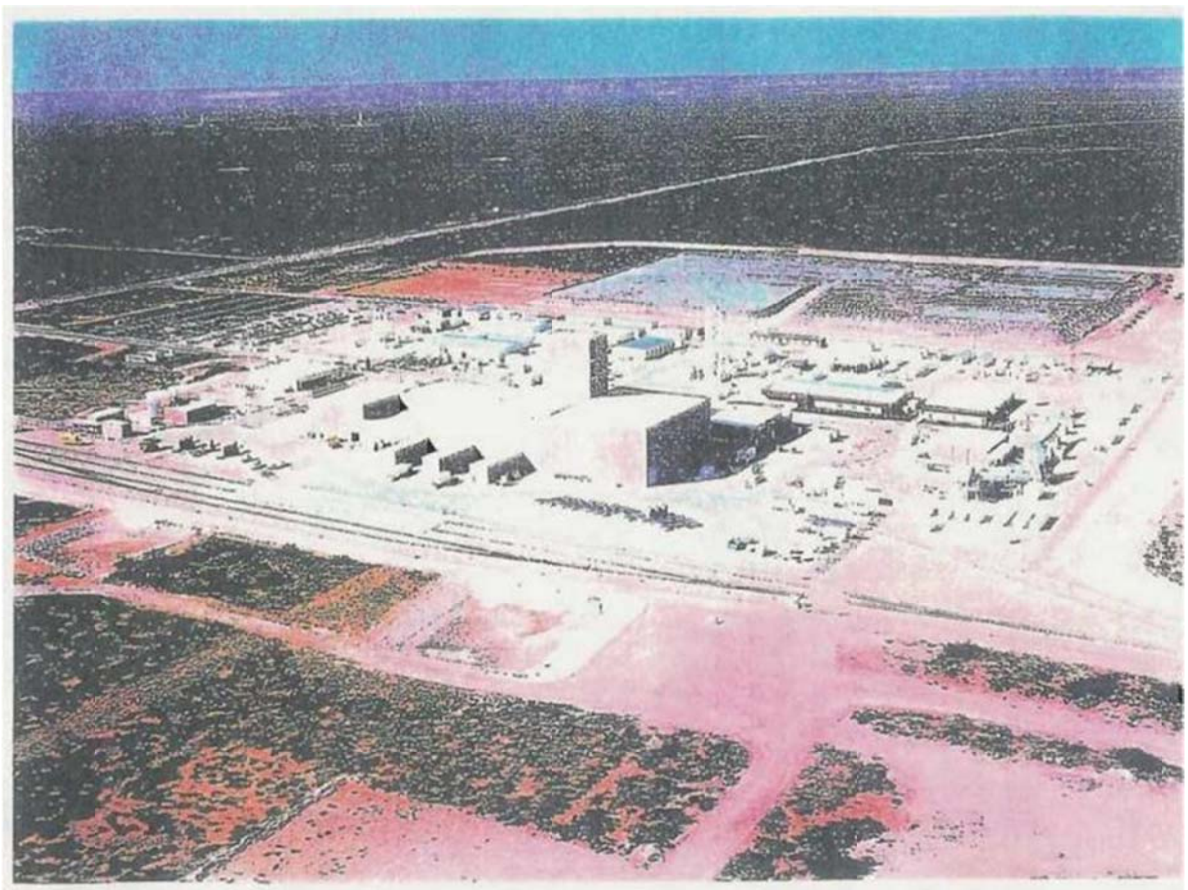

Figure B4-3
Aerial Photograph of the Waste Handling Building

Figure B4-4
TRUDOCKs in CH Bay of the Waste Handling Building

Figure B4-5
NE Corner of CH Bay of the Waste Handling Building

Figure B4-6
Westward View of CH Bay of the Waste Handling Building

Figure B4-7
Waste Shaft Conveyance - Loading Facility Pallet with CH Waste, Waste Handling Building

Figure B4-8
RH Bay (Photo Taken July 2000)

Figure B4-9
Cask Unloading Room and Bridge Crane

Figure B4-10
Hot Cell

Figure B4-11
Transfer Cell

Figure B4-12
Facility Cask Loading Room and Facility Cask Rotating Device

1

ATTACHMENT D

RCRA CONTINGENCY PLAN

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ATTACHMENT D

RCRA CONTINGENCY PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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ATTACHMENT D

RCRA CONTINGENCY PLAN

Introduction

This attachment contains the *RCRA Contingency Plan* prepared in accordance with the Resource Conservation and Recovery Act (**RCRA**) requirements codified in 20.4.1.500 New Mexico Administrative Code (**NMAC**) (incorporating 40 CFR Part 264, Subpart D), "Contingency Plan and Emergency Procedures." The purpose of this document is to define responsibilities and to describe the coordination of activities necessary to minimize hazards to human health and the environment from fires, explosions, or any sudden or non-sudden release of hazardous waste, or hazardous waste constituents to air, soil, or surface water (20.4.1.500 NMAC (incorporating 40 CFR §264.51 [a])). This plan consists of descriptions of emergency responses specific to contact-handled (**CH**) and remote-handled (**RH**) transuranic (**TRU**) mixed waste and site-generated hazardous waste handled at the WIPP facility.

D-1 Scope and Applicability

The regulated units at the WIPP facility subject to this permit include the hazardous waste management units (**HWMUs)** including the Waste Handling Building (**WHB**) Container Storage Unit (i.e., **WHB Unit**) and the Parking Area Container Storage Unit (i.e., **Parking Area Unit**), , and the hazardous waste disposal units (**HWDUs**) in the underground disposal panels.

Pursuant to 20.4.1.500 NMAC (incorporating 40 CFR §264.51(b)), owners/operators of treatment, storage, and disposal facilities are required to have formal contingency plans in place that describe actions that facility personnel will take in response to any fire, explosion, or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment. The contingency plan must meet the requirements of NMAC 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart D). The provisions of the *RCRA Contingency Plan* apply to HWDUs in the underground waste disposal panels, HWMUs in the WHB Unit and the Parking Area Unit, the Waste Shaft, and supporting TRU mixed waste handling areas. These areas are shown in Figures D-1 through D-3.

The WIPP facility is a large quantity generator of hazardous waste pursuant to 20.4.1.300 NMAC (incorporating 40 CFR Part 262, "Standards for Generators of Hazardous Waste"). 20.4.1.300 NMAC (incorporating 40 CFR §262.34(a)(4), which references 40 CFR Part 265, Subpart D) requires that a contingency plan be in place that describes actions that facility personnel will take in response to any fire, explosion, or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment. The provisions of the *RCRA Contingency Plan* also apply to the Hazardous Waste Staging Areas for site-generated hazardous waste, which are located in Buildings 474A and 474B on the surface, as shown in Figure D-1, and in the underground at S550/E140.

Wastes may also be generated at the WIPP facility as a direct result of managing the TRU and TRU mixed wastes received from the off-site generators. Throughout the remainder of this plan, this waste is referred to as "derived waste." Derived waste will be placed in the rooms in HWDUs along with the TRU mixed waste for disposal. Every reasonable effort to minimize the amount of derived waste, while providing for the health and safety of personnel, will be made.

Wastes generated as a result of emergency response actions will be categorized into one of three groups and disposed of accordingly. These are: 1) nonhazardous wastes to be disposed of at an appropriate disposal facility (e.g., low-level waste facility or approved landfill), 2) hazardous nonradioactive wastes (site-generated hazardous waste) to be disposed of at an off-site RCRA permitted facility, and 3) derived waste to be disposed of in the underground HWDUs as TRU mixed waste. Hazardous liquid wastes that may be generated as a result of emergency response actions will be managed as follows:

- Non-Mixed - Accumulated liquids contaminated only with hazardous constituents will be placed into containers and managed in accordance with 20.4.1.300 NMAC (incorporating 40 CFR §262.34) requirements. The waste will be shipped to an approved off-site treatment, storage, or disposal facility.

- Mixed – Accumulated liquids contaminated with TRU mixed waste will be solidified and the solidified materials will be disposed of in the underground WIPP repository as TRU mixed waste.

Waste containing liquid in excess of treatment, storage, or disposal facility Waste Acceptance Criteria (**TSDF-WAC**) limits shall not be emplaced in the underground HWDUs (See Permit Attachment C, Section C-1c).

Off-site waste managed and disposed of at the WIPP facility is radioactive mixed waste, and as a result, response to emergencies must consider the dual hazard associated with this waste. In responding to emergencies involving TRU mixed waste, the actions necessary to protect human health and the environment from the effects of radioactivity may be similar to those actions necessary to provide protection from hazardous waste and hazardous waste constituents. Such responses may require the use of equipment and processes specific to events resulting in radiological contamination (e.g., continuous air monitors, decontamination shower equipment, HEPA vacuums, paint/fixatives) and are not included in the *RCRA Contingency Plan*. Furthermore, the *RCRA Contingency Plan* may require additional actions to be taken to mitigate the hazards associated with the hazardous component of the waste. These measures are not intended to replace actions required to protect human health and the environment in response to radiological emergencies. In this manner, the *RCRA Contingency Plan* complements the radiological response activities.

D-2 Emergency Response Personnel and Training

D-2a Emergency Response Personnel

A RCRA Emergency Coordinator will be on-site at the WIPP facility 24 hours a day, seven days a week, with the responsibility for coordinating emergency response measures. In accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.52(d)), qualified RCRA Emergency Coordinators are listed in Table D-1 and are trained to the requirements found in Attachment F1, under “RCRA Emergency Coordinator”.

In addition, persons qualified to act as the RCRA Emergency Coordinator have the authority to commit the necessary resources to implement this *RCRA Contingency Plan*.

During emergencies, the RCRA Emergency Coordinator has three primary responsibilities:

- Assess the Situation—The RCRA Emergency Coordinator shall gather information relevant to the incident, such as the type of event, quantity and type of released waste, and existing or potential hazards to human health and the environment.

- Protect Personnel—The RCRA Emergency Coordinator shall take reasonable measures to ensure the safety of personnel, such as ensuring that alarms have been activated, personnel have been accounted for, any injuries have been attended to, and evacuation of personnel has occurred, if necessary.

- Contain the Release—The RCRA Emergency Coordinator shall take reasonable measures to ensure that fires, explosions, or releases of hazardous waste or hazardous waste constituents do not occur, recur, or spread.

In addition to the RCRA Emergency Coordinator, the following individuals, groups, and organizations have specified responsibilities during any WIPP facility emergency:

- WIPP Fire Department—The primary providers of fire suppression, technical rescue, Emergency Medical Services (EMS), and hazardous materials response for the protection of personnel in both surface and underground facilities.

- Facility Shift Manager (**FSM**)—A member of the Facility Operations organization who is in charge of plant operations and is the senior shift representative responsible for maintaining the facility in a safe configuration during normal and abnormal conditions. The FSM can concurrently serve as the RCRA Emergency Coordinator, if trained to the requirements of Attachment F1, or provide support to the qualified RCRA Emergency Coordinator on shift. Since the FSM provides support to the RCRA Emergency Coordinator relative to the safety of the WIPP facility, no specific RCRA training is required.

- Central Monitoring Room Operator (**CMRO**)—An on-shift operator responsible for Central Monitoring Room (CMR) operations, including coordination of facility communications. The CMRO documents these activities (e.g., communications, notifications) in a facility log. The CMRO is a member of Facility Operations, and during emergencies, the CMRO supports the RCRA Emergency Coordinator.

- Emergency Response Team (**ERT**) — WIPP facility personnel who serve as an Industrial Fire Brigade and are trained to respond to surface and underground emergencies on site, including fires, medical emergencies, and releases of hazardous materials. The ERT members supplement WIPP Fire Department response capabilities. The ERT member assigned to the underground will not perform any coordinated firefighting underground and will only respond to incipient-stage fires that threaten TRU mixed waste, if is it safe to do so.

- Firefighter—A WIPP Fire Department member who serves as a primary responder to surface and underground emergencies, including fires, medical emergencies, and releases of hazardous materials. Firefighters assigned to the underground will not perform any coordinated firefighting underground and will only respond to incipient-stage fires that threaten TRU mixed waste, if is it safe to do so.

- Fire Department Incident Commander—Upon delegation by the RCRA Emergency Coordinator, and once incident command has been established, the Incident Commander is responsible for direction and supervision of emergency responders during an incident resulting in implementation of the *RCRA Contingency Plan*. The Incident Commander will be a member of the WIPP Fire Department. For security-related incidents that invoke implementation of the *RCRA Contingency Plan*, the Fire Department Incident Commander will establish a unified command with the WIPP Protective Force.

- Mine Rescue Team (**MRT**)— The MRT is responsible for emergency rescue and recovery of trapped or missing personnel in the underground, conducting mine facility assessments, and underground firefighting once the underground has been evacuated and only if needed to rescue unaccounted personnel.

- Emergency Operations Center (**EOC**) Staff- Upon activation, the EOC supports the RCRA Emergency Coordinator and Incident Commander with emergency management decision-making and associated notifications. Since EOC staff performs duties similar to their normal job functions during an emergency response and provides support related to their area(s) of expertise, no specific RCRA training is required.

D-2b Emergency Response Training

The WIPP Fire Department personnel are trained in accordance with the *WIPP Fire Department Training Plan*, which is kept on file at the WIPP facility. The training plan incorporates current National Fire Protection Association (**NFPA**) standards for training Firefighters and ERT members.

Fire Department Incident Commanders are also trained in accordance with the *WIPP Fire Department Training Plan*, which incorporates the Federal Emergency Management Agency (**FEMA**), Incident Command System (**ICS**), and the National Incident Management System (**NIMS**) standards.

WIPP personnel who perform EMS duties are licensed through the State of New Mexico Emergency Medical Systems Bureau. Licensure requirements for training, continuing education, and skills maintenance are set forth through state requirements. Licenses are maintained by attending training seminars or conferences.

As described above, emergency response training is conducted in accordance with the *WIPP Fire Department Training Plan*, which is updated whenever the applicable standards are revised. In addition to the emergency response training, WIPP Fire Department personnel are required to complete applicable site-specific training, which is described in Attachment F, *Personnel Training*; Attachment F1, *RCRA Hazardous Waste Management and Emergency Response Job Titles and Descriptions*; and Attachment F2, *Training Course and Qualification Card Outlines.*

D-3 Criteria for Implementation of the *RCRA Contingency Plan*

The provisions of the *RCRA Contingency Plan* shall be implemented immediately whenever there is a fire, an explosion, or a release of hazardous wastes or hazardous waste constituents that could threaten human health or the environment, or whenever the potential for such an event exists as determined by the RCRA Emergency Coordinator, as required under 20.4.1.500 NMAC (incorporating 40 CFR §264.51(b)).

There may be situations which do not readily lend themselves to an immediate assessment of the possible hazards to human health and the environment. In these cases, the RCRA Emergency Coordinator will implement the *RCRA Contingency Plan* as a precautionary measure, regardless of the emergency situation or occurrence, if the RCRA Emergency Coordinator has reason to believe that a fire, explosion, or release of hazardous waste or hazardous waste constituents has occurred that could threaten human health or the environment.

In accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.56(i)), the RCRA Emergency Coordinator, on behalf of the Permittees, will record the time, date, and details of the incident that required implementation of the *RCRA Contingency Plan*. The Secretary of the NMED will be immediately notified by the Permittees. Additionally, the Permittees shall submit a written report to the NMED within 15 days of the incident, as specified in Section D-5. The following emergency situations, as they pertain to TRU mixed waste and generated hazardous wastes, warrant immediate implementation of the *RCRA Contingency Plan* by the RCRA Emergency Coordinator in accordance with standard operating procedures on file at the WIPP facility:

- Fires
    - If a fire involving TRU mixed waste or site-generated hazardous waste occurs
    - If a fire (e.g., building, grass, nonhazardous waste fire) occurs within or near the azardous Waste Staging Areas that threatens to involve site-generated hazardous waste
    - If a fire (e.g., building, grass, nonhazardous waste fire) occurs within or near the permitted HWMUs that threatens to involve TRU mixed waste
    - If a fire occurs in underground that results in immediate personnel evacuation or prevents normal personnel access to the underground

For any fire which does not meet the above criteria, the RCRA Emergency Coordinator shall document the rationale for not implementing the *RCRA Contingency Plan* (e.g., there is no threat to human health or the environment).

- Explosions
    - If an explosion involving TRU mixed waste or site-generated hazardous waste occurs
    - If an explosion occurs within or near the Hazardous Waste Staging Areas which threatens to involve site-generated hazardous waste
    - If an explosion occurs within or near the permitted HWMUs which threatens to involve TRU mixed waste

- If an explosion occurs in the underground that results in immediate personnel evacuation or prevents normal personnel access to the underground

- If there is an imminent danger of an explosion occurring (e.g., gas leak with an ignition source nearby) which could involve TRU mixed or site-generated hazardous waste

For any explosion which does not meet the above criteria, the RCRA Emergency Coordinator shall document the rationale for not implementing the *RCRA Contingency Plan* (e.g., there is no threat to human health or the environment).

- Unplanned Sudden/Non-Sudden Releases

  - If, prior to waste emplacement, one or more containers of TRU mixed waste has spilled or been breached due to dropping, puncturing, container failure or degradation, or any other physical or chemical means, resulting in a release

  - If, after waste emplacement, one or more containers of TRU mixed waste in an active room has been breached

  - If a continuous air monitor confirms a release of radioactive particulates to the ambient atmosphere, indicating a possible release of TRU mixed waste constituents from the permitted facility

  - If a spill of site-generated hazardous waste occurs in a Hazardous Waste Staging Area and cannot be contained with secondary containment methods or absorbents, thereby threatening a release to air, soil, or surface water

  - If a site-generated hazardous waste spill occurs in a Hazardous Waste Staging Area and results in the release of potentially flammable material, thereby threatening to create a fire or explosion hazard

  - If a site-generated hazardous waste spill occurs in a Hazardous Waste Staging Area and results in the release of potentially toxic fumes that would threaten human health

For any release of hazardous waste or hazardous waste constituents that does not meet the above criteria, the RCRA Emergency Coordinator shall document the rationale for not implementing the *RCRA Contingency Plan* (e.g., there is no threat to human health or the environment).

- Other Occurrences

  - If a natural phenomenon (e.g., earthquake, flood, lightning strike, tornado) occurs that involves TRU mixed waste or site-generated hazardous waste or threatens to involve TRU mixed waste or site-generated hazardous waste

  - If an underground structural integrity emergency (e.g., roof fall in an active room) occurs that involves TRU mixed waste, threatens to involve TRU mixed waste results in immediate personnel evacuation, or prevents normal personnel access to the underground

For any natural phenomenon or underground structural emergency that does not meet the above criteria, the RCRA Emergency Coordinator shall document the rationale for not implementing the *RCRA Contingency Plan* (e.g., there is no threat to human health or the environment)..

D-4 Emergency Response Method

Methods that describe implementation of the *RCRA Contingency Plan* cover the following six areas:

1. Immediate Notifications (Section D-4a)
2. Identification of Released Materials and Assessment of Extent of Emergency (Section D-4b)
3. Assessment of the Potential Hazards (Section D-4c)
4. Post-Assessment Notifications (Section D-4d)
5. Control and Containment of the Emergency (Section D-4e)
6. Post-Emergency Activities (Section D-4f)

D-4a Immediate Notifications

Notification requirements in the event of implementation of the *RCRA Contingency Plan* are defined by 20.4.1.500 NMAC (incorporating 40 CFR §§264.56(a). Personnel at the WIPP facility are trained to respond to emergency notifications.

Whenever an emergency situation occurs that warrants implementation of this *RCRA Contingency Plan,* as described in Section D-3, the Permittees will immediately notify the Secretary of the NMED.

D-4a(1) Initial Emergency Response and Alerting the RCRA Emergency Coordinator

The first person to become aware of an incident shall immediately report the situation to the CMRO and, as requested by the CMRO, provide the relevant information. Facility personnel are trained in the process for notifying the CMRO as part of General Employee Training (**GET**).

In addition to receiving incident reports from facility personnel, the CMRO continuously monitors (24 hours a day) the status of alarms, takes telephone calls and radio messages, initiates calls to emergency staff, and initiates emergency response procedures regarding evacuation, if needed.

Once the CMRO is notified of a fire, explosion, or a release anywhere in the facility (either by eyewitness notification or an alarm), the RCRA Emergency Coordinator is immediately notified. The RCRA Emergency Coordinator ensures that the emergency responders, including the WIPP Fire Department, the ERT, and the MRT, have been notified, as needed. Once incident command has been established, the RCRA Emergency Coordinator has the authority to delegate the responsibilities for mitigation of the incident to the Incident Commander.

The response to an unplanned event will be performed in accordance with standard operating procedures and guides based on the applicable Federal, State, or local regulations and/or guidelines for that response. These include DOE Order 151.1C, *Comprehensive Emergency Management System;* the U.S. Mine Safety and Health Administration (**MSHA**); NMAC; Comprehensive Environmental Response, Compensation, and Liability Act; Chapter 74, Article 4B, New Mexico Statutes Annotated 1978; and the New Mexico Emergency Management Act.

If needed, the RCRA Emergency Coordinator will immediately notify the appropriate State and local agencies, listed in Section D-7, with designated response roles.

Depending on the emergency, the EOC may be activated for additional support. In the event that the EOC is activated, decision-making responsibilities related to emergency management and associated notifications may be delegated to the EOC by the RCRA Emergency Coordinator. The EOC will assist in the mitigation of the incident with the use of appropriate communications equipment and technical expertise from available resources. During the emergency, the RCRA Emergency Coordinator will remain in contact with and advise the EOC of the known hazards.

The EOC staff assesses opportunities for coordination and the use of mutual-aid agreements with local agencies making additional emergency personnel and equipment available (Section D-7), as well as the use of specialized response teams available through various State and Federal agencies. Because the WIPP facility is a DOE-owned facility, the Permittees may also use the resources available from the *National Response Framework.*

D-4a(2) Communication of Emergency Conditions to Facility Employees

Procedures for immediately notifying facility personnel of emergencies are as follows:

- Local Fire Alarms

  The local fire alarms sound an audible tone and may be activated automatically or manually in the event of a fire.

- Surface Evacuation Signal

  The evacuation signal is a yelp tone and is manually activated by the CMRO when needed. The CMRO follows the evacuation signal with verbal instructions and ensure the Site Notification System has been activated.

- Underground Evacuation Warning System

  The underground evacuation signal is a yelp tone and flashing strobe light. In the event of an evacuation signal, underground personnel will follow escape routes to egress hoist stations. Underground personnel are trained to report to the underground assembly areas and await further instruction if all power fails or if ventilation stops. If evacuation of underground personnel is required, this will be done using the backup electric generators and in accordance with the applicable requirements of MSHA.

WIPP facility personnel are trained and given instruction during GET to recognize the various alarm signals and the significance of each alarm. WIPP facility employees and site visitors are required to comply with directions from emergency personnel and alarm system notifications and to follow instructions concerning emergency equipment, shutdown procedures, and emergency evacuation routes and exits.

D-4b Identification of Released Materials and Assessment of the Extent of the Emergency

The identification of hazardous wastes or hazardous waste constituents involved in a fire, an explosion, or a release to the environment is a necessary part of the RCRA Emergency Coordinator's assessment of an incident, as described in 20.4.1.500 NMAC (incorporating 40 CFR §264.56(b)). Immediately after alarms have been activated and required notifications have been made, the RCRA Emergency Coordinator shall direct an investigation to determine pertinent information relevant to the actual or potential threat posed to human health or the environment. The information will include the character, exact source, amount, and areal extent of any released material. This may be done by observation or review of facility records or manifests and, if necessary, by chemical analysis.

The identification of the character and source of released materials at any location is enhanced because hazardous wastes are stored, managed, or disposed at specified locations throughout the WIPP facility.

Sources of information available to identify the hazardous wastes involved in a fire, an explosion, or a release at the WIPP facility include operator/supervisor knowledge of their work areas, materials used, and work activities underway; the WIPP Waste Information System (**WWIS**), which identifies the location within the facility of emplaced TRU mixed waste, including emplaced derived waste; and waste manifests and other waste characterization information in the operating record. The WWIS also includes information on wastes that are in the waste handling process. Also available are Safety Data Sheets (SDSs) for hazardous materials in the various user areas throughout the facility, waste acceptance records, and materials inventories for buildings and operating groups at the WIPP facility. Information or data from the derived waste accumulation areas, the Hazardous Waste Staging Areas, satellite staging areas, and nonregulated waste accumulation areas are included. It is anticipated that this information is sufficient for identifying the nature and extent of the released materials. The RCRA Emergency Coordinator has access to this information when needed.

The waste received at the WIPP facility must meet TSDF-WAC (e.g., no more than one percent liquid), which minimizes the possibility of waste container degradation and liquid spills. Should a spill or release occur from a container of site-generated hazardous or TRU mixed waste, following an initial assessment of the event, the RCRA Emergency Coordinator will ensure that the following actions are immediately taken, consistent with radiological control procedures, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.52(a) and §264.171):

- Assemble the required response equipment, such as protective clothing and gear, heavy equipment, empty drums, overpack drums, hand tools, and absorbent materials
- Transfer the released material to a container that is in good condition and patch or overpack the leaking container into another container that is in good condition

- Once the release has been contained, determine the areal extent of the release and proceed with appropriate cleanup action, such as chemical neutralization, vacuuming, or excavation

D-4c Assessment of the Potential Hazards

Concurrent with the actions described in Sections D-4a and D-4b, and in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.56(c)), the RCRA Emergency Coordinator shall assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment will consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat-induced explosions). The RCRA Emergency Coordinator will be responsible for identifying and responding to immediate and potential hazards, using the services of trained personnel.

After the materials involved in an emergency are identified, the specific information (e.g., associated hazards, appropriate personal protective equipment (**PPE**), decontamination) may be obtained from SDSs and from appropriate chemical reference materials at the same location. These information sources are available to the RCRA Emergency Coordinator or may be accessed through several WIPP facility organizations.

If, upon completion of the hazards assessment, the RCRA Emergency Coordinator determines that there are no actual or potential hazards to human health or the environment present, this *RCRA Contingency Plan* may be terminated. The RCRA Emergency Coordinator will record the time, date, and details of the incident in the operating record, and the Permittees will ensure that the reporting requirements of Section D-5 are fulfilled.

D-4d Post-Assessment Notifications

Upon *RCRA Contingency Plan* implementation, post-assessment notifications may be necessary in order to satisfy 20.4.1.500 NMAC (incorporating 40 CFR §264.56(d)). If it has been determined that the facility has had a fire, an explosion, or a release of hazardous waste or hazardous waste constituents that could threaten human health or the environment outside the facility (i.e., outside the Land Withdrawal Boundary), the RCRA Emergency Coordinator, after consultation with the DOE as the owner of the facility, will ensure that the appropriate local authorities are immediately notified by telephone and/or radio in the event that evacuation is needed. The following notifications satisfy the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.56(d)(1)):

- New Mexico Department of Homeland Security and Emergency Management (telephone number: (505) 476-9635)

- Eddy County via the Regional Emergency Dispatch Authority (telephone number: (575) 616-7155)

- Lea County via the Regional Emergency Dispatch Authority (telephone number: (575) 397-9265)

The RCRA Emergency Coordinator must be available to help appropriate officials decide whether local areas should be evacuated.

After local authorities are notified, the RCRA Emergency Coordinator must immediately notify either the government official designated as the on-scene coordinator for that geographical area, or the National Response Center. For the purposes of the *RCRA Contingency Plan*, the following notifications satisfy the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.56(d)(2)):

- New Mexico Environment Department (NMED)
  Department of Public Safety
  24-Hour Emergency Reporting Telephone Number: (505) 827-9329
  FAX number: (505) 827-9368

- National Response Center
  Telephone number: 1-800-424-8802
  FAX number: (202) 479-7181

This notification shall include the following information:

- The name and phone number of the reporter
- The name and address of the facility
- The type of incident (fire, explosion, or release)
- The date and time of the incident
- The name and quantity of material(s) involved, to the extent known
- The extent of injuries, if any
- Possible hazards to human health and the environment (air, soil, water, wildlife, etc.) outside the facility

Communications beyond those required by the *RCRA Contingency Plan* are the responsibility of the Permittees in accordance with plans and policies on file at the WIPP facility.

D-4e Control and Containment of the Emergency

The RCRA Emergency Coordinator is required to ensure control of an emergency and to minimize the potential for the occurrence, recurrence, or spread of releases due to the emergency situation, as described in 20.4.1.500 NMAC (incorporating 40 CFR §264.56 (e) and (f)). Standard operating procedures and guides are used to implement initial response measures with priority being control of the emergency, and those actions necessary to ensure confinement and containment in the early, critical stages of a spill or leak. The RCRA Emergency Coordinator, in conjunction with the Incident Commander, is responsible for implementing the following measures:

- Stopping processes and operations

- Collecting and containing released wastes and materials
- Removing or isolating containers of hazardous waste posing a threat
- Ensuring that wastes managed during an emergency are handled, stored, or treated with due consideration for compatibility with other wastes and materials on site and with containers utilized (Section D-4f(2))
- Restricting personnel not needed for response activities from the scene of the incident
- Evacuating the area
- Curtailing nonessential activities in the area
- Conducting preliminary inspections of adjacent facilities and equipment to assess damage
- Maintaining fire equipment on standby at the incident site in cases where ignitable liquids have been or may be released and ensuring that ignition sources are kept out of the area. Ignitable liquids will be segregated, contained, confined, diluted, or otherwise controlled to preclude inadvertent explosion or detonation.

No operation that has been shut down in response to the incident will be restarted until authorized by the RCRA Emergency Coordinator. If a release occurs that involves radioactivity, the RCRA Emergency Coordinator actions will be consistent with radiation control policies and practices.

The standard operating procedures for emergency response may include, but are not limited to, the following actions appropriate for control of releases:

1. Isolating the area from unauthorized entry by fences, barricades, warning signs, or other security and site control precautions. Isolation and evacuation distances vary, depending upon the chemical/product, fire, and weather situations.
2. Establishing drainage controls.
3. Stabilizing physical controls (such as dikes or impoundment[s]).
4. Capping contaminated soils to reduce migration.
5. Using chemicals and other materials to retard the spread of the release or to mitigate its effects.
6. Excavating, consolidating, or removing contaminated soils.
7. Removing wastes containers to reduce exposure risk during situations such as fires.

If the facility stops operations in response to a fire, explosion, or release, the RCRA Emergency Coordinator shall ensure continued monitoring for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever appropriate.

Natural and/or synthetic methods will be employed to limit the releases of hazardous wastes or hazardous waste constituents so that effective recovery and treatment can be accomplished with minimal additional risk to human health or the environment.

Emergency response actions taken to mitigate releases may include, but are not limited to, the following:

1. Physical methods of control may involve any of several processes to reduce the area of the spill/leak, or other release mechanism (such as fire suppression).

   a. Absorption (e.g., absorbent sheets; spill control bucket materials specifically for solvents, neutralization, or acids/caustics; and absorbent socks for general liquids or oils)

   b. Dikes or Diversions (e.g., absorbent socks or earth)

   c. Overpacking

   d. Plug and Patch

   e. Transfers from leaking container to new container f. Vapor Suppression (e.g., aqueous foam blanket)

2. Chemical methods of mitigation may include the following:

   a. Neutralization
   b. Solidification

Once the Incident Commander informs the RCRA Emergency Coordinator that the emergency scene is stable, the release has been stopped, any reactions have been controlled, the released hazardous materials have been contained within a localized area, and the area of contamination has been secured from unauthorized entry, the field emergency response activity can be terminated.

D-4e(1) Fires

In the event of a fire that involves or threatens TRU mixed waste or site-generated hazardous waste, emergency response actions may include, but are not limited to, the following:

1. The RCRA Emergency Coordinator will remain in contact with and advise the Incident Commander of the known hazards.

2. The Incident Commander will maintain overall control of the emergency and may accept and evaluate the advice of WIPP facility personnel and emergency response organization members, but retains overall responsibility until the emergency is terminated.

3. Only fire extinguishing materials that are compatible with the materials involved in the fire will be used to extinguish fires. Water and dry chemical materials have been determined to be compatible with all components of the TRU mixed waste.

4. In order to ensure that storm drains and/or sewers do not receive potentially hazardous runoff, dikes will be built around storm drains to control discharge as needed. Collected waste will be sampled and analyzed for hazardous constituents, and appropriately disposed.

5. The RCRA Emergency Coordinator will ensure that measures are taken to shut down operational units (e.g., process equipment and ventilation equipment) that have been affected directly or indirectly by the fire.

6. Fire suppression materials used in response to incidents will be retained on-scene, where an evaluation will be performed to determine appropriate recovery and disposal methods.

7. Upon underground evacuation due to a fire in the underground that involves or threatens to involve TRU mixed waste, a response plan will be developed depending on the status of the fire. The plan may include ventilation control, barrier erection, and waiting for the fire to self-extinguish or implement active ventilation.

D-4e(2) Explosions

In the event of an explosion that involves or threatens TRU mixed waste or site-generated hazardous waste, emergency response actions may include, but are not limited to, the following:

1. The RCRA Emergency Coordinator will remain in contact with and advise the Incident Commander of the known hazards.

2. The Incident Commander will maintain overall control of the emergency and may accept and evaluate the advice of WIPP facility personnel and emergency response organization members, but retains overall responsibility until the emergency is terminated.

3. The RCRA Emergency Coordinator will ensure measures are taken to shut down operational units (e.g., process equipment and ventilation equipment) that have been affected directly or indirectly by the explosion.

4. If, following an explosion, there is an ensuing fire, see Section D-4e(1).

5. If, following an explosion, there is an underground structural integrity emergency, see Section D-4e(4).

D-4e(3) Unplanned Sudden/Non-Sudden Releases

Spills of Site-Generated Hazardous Waste

If a spill of site-generated hazardous waste has occurred, and 1) the spill cannot be contained with secondary containment methods or absorbents, 2) the spill causes a release of flammable material, or 3) the spill results in toxic fumes, the RCRA Emergency Coordinator will ensure implementation of measures that may include, but are not limited to, the following actions:

1. The RCRA Emergency Coordinator will remain in contact with and advise the Incident Commander of the known hazards.

2. The Incident Commander will maintain overall control of the emergency and may accept and evaluate the advice of WIPP facility personnel and emergency response organization members, but retains overall responsibility until the emergency is terminated.

3. The immediate area will be evacuated.

4. The source of the release will be mitigated, if possible.

5. A dike to contain runoff will be built, if necessary.

6. Dikes around storm drains to control discharge will be built, as needed, to ensure that storm drains and/or sewers do not receive potentially hazardous runoff.

7. Fire equipment will be maintained on standby at the incident site in cases where ignitable liquids have been or may be released, and ignition sources will be kept out of the area of ignitable liquids.

8. Released waste and contaminated media will be collected and placed into drums or other appropriate containers.

Releases of TRU Mixed Waste

If a release of TRU mixed waste has occurred, the emergency will be managed as a potential radiological release, and radiological control measures will determine the activities that can be performed safely, which may include the following:

1. The RCRA Emergency Coordinator will remain in contact with and advise the Incident Commander of the known hazards.

2. The Incident Commander will maintain overall control of the emergency and may accept and evaluate the advice of WIPP facility personnel and emergency response organization members, but retains overall responsibility until the emergency is terminated.

3. Prior to the re-entry following an event involving containers that are managed as TRU mixed waste, a Radiological Work Permit (**RWP**) will be prepared.

4. During the re-entry phase, the extent of radiological contamination will be determined. This information is used by the RCRA Emergency Coordinator to determine an appropriate course of action to recover the area.

5. During the recovery phase, the necessary resources to conduct decontamination and/or overpacking operations will be used as needed.

6. Prior to returning the affected area and/or equipment to normal activities, the RCRA Emergency Coordinator will determine if additional measures are required by the *RCRA Contingency Plan* (e.g., characterization and disposal of contaminated media).

7. The recovery phase will include activities (e.g., placing the waste material in another container, vacuuming the waste material, overpacking or plugging/patching the affected waste container(s), decontaminating or covering the affected area), as specified in the RWP, to minimize the spread of contamination to other areas.

8. The RWPs and other administrative controls will provide protective measures to help ensure that new hazardous constituents will not be added during decontamination activities.

D-4e(4) Other Occurrences

Natural Phenomena

In the event of a natural phenomenon (e.g., earthquake, flood, lightning strike, tornado) that involves hazardous waste or has threatened to cause a release of hazardous waste or hazardous waste constituents, emergency response actions may include, but are not limited to, the following:

1. The RCRA Emergency Coordinator will remain in contact with and advise the Incident Commander of the known hazards.

2. The Incident Commander will maintain overall control of the emergency and may accept and evaluate the advice of WIPP facility personnel and emergency response organization members, but retains overall responsibility until the emergency is terminated.

3. Containers which have not been disposed will be inspected for signs of leakage or damage, and containment systems will be inspected for deterioration.

4. Affected equipment or areas associated with hazardous waste management activities will be inspected, and the operability of monitoring systems will be ensured.

5. Affected electrical equipment and lines will be inspected for damage.

6. Affected buildings and fencing directly related to hazardous waste management activities will be inspected for damage.

7. A general survey of the site will be conducted to check for signs of physical damage.

8. The RCRA Emergency Coordinator will ensure that measures are taken to shut down operational units (e.g., process equipment and ventilation equipment) that have been affected by the natural phenomenon.

Underground Structural Integrity Emergencies

In the event of an underground structural integrity emergency that involves or threatens TRU mixed waste (i.e., occurs in an active disposal room), the emergency will be managed as a potential radiological release, and radiological control measures will determine the activities that can be performed safely, and may include the following:

1. The RCRA Emergency Coordinator will remain in contact with and advise the Incident Commander of the known hazards.

2. The Incident Commander will maintain overall control of the emergency and may accept and evaluate the advice of WIPP facility personnel and emergency response organization members, but retains overall responsibility until the emergency is terminated.

3. The RCRA Emergency Coordinator will ascertain whether the roof conditions allow for safe entry and if the waste container or containers in question are accessible.

4. The RCRA Emergency Coordinator may recommend closing the entire panel, or the affected room of waste containers, based on the location of the event and the stability of the roof and walls in the panel as a method to ensure that measures are taken to shut down affected operational units.

5. Access to the ventilation flow path downstream of the incident will be restricted, as appropriate.

6. Ventilation to the affected room will be restricted to ensure that there is no spread of contamination that may have been released, as appropriate.

7. Accessible containers will be inspected for signs of leakage or damage.

8. The spill area will be covered with material (e.g., plastic, fabric sheets) in a manner that safely isolates the contamination in the area.

9. The RCRA Emergency Coordinator will determine if the covered spill area safely allows for continued waste disposal operations or whether further action is required to reinitiate operations.

D-4f Post-Emergency Activities

Immediately after the emergency, and once initial release or spill control and containment have been completed, the RCRA Emergency Coordinator will ensure that necessary decontamination occurs and that recovered hazardous waste is properly managed, stored, and/or disposed, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.56(g)). As required by 20.4.1.500 NMAC (incorporating 40 CFR §264.56(h)), the RCRA Emergency Coordinator will ensure that incompatibility of waste and restoration of emergency equipment are addressed.

D-4f(1) Management and Disposition of Released Material

When a release of TRU mixed waste has occurred, priority is given to actions required to minimize radiological exposure to workers and the public. In most cases, these actions are sufficient to mitigate any health effects associated with contamination by hazardous waste or hazardous waste constituents.

If a release of site-generated hazardous waste occurs, the contaminated surface will be cleaned, and decontamination materials will be placed in containers and dispositioned appropriately. If the release is TRU mixed waste, decontamination and disposition will be in accordance with the RWP.

If radioactive contamination is detected on equipment or on structures, radiological cleanup standards will be used to determine the effectiveness of decontamination efforts and/or the final disposition of the equipment or structures. Many types of equipment are difficult to decontaminate and may have to be discarded as derived waste. Fixatives (e.g., paint or water spray on salt in the underground) may be used on contaminated structures if the contamination cannot be safely removed.

Following decontamination, the RCRA Emergency Coordinator will ensure that nonradioactive hazardous waste resulting from the cleanup of a fire, an explosion, or a release involving a nonradioactive hazardous waste at the WIPP facility will be contained and managed as a hazardous waste until such time as the waste is disposed of, or determined to be nonhazardous, as defined in 20.4.1.200 NMAC (incorporating 40 CFR Part 261, Subparts C and D). In most cases, knowledge of the material inventories for the various buildings and areas at the facility will allow a hazardous waste determination for the material resulting from the cleanup of a release. When knowledge of the material inventories is not sufficient, samples of the waste will be collected and analyzed using U.S. Environmental Protection Agency (**EPA**)-approved methods to determine the presence of any hazardous characteristics and/or hazardous waste constituents.

D-4f(2) Incompatible Waste

The RCRA Emergency Coordinator will ensure, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.56(h)(1)), that in the affected area(s) of the facility, no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup has been completed. The RCRA Emergency Coordinator will not allow hazardous or TRU mixed waste operations to resume in a building or area in which incompatible materials have been released prior to completion of necessary post-emergency cleanup operations to remove potentially incompatible materials. In making the determination of compatibility, the RCRA Emergency Coordinator will have available the resources and information described in Section D-4b, *Identification of Released Materials and Assessment of the Extent of the Emergency*.

D-4f(3) Cleaning and Restoration of Equipment

The RCRA Emergency Coordinator will take measures to ensure, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.56(h)(2)), that in the affected area(s) of the facility, emergency equipment listed in the *RCRA Contingency Plan*, and used in the emergency response, is cleaned and fit for its intended use or replaced before operations are resumed.

Any equipment that cannot be decontaminated will be discarded as waste (e.g., hazardous, mixed, solid), as appropriate. After the equipment has been cleaned, repaired, or replaced, a post-emergency facility and equipment inspection will be performed, and the results will be documented.

D-5 Required Reporting

The RCRA Emergency Coordinator, on behalf of the Permittees, will note in the operating record the time, date, and details of the incident that required implementation of the *RCRA Contingency Plan*. In compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.56(i)), within 15 days after the incident, the Permittees will ensure that a written report on the incident will be submitted to the Secretary of the NMED and the EPA Region VI Administrator. The report will include:

- The name, address, and telephone number of the Owner/Operator
- The name, address, and telephone number of the facility
- The date, time, and type of incident (e.g., fire, explosion, or release)
- The name and quantity of material(s) involved
- The extent of injuries, if any
- An assessment of actual or potential hazards to human health or the environment, where this is applicable
- The estimated quantity and disposition of recovered material that resulted from the incident

D-6 Emergency Equipment

A variety of equipment is available at the facility for emergency response, containment, and cleanup operations in the surface HWMUs, the underground HWDUs, and the WIPP facility in general. This includes equipment for spill control, fire control, personnel protection, monitoring, first aid and medical attention, communications, and alarms. This equipment is immediately available to emergency response personnel. A listing of major emergency equipment available at the WIPP facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.52(e)), is shown in Table D-2. Table D-2 also includes the location and a physical description of each item on the list along with a brief outline of its capabilities. The fire-water distribution system map is show in Figure D-5. Equipment specified at the locations listed in Table D-2 are inspected in accordance with the inspection schedule specified in Attachment E, Table E-1, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.52(e)).

D-7 Agreements with Local Emergency Response Agencies

The Permittees have established agreements with local emergency response agencies for firefighting, medical assistance, hazardous materials response, and law enforcement. In the event that on-site response resources are unable to provide the needed response actions during a medical, fire, hazardous materials, or security emergency, the RCRA Emergency Coordinator will notify appropriate response agencies and request assistance. Once on site, local emergency response agency personnel will perform emergency response activities under the direction of the Incident Commander.

The agreements with local agencies for emergency response capabilities are on file at the WIPP facility. Additional agreements may be established when needed. A description of the agreements with State and local agencies and mining operations in the vicinity of the WIPP facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.37 and §264.52(c)), include, but is not limited to, the following:

- Agreements with local mining companies, including Intrepid Potash NM LLC and Mosaic Potash Carlsbad Inc. provide for mutual aid and assistance, in the form of

MRTs, in the event of a mine disaster or other circumstance at either of the facilities. This provision ensures that the WIPP MOC will have two MRTs available at all times when miners are underground.

- An agreement with the U.S. Department of Interior (**DOI**), represented by the Bureau of Land Management (**BLM**), Roswell District, for wildland firefighting support within the WIPP Land Withdrawal Area.

- Agreements for mutual-aid firefighting with Eddy County, the City of Hobbs, and the City of Carlsbad for assistance, including equipment and personnel.

- A mutual-aid Agreements with the City of Hobbs and the City of Carlsbad for mutual ambulance, medical, rescue, and hazardous material response services; for use of WIPP facility radio frequencies during emergencies; and for mutual security and law enforcement services, within the appropriate jurisdiction limits of each party.

- Agreements with the Lea Regional Medical Center and the Carlsbad Medical Center for the treatment of persons with radiological contamination who have incurred injuries beyond the treatment capabilities at the WIPP site. The WIPP facility provides transport of the patient(s) to the medical center.

- Agreements with the Sheriff of Eddy County and the Sheriff of Lea County for mutual law enforcement services support.

- An agreement with the New Mexico Department of Homeland Security and Emergency Management for mutual emergency management support, access to state law enforcement, public works, and transportation assets.

D-8 Evacuation Plan

If it becomes necessary to evacuate all or part of the WIPP facility, on-site assembly and off-site staging areas have been established. The off-site staging areas are outside the security fence. The Permittees have plans and implementation procedures for both surface and underground evacuations. Drills are performed on these procedures at the WIPP facility at least annually. The following sections describe the evacuation plan for the WIPP facility, as required under 20.4.1.500 NMAC (incorporating 40 CFR §264.52(f)).

D-8a Surface Evacuation On-site and Off-site Staging Areas

Figure D-6 shows the surface assembly and staging areas. Security officers remain at the primary staging area gate 24 hours a day, and the vehicle trap is opened for personnel during emergency evacuations. The north gate has a single-person gate and a large gate which can be opened, similar to the main gates for the primary staging area. The east gate is a turnstile gate, Upon notification, security personnel will respond, open gates, and facilitate egress for evacuation.

If a building or area evacuation is necessary, the RCRA Emergency Coordinator, in conjunction with the Incident Commander, will determine which assembly area is to be used and will communicate the selection to facility personnel. The preferred evacuation route is determined based on the nature of the event, prevailing weather conditions, and actual or potential radiological release. If site evacuation is necessary, the RCRA Emergency Coordinator, in conjunction with the Incident Commander, will decide which staging area is to be used and will communicate the selection to facility personnel. The WIPP site evacuation routes are shown in Figure D-8. The surface evacuation alarm and public address system are used to direct personnel evacuation. Persons responsible for surface accountability will direct personnel to the selected staging area outside the security fence.

Personnel report to the designated assembly or staging area where accountability is conducted (Figure D-6). Personnel who are working in a contaminated area when site evacuation is announced will assemble at specific staging areas for potentially contaminated personnel in order to minimize contact with other personnel during the evacuation.

D-8b Underground Assembly Areas and Egress Hoist Stations

Depending upon the type of emergency and level of response, it may be necessary for personnel in the underground to shelter in place, report top designated assembly areas (Figure D-7), or to evacuate the underground. Underground personnel are trained to immediately report to assembly areas under specific circumstances (i.e., loss of underground power or ventilation). Underground accountability is taken when the underground is sheltered in place or evacuated. The Underground Controller is responsible for underground personnel accountability. Each assembly area contains a mine page phone, miner’s aid station, and evacuation maps.

In accordance with 30 CFR §57.11050, the mine maintains two escapeways. These escapeways are designated as Egress Hoist Stations. When the need for an underground evacuation has been determined, underground personnel report to the Egress Hoist Stations.

Decontamination of underground personnel will be conducted the same way as described for surface decontamination. Contaminated personnel are trained to remain segregated from other personnel until radiological contamination control personnel can respond.

D-8c Plan for Surface Evacuation

Surface evacuation notification is initiated by the CMRO, as directed by the RCRA Emergency Coordinator, via sound-ing of the surface evacuation alarm and providing incident information via the public address system. The persons responsible for surface accountability assist personnel in evacuation from their areas. Egress routes from buildings and site evacuation routes and instructions are posted in designated areas throughout the site. Egress routes from the WHB Unit are shown in Figures D-6a, D-6b, and D-6c.

If the ERT members have been notified to respond to an identified area, these members will not depart the site during an evacuation, but will report to the Incident Commander for instructions and accountability. The ERT members will not evacuate until released by the Incident Commander.

D-8d Plan for Underground Evacuation

Notification for underground evacuation will be made using the underground evacuation alarm and strobe light signals.

Personnel will evacuate to the nearest Egress Hoist Station. Primary underground escape routes (identified by green reflectors on the rib) will be used, if possible. Secondary underground escape routes (identified by red reflectors on the rib) will be used if necessary (Figure D-4). Detailed descriptions of escapeways and an underground escape map are included in the *Underground Escape and Evacuation* Plan on file at the WIPP facility, as required by MSHA, 30 CFR §57.11053, for underground mining situations. The MSHA required map takes precedence over Figure D-4, *Underground Escape/Evacuation Routes*, should an underground mine related event occur necessitating a change to the evacuation routes. The Underground Controller is responsible for underground personnel accountability and for reporting accountability to the RCRA Emergency Coordinator.

Upon reaching the surface, personnel will report to their on-site surface assembly or off-site staging area, as directed, to receive further instructions.

Members of the WIPP Fire Department and the MRT who may be underground, will assist in the evacuation of the underground when an underground evacuation is called for. A reentry by the MRT will be performed according to 30 CFR Part 49 and MSHA regulations for reentry into a mine. The two MRTs are trained in compliance with 30 CFR Part 49 in mine mapping, mine gases, ventilation, exploration, mine fires, rescue, and recovery.

D-8e Further Site Evacuation

In the event of an evacuation involving the need to transport employees, the following transportation will be available:

- Buses/vans—WIPP facility buses/vans will be available for evacuation of personnel. The buses/vans are stationed in the employee parking lot.

- Privately Owned Vehicles—Because many employees drive to work in their own vehicles, these vehicles may be used in an emergency. Personnel will be provided routes to be taken when leaving the facility.

These vehicles may be used to transport personnel who have been released from the site by the RCRA Emergency Coordinator.

The primary evacuation routes for the WIPP facility are the main DOE north/south access road, which connects to U.S. Highways 62/180 (north) and State Highway 128 (south). Alternate evacuation routes from the facility are provided at the south side and the east side of the facility (Figure D-8).

D-9 Location of the *RCRA Contingency Plan* and Plan Revision

In accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.53(a)), the owner/operator of the WIPP facility will ensure that copies of this *RCRA Contingency Plan* are maintained at the WIPP facility and are available to the emergency personnel and organizations described in Section D-2. When the *RCRA Contingency Plan* is revised, updated copies are distributed (electronically or via site mail) or hand delivered to applicable WIPP facility emergency personnel and Emergency Operations Centers. In addition, the Permittees will make copies available to the following State and local agencies, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.53(b)):

- Intrepid Potash New Mexico LLC

- Mosaic Potash Carlsbad Inc.
- City of Carlsbad
- Carlsbad Medical Center, Carlsbad
- Lea Regional Medical Center, Hobbs
- City of Hobbs
- BLM, Carlsbad
- New Mexico State Police
- New Mexico Department of Homeland Security and Emergency Management
- Eddy County Commission
- Sheriff of Eddy County
- Sheriff of Lea County

In accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.54), the Permittees will ensure that this plan is reviewed and amended whenever:

- The Permit for the WIPP facility is revised in any way that would affect the *RCRA Contingency Plan*;

- This plan fails in an emergency;

- The WIPP facility design, construction, operation, maintenance, or other circumstances change in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous constituents or change the response necessary in an emergency;

- The list of RCRA Emergency Coordinators change; or

- The list of WIPP facility emergency equipment changes.

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TABLES

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Table D-1
Resource Conservation and Recovery Act Emergency Coordinators[1]

Name	Address*	Office Phone	Personal Phone*
R. C. (Russ) Stroble		234-8276 or 234-8554	
J. E. (Joseph) Bealler		234-8276 or 234-8916	
M. G. (Mike) Proctor		234-8276 or 234-8143	
G. L. (Gary) Kessler		234-8326	
P. J. (Paul) Paneral		234-8498	
J. B. (James) Wheeler		234-8273	
M. L. (Mark) Long		234-8170	
A.C. (Andy) Cooper		234-8197	

* NOTE: Personal information (home addresses and personal phone numbers) has been removed from informational copies of this Permit.

[1] For every shift, one qualified RCRA Emergency Coordinator serves as the primary, and a second qualified RCRA Emergency Coordinator is available to serve as the alternate.

Table D-2
Emergency Equipment Maintained at the Waste Isolation Pilot Plant

Equipment	Description and Capabilities	Location
Communications		
Building Fire Alarms	Fire alarm panels, fire alarm transmitter, audible alarm devices (e.g., horns, bells, tones) that provide notification of fires; transmitted to the CMR	Guard and Security Building (Building 458), Water Pumphouse (Building 456), Warehouse/Shops Building (Building 453), Exhaust Shaft Filter Building (Building 413), Support Building (Building 451), CMR/Computer Room, Waste Handling Building (Building 411), TRUPACT Maintenance Building (Building 412), Salt Handling (**SH**) Shaft Hoisthouse (Building 384), Auxiliary Warehouse Building (Building 455), Engineering Building (Building 486), Training Building (Building 489), Safety and Emergency Services Facility (Building 452), and surface Hazardous Waste Staging Areas (Buildings 474A and 474B)
Underground Fire Alarms	Fire alarm panels, fire alarm transmitter, and audible/visual alarm devices (e.g., horns, bells, strobes) that provide notification of fires; transmitted to the CMR	Fire detection and control panel locations: Waste Shaft Underground Station, SH Shaft Underground Station, Between E-140 and E-300 in S-2180 Drift, Fuel Station (N150/W170)
Site Notification System; Underground Evacuation Alarm System	For surface, alarms and notifications transmitted over paging channel of the public address system, manually initiated; for underground, audible alarm	Site-wide
Public Address System	Includes intercom phones; handset stations and loudspeaker assemblies	Site-wide
Mine Pager Phones	Battery-operated paging system	Underground at S550/W30, S1000/W30, S1950/E140, SH Shaft Collar and Underground Station Waste Shaft Collar and Underground Station; – surface at Support Building (Building 451, FSM desk, CMR, lamproom), Safety and Emergency Services Facility (Building 452, Fire Department workstation area, Mine Rescue Room)

Equipment	Description and Capabilities	Location
Portable Radios	Two-way, portable; transmits and monitors information to/from other transmitters	Issued to individuals
Plant Base Radios	Two-way, stationary; transmits and monitors information to/from other transmiitters	Safety and Emergency Services Facility (Building 452), Guard and Security Building (Building 458), Support Building (Building 451, CMR, FSM desk)
Mobile Phones	Provide communications link between emergency response personnel, as needed	Issued to individuals plus emergency vehicles
Spill Response Equipment and Materials		
HAZMAT Equipment	Spill response equipment and supplies, PPE, and decontamination supplies stored and maintained in accordance with NFPA 1901 and as documented in WIPP facility files	Surface, in designated areas near Safety and Emergency Services Facility (Building 452)
Absorbent Materials	Containment or cleanup of spills, including: Pressurized spill-response gun; Absorbent sheets and/or dikes for containment or cleanup of spills of oil, petroleum-based chemicals, and general liquids; Spill-control material for solvents and neutralizing absorbents and for acids/caustics	Surface, in designated areas near Safety and Emergency Services Facility (Building 452)
Medical Resources		
Ambulance	A minimum of one ambulance, maintained and equipped in accordance with the New Mexico Ambulance Standard, 18.3.14 NMAC, and as documented in WIPP facility files	Surface at Safety and Emergency Services Facility(Building 452, Vehicle Bay)
Medical Cart	A minimum of one medical cart, equipped to provide basic life support operations, as documented in WIPP facility files	Underground (Emergency Vehicle Parking/Charging Area at S700/E140)
Miners First Aid Stations	Equipped per 30 CFR 57.15001	Underground (Salt Shaft Area, Waste Shaft Area, E300 Maintenance Shop, and at S1000/W30, S1300/W30, and S1950/E140)

Equipment	Description and Capabilities	Location
Fire Detection and Fire Suppression Equipment		
Building Smoke, Thermal Detectors, or Manual Pull Stations	Devices that trigger an alarm and/or fire suppression system	Guard and Security Building (Building 458), Warehouse/Shops Building (Building 453), Support Building (Building 451, CMR/Computer Room), Waste Handling Building (Building 411), TRUPACT Maintenance Building (Building 412), Underground Fuel Station (N150/W170), SH Shaft Hoisthouse (Building 384), Engineering Building (Building 486), Safety and Emergency Services Facility (Building 452),and Training Building (Building 489)
Fire Trucks	A minimum of two fire trucks to assist in fighting fires; firefighter equipped in accordance with NFPA 1901 and/or 1906 and as documented in WIPP facility files	Surface at Safety and Emergency Services Facility (Building 452, Vehicle Bay)
Rescue Cart/Truck	A minimum of two special-purpose vehicles, one on the surface and one in the underground; light rescue units, equipped in accordance with the NFPA 1901 and as documented in WIPP facility files	Surface at Safety and Emergency Services Facility (Building 452, Vehicle Bay) and Underground (Emergency Vehicle Parking/Charging Area at S700/E140)
Fire Suppression Cart	A minimum of one special-purpose electric cart to assist in fighting fires; equipped with a minimum of one fire extinguisher	Underground (Emergency Vehicle Parking/Charging Area at S700/E140)
Fire Extinguishers	Hand-held fire extinguishers; located throughout the facility in accordance with NFPA-10	Surface and underground locations used for hazardous waste management, as documented in WIPP facility files
Automatic Dry Chemical Extinguishing Systems	Automatic; actuated by thermal detectors or by manual pull stations	Underground fuel station (N150/W170)
Automatic Fire Suppression Systems on liquid fueled vehicles	Individual automatic fire suppression systems installed on applicable liquid-fueled vehicles, as determined by a fire risk assessment performed in accordance with NFPA 122	Surface and underground locations used for hazardous waste management, as documented in WIPP facility files

Equipment	Description and Capabilities	Location
Sprinkler Systems	NFPA water-based fire suppression systems	Water Pumphouse (Building 456), Guard and Security Building (Building 458), Waste Handling Building (Building 411, CH Bay, RH Bay, and Overpack Repair Areas only),TRUPACT Maintenance Building (Building 412), Exhaust Shaft Filter Building (Building 413), and surface Hazardous Waste Staging Areas (Buildings 474A and 474B)
Water Tanks, Hydrants	Fire suppression water supply; one 180,000-gallon capacity tank, plus a second tank with 100,000 gallon reserve	Tanks are at southwestern edge of WIPP facility; pipelines and hydrants are throughout the surface
Fire Water Pumps	Fire suppression water supply; pumps are minimally rated at 125 pounds per square inch, 1,500 gallons per minute centrifugal pump, one with electric motor drive, the other with diesel engine; pressure maintenance jockey pump	Water Pumphouse (Building 456)
Personal Protection Equipment		
Head Lamps	Mounted on hard hat; battery operated	Each person underground
Underground Self-Rescuer Units	Short-term self-rescue devices per 30 CFR 57.15030	Each person underground
Self-Contained Self-Rescuer	Air supply; a minimum of 12 caches in the underground; self-contained rescue units shall be adequate to protect an individual for one hour or longer or, alternatively, sufficient to allow the employee time to reach an additional self-contained self-rescue device in the underground per NMSA 69-8-16	Cached throughout the underground
Mine Rescue Self-Contained Breathing Apparatus (SCBA)	Oxygen supply; 4-hour closed circuit units consistent with 30 CFR 49.6; a minimum of 12 units, one for each Mine Rescue Team member	Safety and Emergency Services Facility (Building 452, Mine Rescue Training Room)
Fire Department Self-Contained Breathing Apparatus (SCBA)	Air supply; a minimum of 12 units; SCBAs shall meet the minimum requirements established per NFPA 1981	Surface Fire Trucks and Rescue Truck; Underground Rescue Cart
General Plant Emergency Equipment		
Emergency Lighting	For employee evacuation, and fire/spill containment; linked to main power supply, and selectively linked to back up diesel power supply and/or battery-backed power supply	Waste Handling Building (Building 411); TRUPACT Maintenance Building (Building 412), and Exhaust Shaft Filter Building (Building 413)
Backup Power Sources	A minimum of two diesel generators, and battery-powered uninterruptible power supply (UPS)	Generators are east of Safety and Emergency Services Facility (Building 452); UPS is located at the essential loads
Emergency Hoist	Hoist in Air Intake Shaft	Air Intake Shaft (Building 361)

Equipment	Description and Capabilities	Location
Emergency Showers	For emergency flushing of chemical contact or injury	Waste Handling Building (Building 411) is served by the decontamination shower trailer located north of Building 411, in front of Building 952, between Buildings 243 and 455; and surface Hazardous Waste Staging Areas (Building 474A)
Emergency Eyewash Equipment	For emergency flushing of affected eyes	Waste Handling Building (Building 411, RH Bay, Site Derived Waste Area, Waste Shaft Collar, and Room 108 TRUPACT III only), TRUPACT Maintenance Building (Building 412), Exhaust Shaft Filter Building (Building 413), surface, Hazardous Waste Staging Areas (Building 474A , Waste Oil Retainer Area), and the underground Hazardous Waste Staging Area (S550/E140)
Overpack containers for TRU Mixed Waste	85 Gallon drums SWBs TDOP	Warehouse Annex (Building 481)
Aquaset or Cement	Material for solidification of liquid waste generated as a result of fire fighting water or decontamination solutions	Surface Connex A, located south of Waste Handling Building (Building 411)
TDOP Upender	Upender facilitates overpacking standard waste boxes	Waste Handling Building (Building 411)
Non hazardous Decontaminating Agents	For decontamination of surfaces, equipment, and personnel	Waste Handling Building (Building 411); Surface Connex A, located south of Building 411

FIGURES

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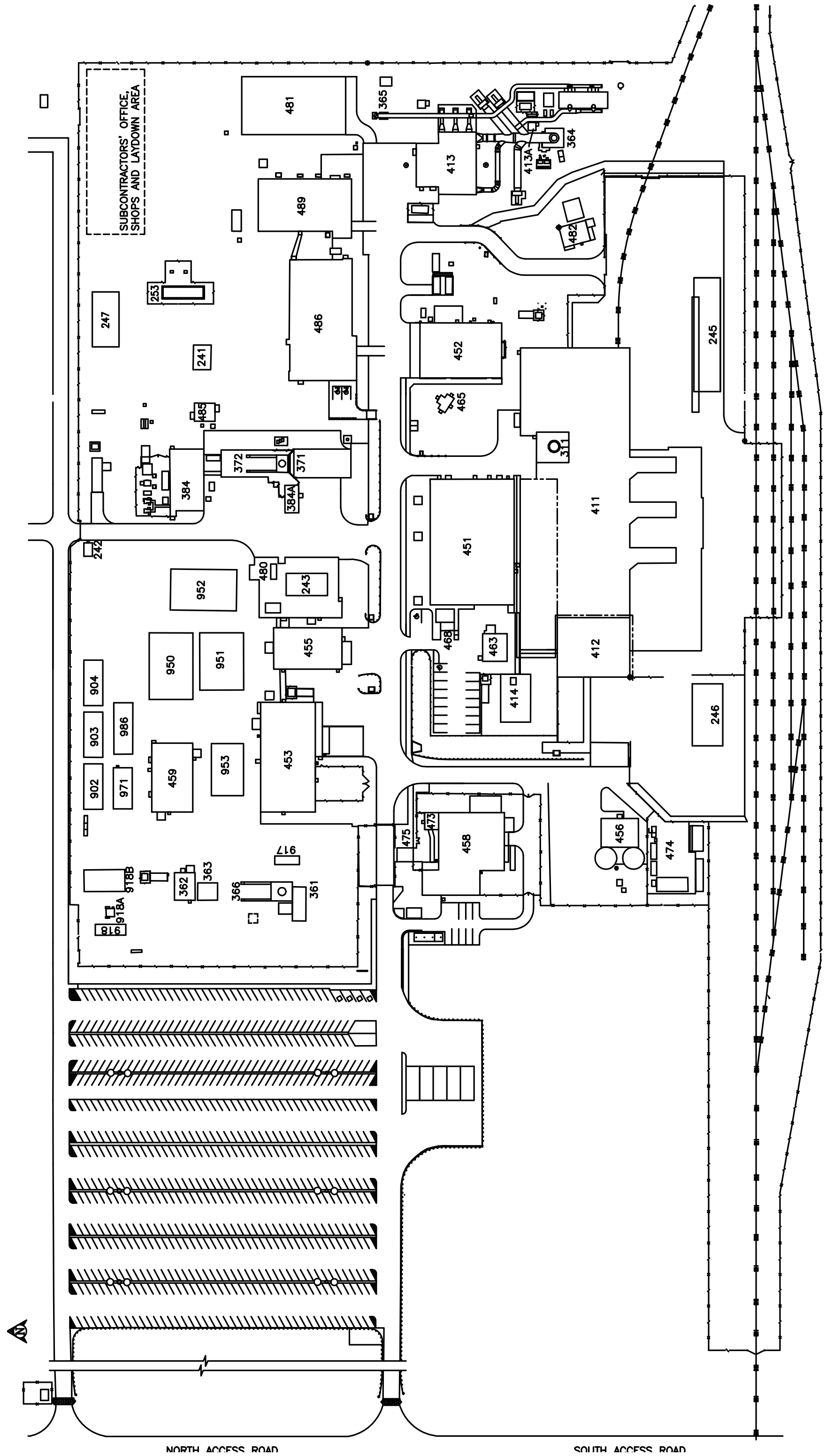


Figure D-1
WIPP Surface Structures

BLDG./ FAC.#	DESCRIPTION	BLDG./ FAC.#	DESCRIPTION	BLDG./ FAC.#	DESCRIPTION
#241	EQUIPMENT SHED	#384	SALT HANDLING SHAFT HOISTHOUSE	#475	GATEHOUSE
#242	GUARDSHACK	#384A	MINING OPERATIONS	#480	VEHICLE FUEL STATION
#243	SALT HAULING TRUCKS SHELTER	#411	WASTE HANDLING BUILDING	#481	WAREHOUSE ANNEX
#245	TRUPACT TRAILER SHELTER	#412	TRUPACT MAINTENANCE BUILDING	#482	EXHAUST SHAFT HOIST EQUIP. WAREHOUSE
#246	MgO STORAGE SHELTER	#413	EXHAUST SHAFT FILTER BUILDING	#485	SULLAIR COMPRESSOR BUILDING
#253	13.8 KV SWITCHGEAR 25p-SWG15/1	#413A	MONITORING STATION A	#486	ENGINEERING BUILDING
#254.1	AREA SUBSTATION NO. 1 25P-SW15.1	#413B	MONITORING STATION B	#489	TRAINING BUILDING
#254.2	AREA SUBSTATION NO. 2 25P-SW15.2	#414	WATER CHILLER FACILITY & BLDG	#H-16	SANDIA TEST WELL
#254.3	AREA SUBSTATION NO. 3 25P-SW15.3	#451	SUPPORT BUILDING	#917	AIS MONITORING
#254.4	AREA SUBSTATION NO. 4 25P-SW15.4	#452	SAFETY & EMERGENCY SERVICES FACILITY	#918	VOC TRAILER
#254.5	AREA SUBSTATION NO. 5 25P-SW15.5	#453	WAREHOUSE/SHOPS BUILDING	#918A	VOC AIR MONITORING STATION
#254.6	AREA SUBSTATION NO. 6 25P-SW15.6	#455	AUXILIARY WAREHOUSE BUILDING	#918B	VOC LAB TRAILER
#254.7	AREA SUBSTATION NO. 7 25P-SW15.7	#456	WATER PUMPHOUSE	#950	WORK CONTROL TRAILER
#254.8	AREA SUBSTATION NO. 8 25P-SW15.8	#457N	WATER TANK 25-D-001B	#951	PROCUREMENT/PURCHASING
#254.9	480V SWITCHGEAR (25P-SWGO4/9)	#457S	WATER TANK 25-D-001A	#952	TRAILER
#255.1	BACK-UP DIESEL GENERATOR #1 25-PE 503	#458	GUARD AND SECURITY BUILDING	#953	MODULAR OFFICE COMPLEX
#255.2	BACK-UP DIESEL GENERATOR #2 25-PE 504	#459	CORE STORAGE BUILDING	#971	HUMAN RESOURCES TRAILER
#256.4	SWITCHBOARD #4 (25P-SBD04/4)	#463	COMPRESSOR BUILDING	#986	PUBLICATIONS & PROCEDURES TRAILER
#311	WASTE SHAFT	#465	AUXILIARY AIR INTAKE	SWR NO. 6	SWITCHRACK NO. 6
#351	EXHAUST SHAFT	#468	TELEPHONE HUT	SWR NO. 7	7A, 7B SWITCHRACK NO. 7, 7A, 7B
#361	AIR INTAKE SHAFT	#473	ARMORY BUILDING	SWR NO. 7C	SWITCHRACK NO. 7C
#362	AIR INTAKE SHAFT/HOIST HOUSE	#474	HAZARDOUS WASTE STORAGE FACILITY	SWR NO. 10	SWITCHRACK NO. 10
#363	AIR INTAKE SHAFT/WINCH HOUSE	#474A	HAZARDOUS WASTE STORAGE BUILDING	SWR NO. 11	SWITCHRACK NO. 11
#364	EFFLUENT MONITORING INSTRUMENT SHED A	#474B	HAZARDOUS WASTE STORAGE BUILDING	SWR NO. 12	SWITCHRACK NO. 12
#365	EFFLUENT MONITORING INSTRUMENT SHED B	#474C	OIL & GREASE STORAGE BUILDING	SWR NO. 15	SWITCHRACK NO. 15
#366	AIR INTAKE SHAFT HEADFRAME	#474D	GAS BOTTLE STORAGE BUILDING		
#371	SALT HANDLING SHAFT	#474E	HAZARD MATERIAL STORAGE BUILDING		
#372	SALT HANDLING SHAFT HEADFRAME	#474F	WASTE OIL RETAINER		

Figure D-1a
Legend to Figure D-1

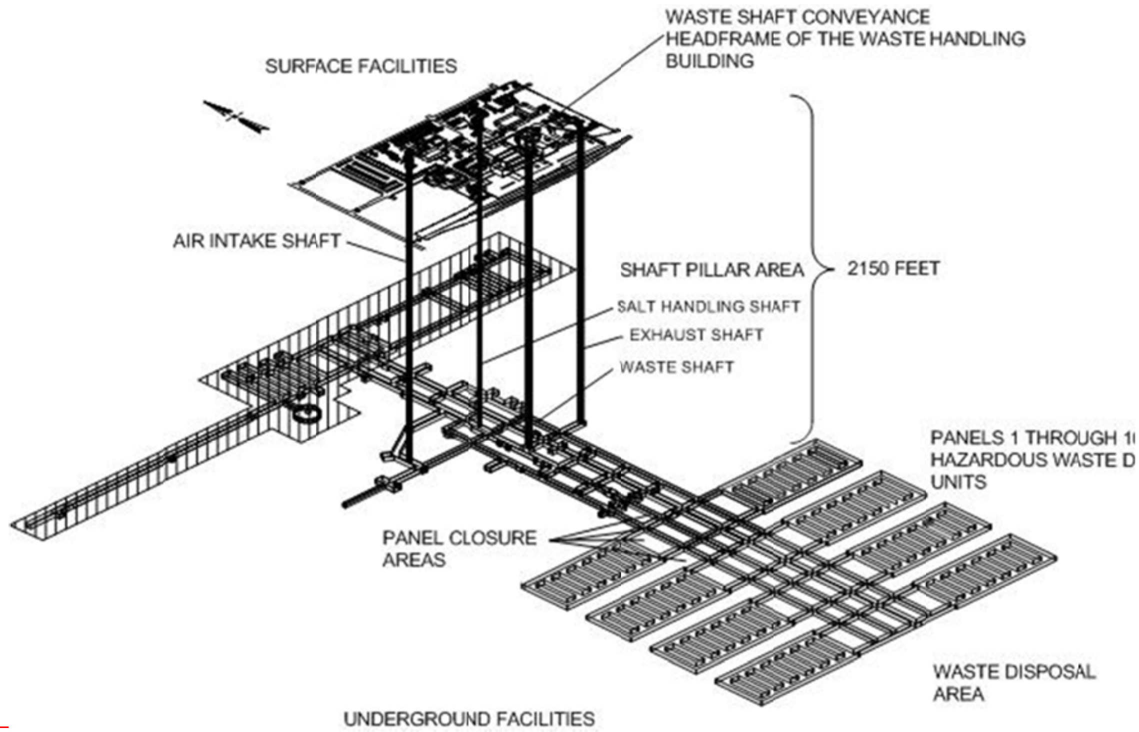
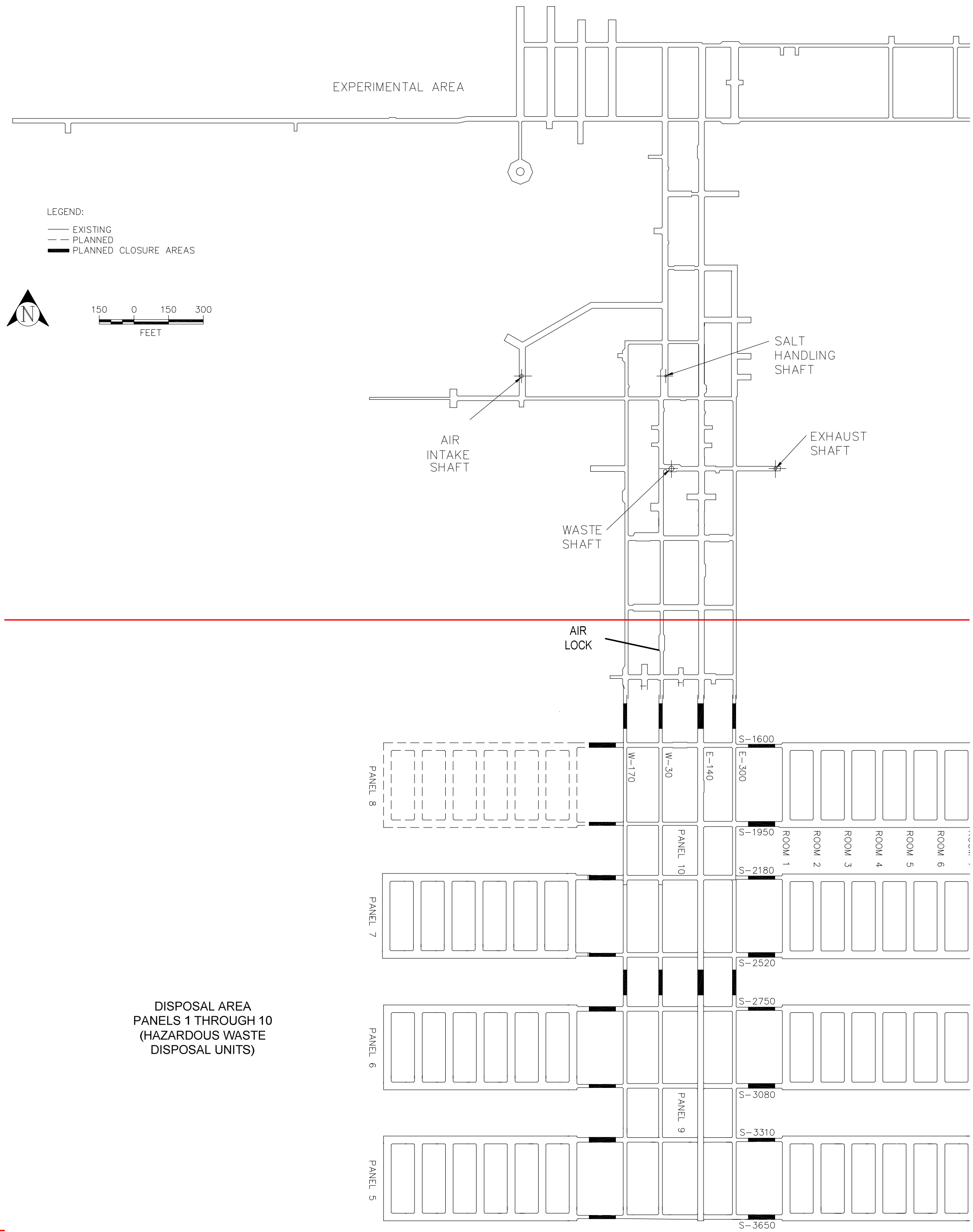


Figure D-2
Spatial View of the WIPP Facility


EXPERIMENTAL AREA
LEGEND:
EXISTING
PLANNED
PLANNED CLOSURE AREAS
N
150 0 150 300
FEET
SALT
HANDLING
SHAFT
AIR
INTAKE
SHAFT
EXHAUST
SHAFT
WASTE
SHAFT
AIR
LOCK
S-1600
W-170
W-30
E-140
E-300
PANEL 8
S-1950
PANEL 10
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
S-2180
PANEL 7
S-2520
S-2750
DISPOSAL AREA
PANELS 1 THROUGH 10
(HAZARDOUS WASTE
DISPOSAL UNITS)
PANEL 6
S-3080
PANEL 9
S-3310
PANEL 5
S-3650

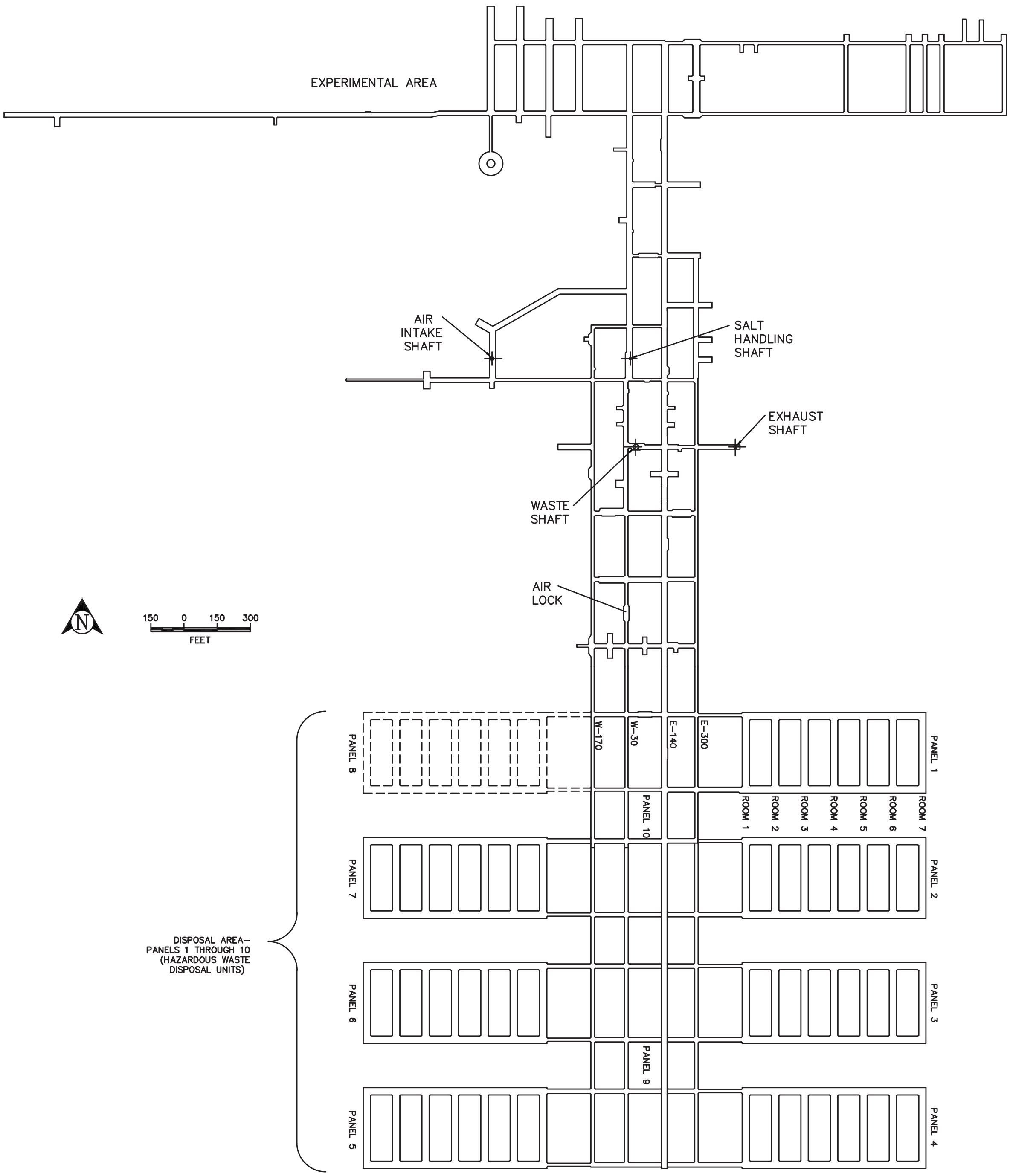


Figure D-3
WIPP Underground Facilities

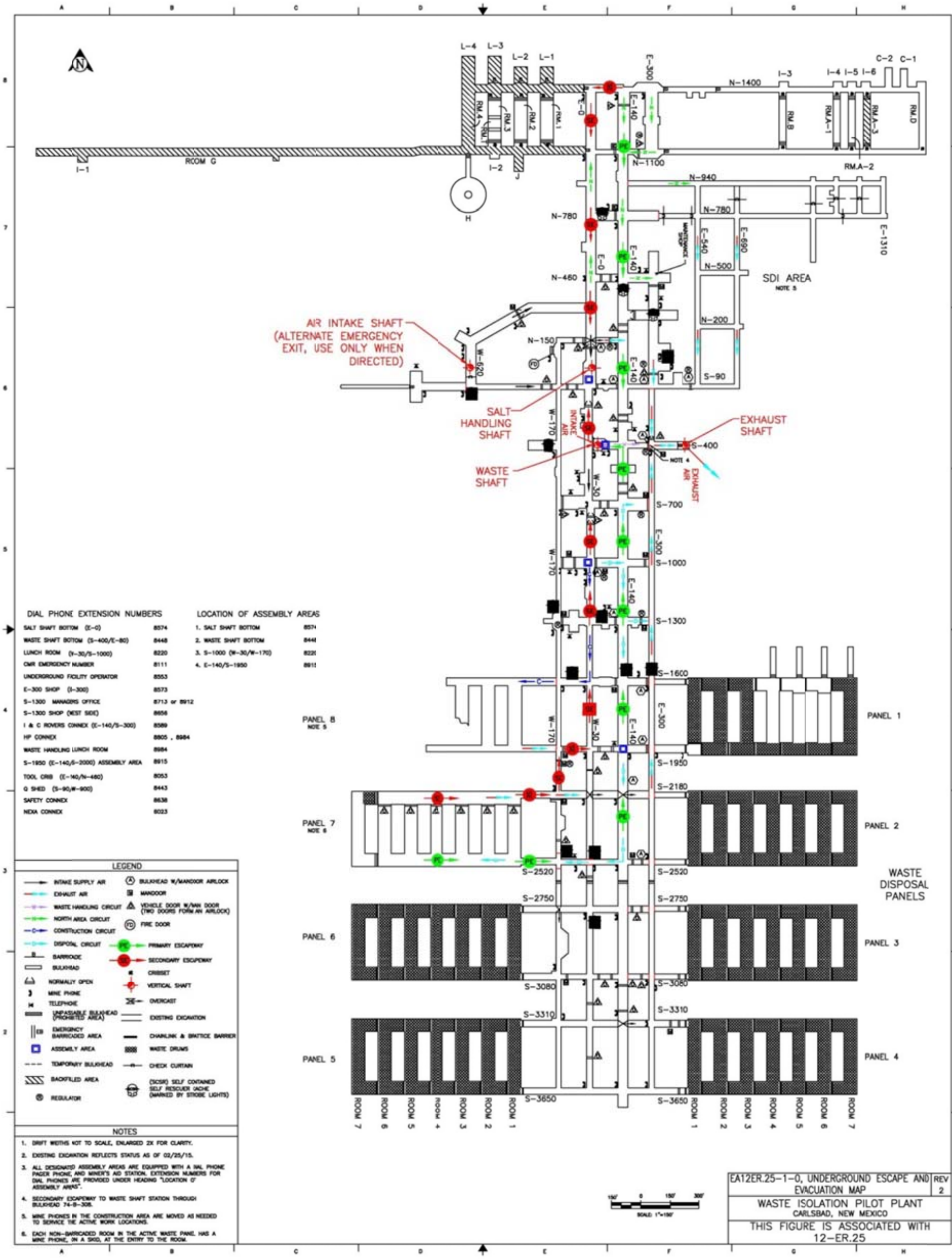


Figure D-4
Underground Escapeways/Evacuation Routes

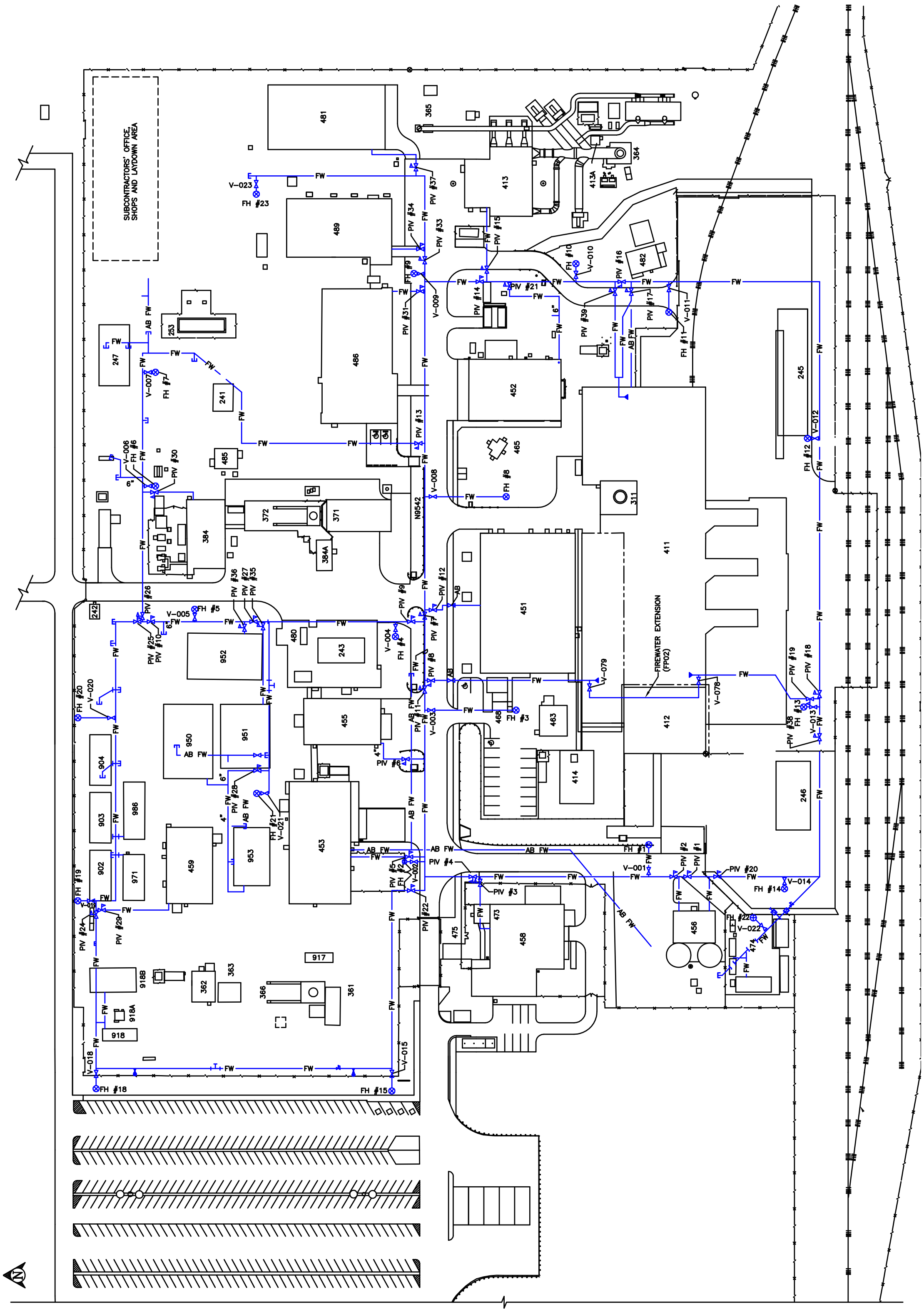


Figure D-5
Fire-Water Distribution System

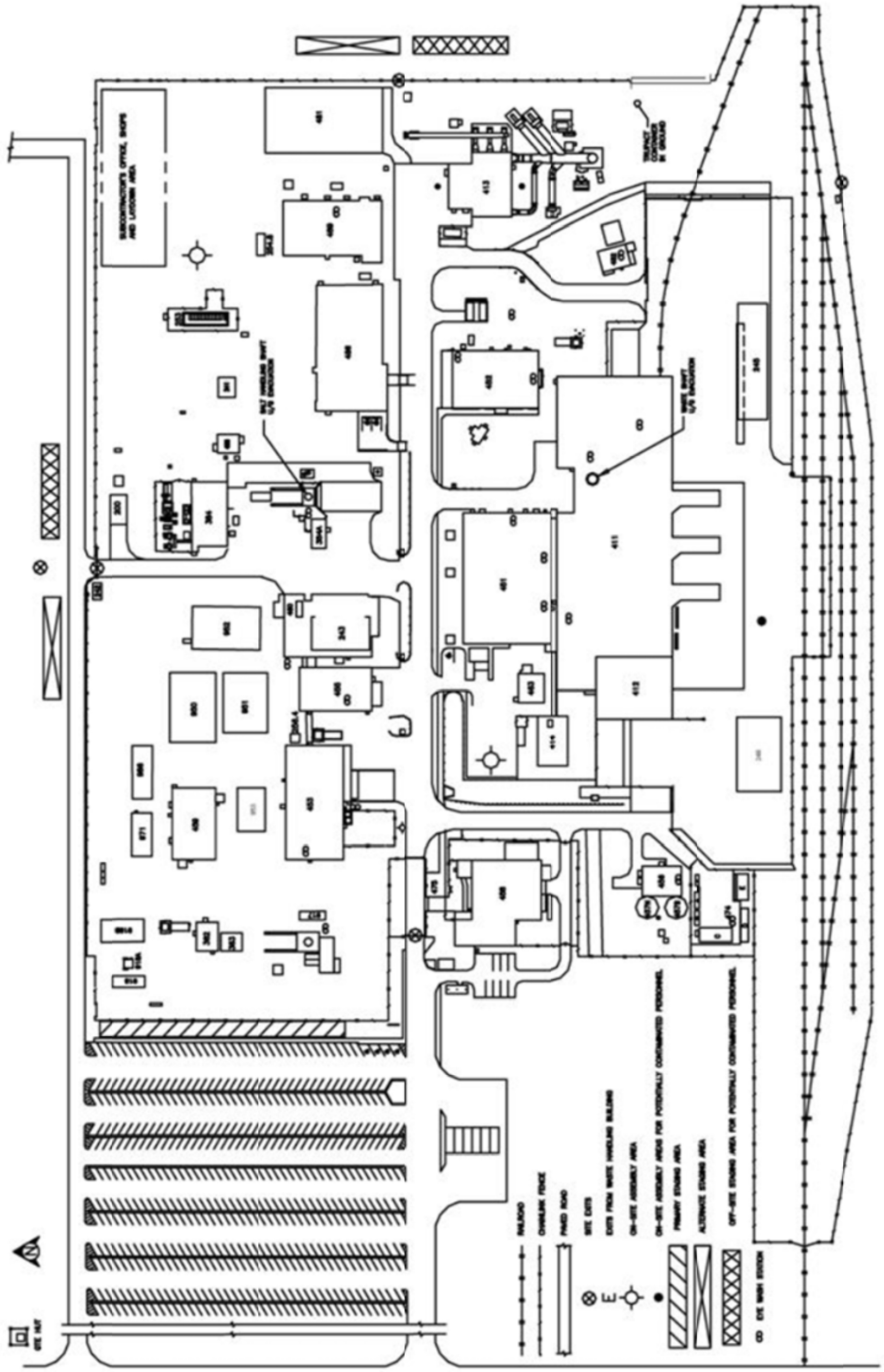


Figure D-6
WIPP On-Site Assembly Areas and Off-Site Staging Areas

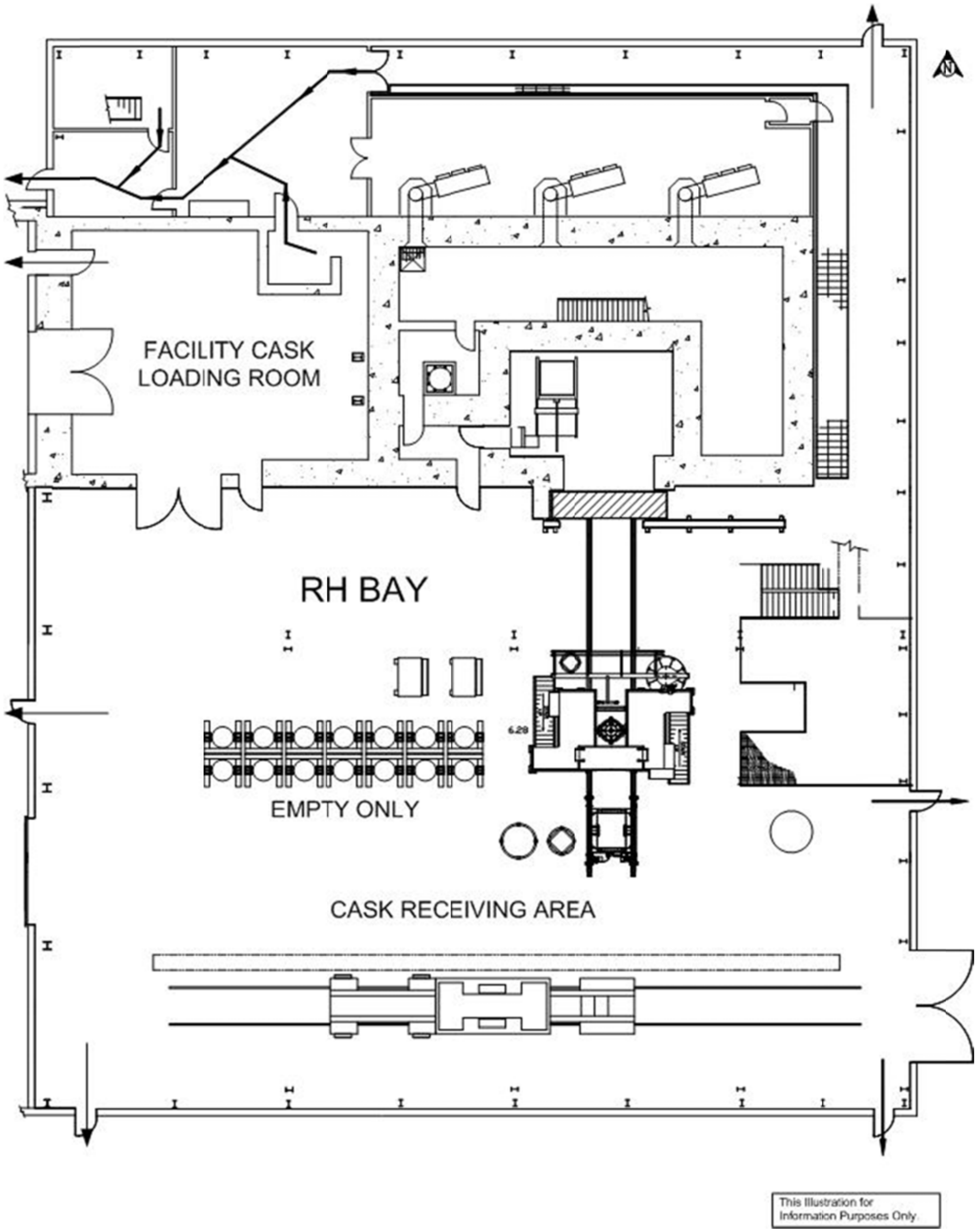


Figure D-6a
RH Bay Evacuation Routes

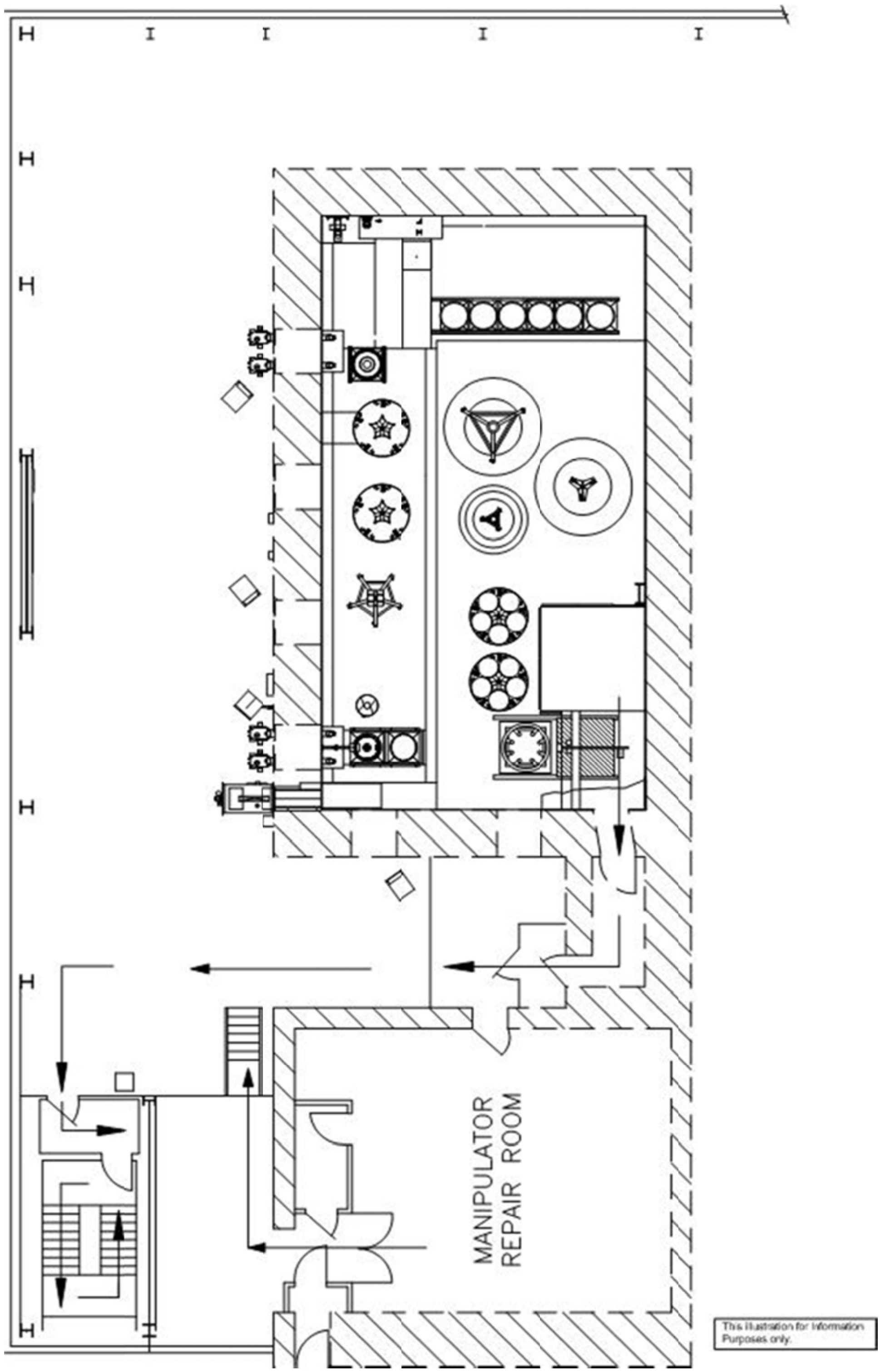


Figure D-6b
RH Bay Hot Cell Evacuation Route

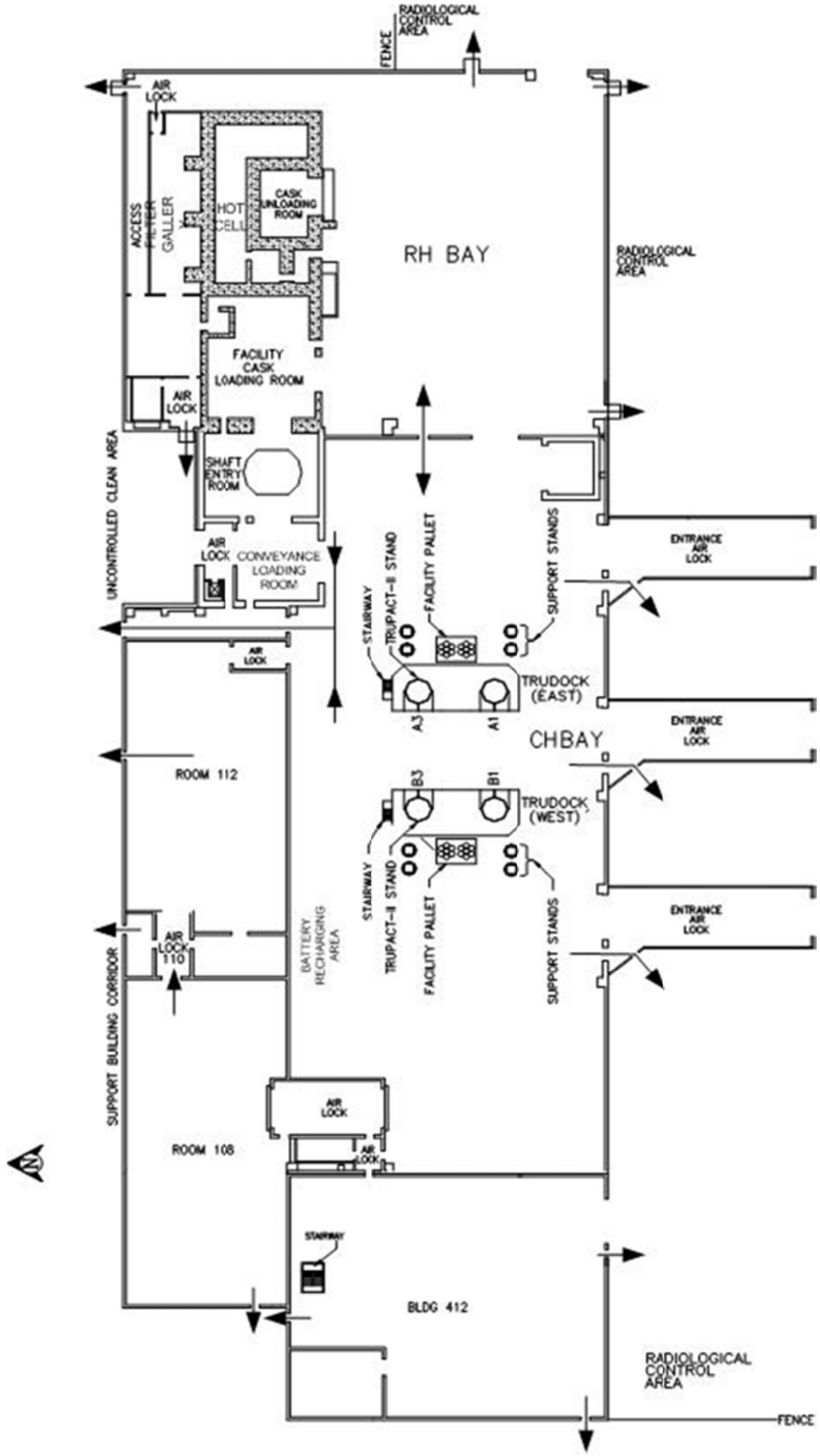
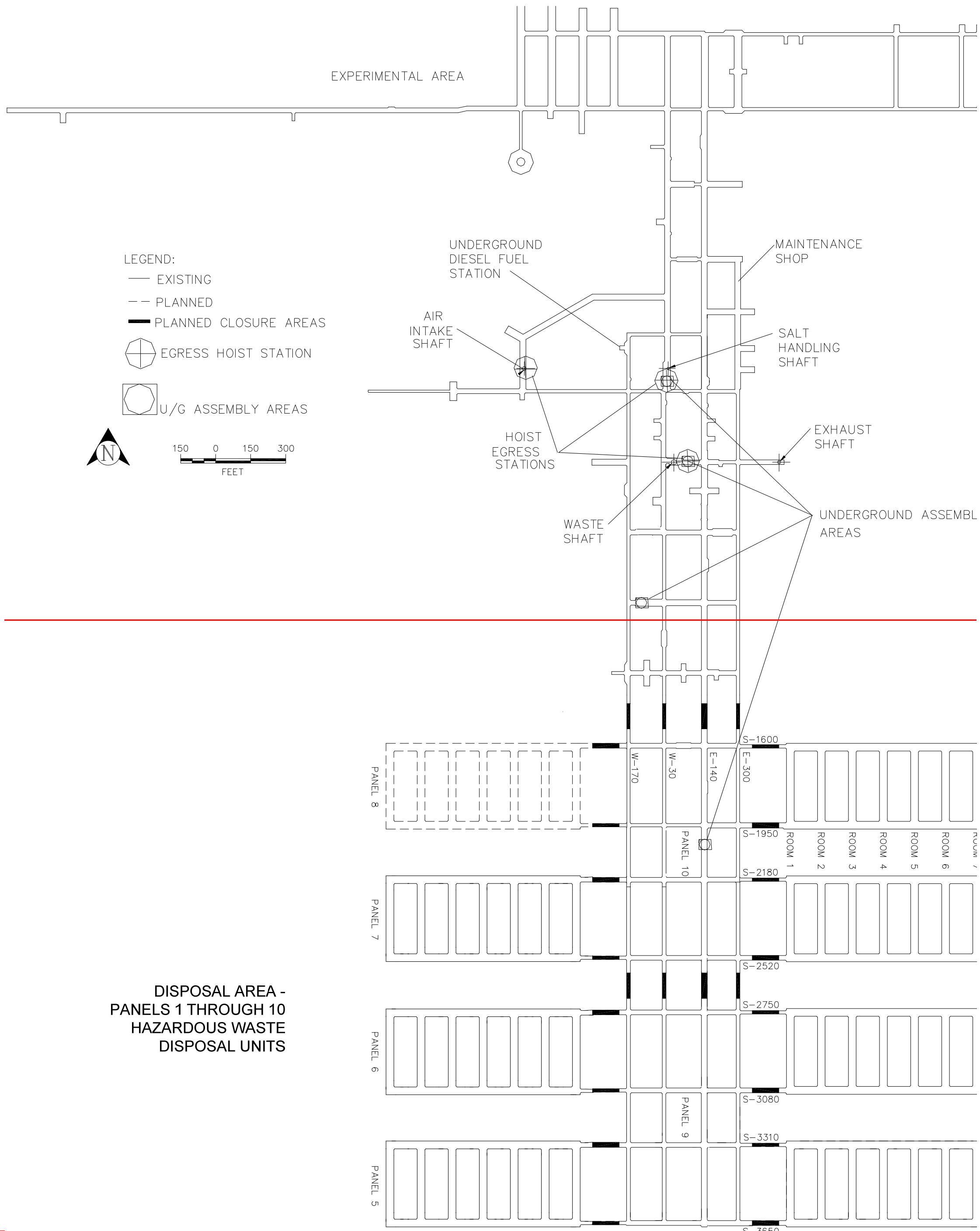


Figure D-6c
Evacuation Routes in the Waste Handling Building



DISPOSAL AREA -
PANELS 1 THROUGH 10
HAZARDOUS WASTE
DISPOSAL UNITS

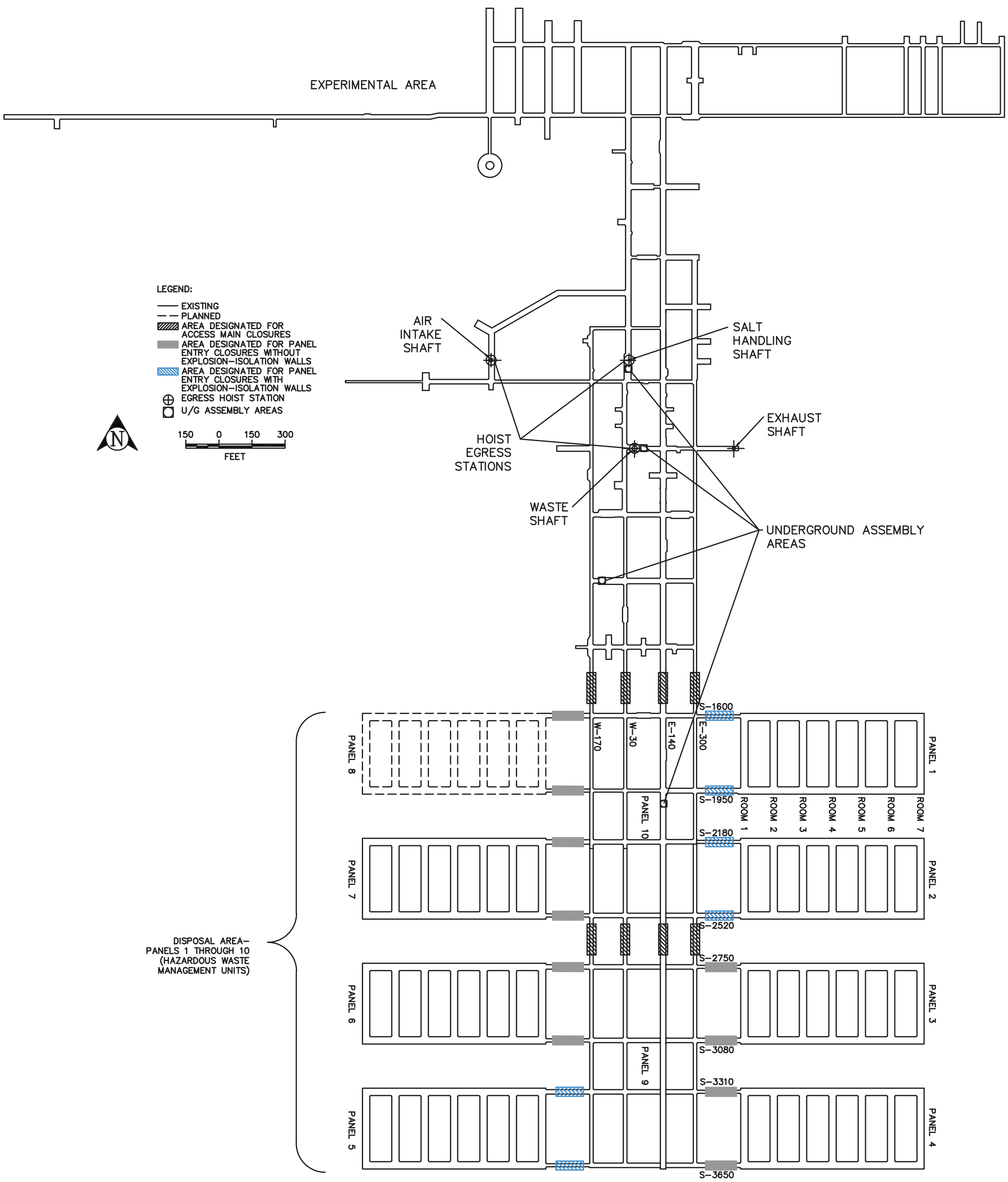


Figure D-7
Designated Underground Assembly Areas

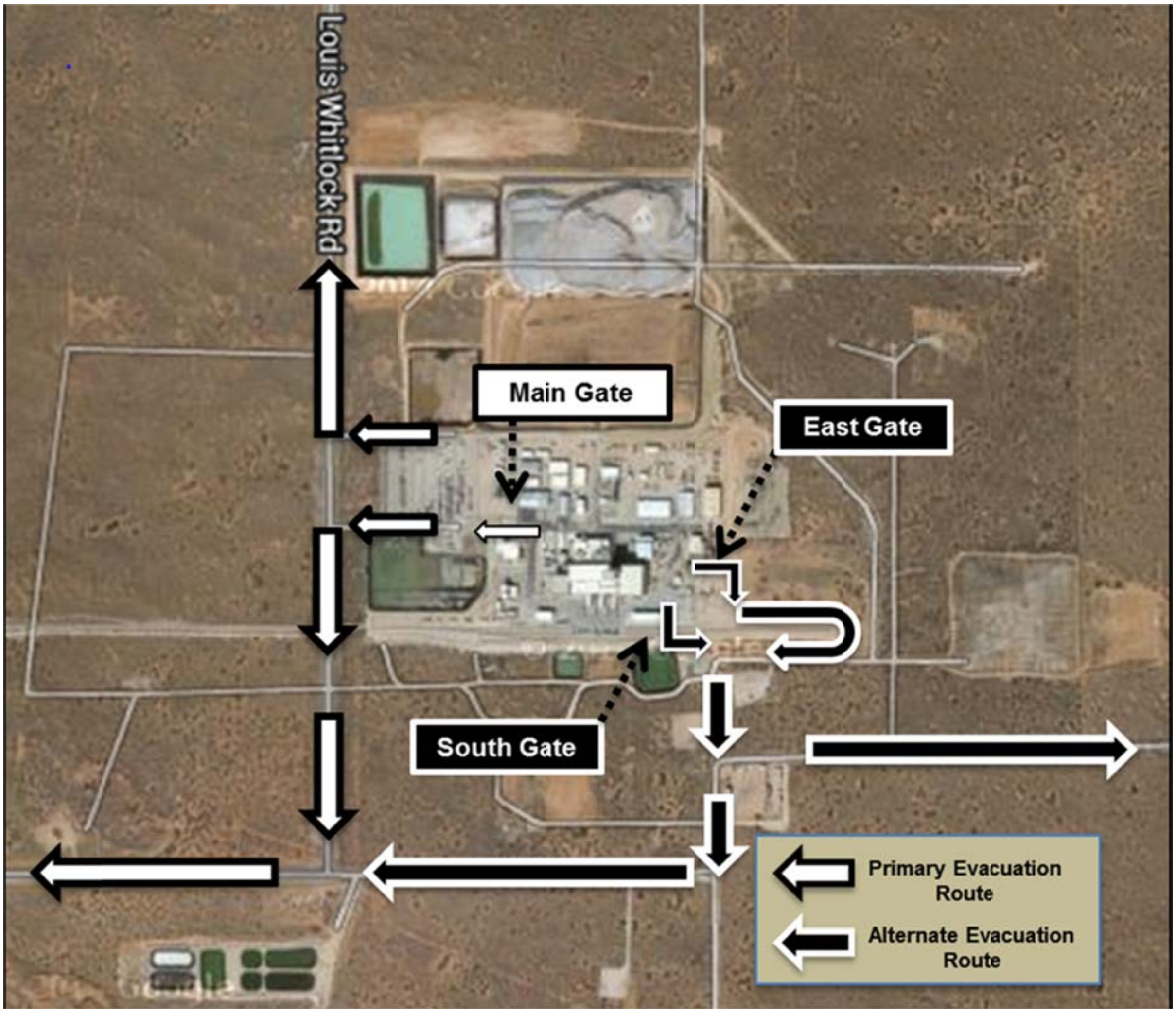


Figure D-8
WIPP Site Evacuation Routes

ATTACHMENT E

INSPECTION SCHEDULE, PROCESS AND FORMS

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ATTACHMENT E

INSPECTION SCHEDULE, PROCESS AND FORMS

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ATTACHMENT E

INSPECTION SCHEDULE, PROCESS AND FORMS

Introduction

This Permit Attachment describes the facility inspections (including container inspections) that are conducted to detect malfunctions, deterioration, operator errors, and discharges that may cause or lead to releases of hazardous waste or hazardous waste constituents to the environment or that could be a threat to human health.

E-1 Inspection Schedule

Equipment instrumental in preventing, detecting, or responding to environmental or human health hazards, such as monitoring equipment, safety and emergency equipment, security devices, and operating or structural equipment are inspected. The equipment will be inspected for malfunctions, deterioration, potential for operator errors, and discharges which could lead to a release of hazardous waste constituents to the environment or pose a threat to human health.

The WIPP facility has developed and will maintain a series of written procedures that include all the detailed inspection procedures and forms necessary to comply with 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)), during the Disposal Phase. Tables E-1 and E-1a list each item or system requiring inspection under these regulations, the inspection frequency, the organization responsible for the inspection, the applicable inspection procedure, and what to look for during the inspection. 20.4.1.500 NMAC (incorporating 40 CFR §§264.15(b), 264.174, and 264.602) list requirements that are applicable to the WIPP facility. Attachment D, Table D-2, *Emergency Equipment Maintained at the Waste Isolation Pilot Plant*, identifies the emergency equipment and corresponding locations to be inspected in accordance with Table E-1.

Operational procedures detailing the inspections required under 20.4.1.500 NMAC (incorporating 40 CFR §§264.15(a) and (b)), are maintained in electronic format on the WIPP computer network, in the Operating Record and, as appropriate, in controlled document locations at the WIPP facility. Frequency of inspections is discussed in detail in Section E-1a(2). Inspections are conducted often enough to identify problems in time to correct them before they pose a threat to human health or the environment and are based on regulatory requirements. The operational procedures assign responsibility for conducting the inspection, the frequency of each inspection, the types of problems to be watched for, what to do if items fail inspection, directions on record keeping, and inspector signature, date, and time. The operational procedures are maintained at the WIPP facility. Tables E-1 and E-1a summarize inspections, frequencies, responsible organizations, personnel making the inspection (by job title), and the types of anticipated problems as well as the references for the operational procedures. Inspection records are maintained at the WIPP site for three years. Beginning with the effective date of this Permit, records that are over the three year retention period are either maintained at the WIPP site or transferred to the WIPP Records Archive located in Carlsbad, NM until closure. The records maintained at the WIPP Records Archive are stored in facilities that are temperature and humidity controlled especially for the long term storage of records and readily retrievable and available for inspection.

Waste handling equipment and area inspections are typically controlled through established procedures and the results are recorded in logbooks or on data sheets. Operators are trained to consult the logbook to identify the status of any piece of waste handling equipment prior to its use. Once a piece of equipment is identified to be operable, a preoperational inspection is initiated in accordance with the appropriate inspection procedure in Tables E-1, E-1a, or in operational procedures. Inspection results as described below are entered in the applicable logbook.

Inspections include identifying malfunctions or deteriorating equipment and structures. Inspection results and data, including deficiencies, discrepancies, or needed repairs are recorded. A negative inspection result does not necessarily lead to a repair. A deficiency, such as low fluid level, may be corrected by the inspector immediately. A discrepancy, such as an increasing trend of a data point, may necessitate additional inspection prior to the next scheduled frequency. The actions taken (corrected, additional inspection, or Action Request (**AR**) for repair submitted) are recorded on the inspection form, the WIPP automated Maintenance Management tracking program (**CHAMPS**) work order sheet, or the equipment logbook, whichever is applicable.

Items that are operational with restrictions are operated in accordance with applicable compensatory measures. Items that are not operational are scheduled for repair or replacement in accordance with work authorization procedures. In such cases, compensatory measures may be needed until the equipment is returned to service. These compensatory measures will provide an equivalent level of protection, be documented in WIPP facility files (e.g., equipment logbook), and include an appropriate inspection schedule, when applicable.

Normally, the individual inspecting the equipment/system is not qualified to make repairs and consequently, prepares an AR if repairs are needed. The AR is tracked by the CHAMPS system through the work control process. When parts are received and work instructions are completed, the work order can be scheduled. The schedule is discussed daily to ensure facility configuration can support scheduled work items and to allocate and coordinate the resources necessary to complete the items.

Work orders are released for work by the responsible organization. When repairs are complete the responsible organization tests the equipment to ensure the repairs corrected the problem, then closes out the work order, to return the equipment to an operational status for normal operations to resume. Implementation of these procedures constitutes compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.15(c)).

Requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.15(d)), are met by the inspections for each item or system included in Tables E-1 and E-1a. Beginning with the effective date of this Permit, the results of the inspections are maintained in the operating record for three years and are then transferred to the WIPP Records Archive where they are maintained until closure. The inspection logs or summary records include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions. Major pieces of waste handling equipment are inspected using proceduralized inspections. Current copies of inspection forms are maintained in the Operating Record. Non-administrative changes (i.e., changes that affect the frequency or content of inspections) to inspection forms must be submitted to the NMED in accordance with the appropriate portions of 20 NMAC 4.1.900 (incorporating 40 CFR §270.42). The status of these pieces of equipment is maintained in an equipment logbook that is separate from the checklist. The logbook contains information regarding the condition of the equipment. Equipment operators are required, by the inspection checklist, to consult the logbook as the first activity in the inspection procedure. This logbook is maintained in the operating record. CH transuranic (**TRU**) mixed waste equipment that is controlled by a logbook includes the waste handling forklifts, all waste handling cranes, the adjustable center of gravity lift fixture, the CH TRU underground transporter, the facility transfer vehicle, the trailer jockey, and the push-pull attachment. RH TRU mixed waste equipment that is controlled by a logbook includes the 140/25-ton RH Bay overhead bridge crane, cask transfer cars, 25-ton cask unloading room crane, transfer cell shuttle car, RH Bay cask lifting yoke, facility grapple, 6.2- ton overhead hoist, facility cask rotating device, hot cell overhead powered manipulator, 15-ton hot cell crane, facility cask transfer car, 41-ton forklift, facility cask, and emplacement equipment. Inspections of the Cask Unloading Room, Hot Cell, Transfer Cell, Facility Cask Loading Room, RH Bay and radiation monitoring equipment will be recorded on data sheets. In addition to the inspections listed in Tables E-1 and E-1a, many pieces of equipment are subject to regular preventive maintenance. This includes more in-depth inspections of mechanical systems, load testing of lifting systems, calibration of measurement equipment and other actions as recommended by the equipment manufacturer or as required by DOE Orders. These preventive maintenance activities along with the inspections in Tables E-1 and E-1a make mechanical failure of waste handling equipment unlikely. The WIPP Safety Analysis Report (DOE, 1999) and the WIPP Remote-Handled Waste Preliminary Safety Analysis Report (RH PSAR) (DOE, 2000) contain the results of a systematic analysis of waste handling equipment and the hazards associated with potential mechanical failures. Equipment subject to failures that cannot practically be mitigated is retained for analysis and is the basis for contingency planning. The inspection procedures maintained in the Operating Record for operational and preventive maintenance are implemented to assure the equipment is maintained. An example equipment inspection checklist and a typical logbook form are shown as Figures E-1 and E-2. Actual checklists or forms are maintained within the Operating Record.

E-1a General Inspection Requirements

Tables E-1, E-1a, and E-2 of this Permit Attachment list the major categories of monitoring equipment, safety and emergency systems, security devices, and operating and structural equipment that are important to the prevention or detection of, or the response to, environmental or human health hazards caused by hazardous waste. These systems may include numerous subsystems. These systems are inspected according to the frequency listed in Tables E-1 and E-1a, a copy of which is maintained at the WIPP facility. The frequency of inspections is based on the nature of the equipment or the hazard and regulatory requirements. When in use, daily inspections are made of areas subject to spills, such as TRU mixed waste loading and unloading areas in the WHB Unit, looking for deterioration in structures, mechanical items, floor coatings, equipment, malfunctions, etc., in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)(4)).

As required in 20.4.1.500 NMAC (incorporating 40 CFR §264.33), the WIPP facility inspection procedures for communication and alarm systems, fire-protection equipment, and spill control and decontamination equipment include provisions for testing and maintenance to ensure that the equipment will be operable in an emergency.

E-1a(1) Types of Problems

The inspections for the systems, equipment, structures, etc., listed in Tables E-1 and E-1a, include the types of problems (e.g., malfunctions, visible cracks in coatings or welds, and deterioration) to be looked for during the inspection of each item or system, if applicable, and are in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)(3)).

E-1a(2) Frequency of Inspections

Tables E-1, E-1a, and E-2 of this Permit Attachment list the inspection frequencies and monitoring schedule for equipment and systems subject to the 20.4.1 NMAC hazardous waste management requirements. The frequency is based on the rate of possible deterioration of the equipment and the probability of an environmental or human health incident if the deterioration or malfunction, or any operator error, goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, are inspected daily when in use, consistent with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)(4)).

When RH TRU mixed waste is present in the RH Complex, inspections are conducted visually and/or using closed-circuit video cameras in order to manage worker dose and to minimize occupational radiation exposures to as low as reasonably achievable (**ALARA**). More extensive inspections of these areas are performed at least annually during routine maintenance periods and when RH TRU mixed waste is not present.

E-1a(3) Monitoring Systems

There are two monitoring systems used at the WIPP to provide assurance that facility systems are operating correctly, that areas can be used safely, and that there have been no releases of hazardous waste constituents. These systems are shown in Table E-2 and include the geomechanical monitoring system and the central monitoring system (**CMS**). The geomechanical monitoring system is used to assess the condition of mined excavations to assure no unsafe conditions are allowed to develop. The CMS continuously assesses the status of the fixed radiation monitoring equipment, electrical power, fire alarm systems, ventilation system, and other facility systems including water tank levels. In addition, the CMS collects data from the meteorological monitoring system.

E-1b Specific Process Inspection Requirements

20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)(4)), requires inspections of specific portions of a facility, rather than the general facility. These include container storage areas and miscellaneous units. Both are addressed below.

E-1b(1) Container Inspection

Containers are used to manage TRU mixed waste at the WIPP facility. These containers are described in Permit Part 3. Off-site waste that will be managed and stored as CH TRU mixed waste will arrive in 55-gallon drums arranged as seven (7)-packs, in Ten Drum Overpacks (**TDOP**), in 85-gallon drums arranged as four (4) packs, in 100-gallon drums arranged as three (3) packs, in standard waste boxes (**SWB**), in standard large box 2s (**SLB2s**) or shielded containers as (3)-packs. The waste containers will be visually inspected to ensure that the waste containers are in good condition and that there are no signs that a release has occurred.

This visual inspection shall not include the center drums of 7-packs and waste containers positioned such that visual observation is precluded due to the arrangement of waste assemblies on the facility pallets. If CH TRU mixed waste handling operations should stop for any reason with containers located on the TRUPACT-II Unloading Dock (**TRUDOCK** storage area of the WHB Unit) or in room 108 while still in the Contact-Handled Packages, primary waste container inspections could not be accomplished until the containers of waste are removed from the shipping containers.

As described in Permit Attachment A1, Section A1-1d(3), off-site waste that will be managed and stored as RH TRU mixed waste will arrive in containers inside Nuclear Regulatory Commission (**NRC**)-certified casks designed to provide shielding and facilitate safe handling. Canisters, will be loaded singly into an RH-TRU 72-B cask. Drums will be loaded into a CNS 10-160B cask. The cask will be visually inspected upon arrival. Because RH TRU mixed waste is stored in the Parking Area Unit in sealed casks, there are no additional requirements for engineered secondary containment systems. Following removal of the canisters and drums, the interior of the cask will be inspected and surveyed for evidence of contamination that may have occurred during transport.

Off-site waste that will be managed and stored as RH TRU mixed waste is managed and stored in the RH Complex of the WHB. The RH Complex includes the following: RH Bay, the Cask Unloading Room, the Hot Cell, the Transfer Cell, and the Facility Cask Loading Room. As RH TRU mixed waste is held in canisters within a canister rack the physical inspection of the drum or canister is not possible. Inspections of RH TRU mixed waste in these areas occurs remotely via closed-circuit cameras a minimum of once weekly when stored waste is present. Because RH TRU mixed waste is in sealed casks, there are no additional requirements for engineered secondary containment systems. However, the floors in the RH Complex (including the RH Bay, Facility Cask Loading Room and Cask Unloading Room) are coated concrete and during normal operations (i.e., when waste is present), the floor of the RH Complex is inspected visually or by using close-circuit cameras on a weekly basis to verify that it is in good condition and free of visible cracks and gaps.

Inspections of RH TRU mixed waste containers stored in the Hot Cell and Transfer Cell are conducted using remotely operated cameras. RH TRU mixed waste in the Hot Cell is stored in either drums or canisters. The containers in the Hot Cell are inspected to ensure that they are in acceptable condition. RH TRU mixed waste in the Transfer Cell is stored in the RH-TRU 72-B cask or shielded insert; therefore, inspections in this area focus on the integrity of the cask or shielded insert. RH TRU mixed waste in the Facility Cask Loading Room is stored in the facility cask; therefore, inspections in this area focus on the integrity of the facility cask.

Inspections will be conducted in the Parking Area Unit at a frequency not less than once weekly when waste is present. These inspections are applicable to loaded Contact- Handled and Remote-Handled Packages. The perimeter fence located at the lateral limit of the Parking Area Unit, coupled with personnel access restrictions into the WHB Unit, will provide the needed security. The perimeter fence and the southern border of the WHB shall mark the lateral limit of the Parking Area Unit. Radiologically controlled areas can be established temporarily with barricades. More permanent structures can be installed. The western boundary can be established with temporary barricades since this area is within the perimeter fence. Access to radiologically controlled areas will only be permitted to personnel who have completed General Employee Radiological Training (**GERT**), a program defined by the Permittees, or escorted by personnel who have completed GERT. This program ensures that personnel have adequate knowledge to understand radiological posting they may encounter at the WIPP site. The fence of the Radiologically Controlled Area, south from the WHB airlocks, was moved to provide more maneuvering space for the trucks delivering waste. Since TRU mixed waste to be stored in the Parking Area Unit will be in sealed Contact-Handled or Remote-Handled Packages, there will be no additional requirements for engineered secondary containment systems. Inspections of the Contact-Handled and Remote-Handled Packages stored in the Parking Area Unit shall be conducted at a frequency no less than once weekly and will focus on the inventory and integrity of the shipping containers and the spacing between trailers carrying the Contact-Handled or Remote-Handled Packages. This spacing will be maintained at a minimum of four feet.

Container inspections will be included as part of the surface TRU mixed waste handling areas (i.e. Parking Area Unit and WHB Unit) inspections described in Tables E-1 and E-1a. These inspections will also include the Derived Waste Storage Areas of the WHB Unit. The Derived Waste Storage Areas will consist of containers of 55 or 85-gallon drums or SWBs for CH TRU mixed waste and 55-gallon drums for RH TRU mixed waste. A Satellite accumulation area (**SAA**) may be required in an area adjacent to the TRUDOCKs for CH TRU mixed waste. A SAA may also be required in the RH Bay and Hot Cell for RH TRU mixed waste. These SAAs will be set up on an as needed basis at or near the point of generation and the derived waste will be discarded into the active derived waste container. All SAAs will be inspected in accordance with 20.4.1.300 NMAC (incorporating 40 CFR §262.34).

E-1b(2) Miscellaneous Unit Inspection

20.4.1.500 NMAC (incorporating 40 CFR §264.602), requires that inspections required in 20.4.1.500 NMAC (incorporating 40 CFR §264.15 and §264.33), as well as any additional requirements needed to protect human health and the environment, be met. The requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.15 and §264.33) are discussed in Section E-1 of this Permit Attachment, along with how the WIPP facility complies with those requirements for standard types of inspections. Inspection frequencies for geomechanical monitoring equipment are provided in Table E-1. The monitoring schedule for geomechanical instrumentation is given in Table E-2.

References

DOE, 1999. “WIPP Safety Analysis Report,” DOE/WIPP-95-2065. Rev. 4, U.S. Department of Energy. Washington, D.C.

DOE, 2000. “WIPP Remote-Handled Waste Preliminary Safety Analysis” (RH PSAR), U.S. Department of Energy. Washington, D.C.

FIGURES

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TYPICAL EQUIPMENT
WEEKLY CHECK LIST

_√_ OK **_X_ Adjustment Made** **_O_ Repairs Required**

AR Written [ ] Yes [ ] No AR # ______________

(check or complete appropriate information)

ITEM INSPECTED	**Condition**	**Comments/Corrective Action**
Mechanical Checks: (examples)		
Oil level		
Radiator fluid level		
Automatic transmission fluid level		
Operate all valves/check gauges		
Emergency brake		
Fuel level (> ¾ full)		
Oil pressure (at warm idle)		
Tire Pressure		
Sirens, horn, & back-up alarm		
Deterioration Checks: (examples)		
Fan belts		
Battery (terminals, cables)		
Run generator 5 min.		
Hose, nozzles & valves		
Leaks/Spills Checks: (examples)		
Leaks around pump		
Foam tank level		
Required Equipment: (examples)		
Inspect SCBAs (> 4050 psi)		
Hand tools & equipment		
Trauma Kit		

Inspected by: ____
Print Name Signature Time/Date

Inspected by: ____
Print Name Signature Time/Date

Reviewed by: ____
Print Name Signature Time/Date

Comments: ____

NOTE: All items that are mandatory for every inspection form are shown in bold.

Figure E-1
Typical Inspection Checklist

HOUR METER READING ______________ EQUIPMENT NO. ______________

DEFICIENCIES NOTED: ____

____

____

____

____

PRE OPS COMPLETED PER __{Procedure Number}__ SAT ______ **PROBLEMS NOTED** _____

CORRECTIVE ACTIONS TAKEN: ____

____

____

____

____

____

____

OPERATOR SIGNATURE	**DATE**	**TIME**	**SUPERVISOR SIGNATURE/DATE**
________________	________	________	________________

NOTE: All items that are mandatory for every inspection form are shown in bold.

Figure E-2
Typical Logbook Entry

TABLES

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Table E-1
Inspection Schedule/Procedures

System/Equipment Name	Responsible Organization	Inspection[a] Frequency and Job Title of Personnel Normally Making Inspection	Procedure Number and Inspection Criteria[h]
Air Intake Shaft Hoist	Underground Operations	Preoperational [c] See Lists 1b and c	WP 04-HO1004 Inspecting for Deterioration[b], Safety Equipment, Communication Systems, and Mechanical Operability[m] in accordance with Mine Safety and Health Administration (MSHA) requirements
Ambulance (Surface) and Medical Cart (Underground)	Fire Department	Weekly See List 11	WP 12-FP0030 Inspecting for Mechanical Operability[m], Deterioration[b], and Required Equipment[n]
Adjustable Center of Gravity Lift Fixture	Waste Handling	Preoperational [c] See List 8	WP 05-WH1410 Inspecting for Mechanical Operability[m] and Deterioration[b]
Backup Power Supply Diesel Generators	Facility Operations	Monthly See List 3	WP 04-ED1301 Inspecting for Mechanical Operability[m] and Leaks/Spills by starting and operating both generators. Results of this inspection are logged in accordance with WP 04-AD3008.
Facility Inspections (Water Diversion Berms)	Facility Engineering	Annually See List 4	WP 10-WC3008 Inspecting for Damage, Impediments to water flow, and Deterioration[b]
Central Monitoring Systems (CMS)	Facility Operations	Continuous See List 3	Automatic Self-Checking
Contact-Handled (CH) TRU Underground Transporter	Waste Handling	Preoperational [c] See List 8	WP 05-WH1603 Inspecting for Leaks/Spills, Mechanical Operability[m], Deterioration[b], and area around transporter clear of obstacles
Conveyance Loading Car	Waste Handling	Preoperational [c] See List 8	WP 05-WH1406 Inspecting for Mechanical Operability[m], Deterioration[b], path clear of obstacles, and guards in the proper place
Facility Transfer Vehicle	Waste Handling	Preoperational [c] See List 8	WP 05-WH1204 Inspecting for Mechanical Operability[m], Deterioration[b], path clear of obstacles, and guards in the proper place

System/Equipment Name	Responsible Organization	Inspection[a] Frequency and Job Title of Personnel Normally Making Inspection	Procedure Number and Inspection Criteria[h]
Emergency Lighting	Fire Department	Monthly/annually See List 11	WP 12-FP0051 Inspecting for Deterioration[b], and Operability of indicator lights in accordance with NFPA 101
Exhaust Shaft	Underground Operations	Quarterly See List 1a	PM041099 Inspecting for Deterioration[b] and Leaks/Spills
Eye Wash and Shower Equipment	Equipment Custodian	Weekly See List 5	WP 12-IS1832 Inspecting for Deterioration[b]
		Semi-annually See List 2a	WP 12-IS1832 Inspecting for Deterioration[b] and Fluid Levels–Replace as Required
Fire Detection and Alarm System	Fire Protection Engineering	Semi-annually/annually See List 12	WP 12-FP0027 Inspecting for Deterioration[b] and Operability of underground fuel station fire suppression system in accordance with NFPA 17 (semi-annual inspection); Inspecting for Deterioration[b] and Operability of the alarm panel and transmitter, audible/visual alarm devices, detectors, and pull stations in accordance with NFPA 72 (annual inspection)
		Monthly/quarterly/annually See List 12	WP 12-FP0028 Inspecting for Deterioration[b], and Operability of the alarm panel and transmitter, audible/visual alarm devices, detectors, and pull stations in accordance with NFPA 72
Fire Extinguishers[j]	Fire Department	Monthly See List 11	WP 12-FP0036 Inspecting for Deterioration[b], Leaks/Spills, Expiration, seals, fullness, and pressure
Fire Hoses	Fire Department	Annually (minimum) See List 11	WP 12-FP0031 Inspecting for Deterioration[b] and Leaks/Spills
Fire Hydrants	Fire Protection Engineering	Semi-annual/annually See List 12	WP 12-FP0034 Inspecting for Deterioration[b] and Leaks/Spills

System/Equipment Name	Responsible Organization	Inspection[a] Frequency and Job Title of Personnel Normally Making Inspection	Procedure Number and Inspection Criteria[h]
Fire Pumps	Fire Protection Engineering	Weekly See List 12	WP 12-FP0026 Inspecting for Deterioration[b], Leaks/Spills, fire water valve position(s), and panel light status
		Annually (Electric Pump) See List 12	WP 12-FP5113 Inspecting for Deterioration[b], operability, flow, discharge pressure, suction pressure, and pump speed
		Annually (Diesel Pump) See List 12	WP 12-FP5114 Inspecting for Deterioration[b], operability, flow, discharge pressure, suction pressure, and pump speed
Fire Sprinkler Systems	Fire Protection Engineering	Monthly/ quarterly/ annually See List 12	WP 12-FP0025, WP 12-FP0063, and WP 12-FP0064 Inspecting for Deterioration[b], Leaks/Spills, water pressures, and main drain test
Fire and Emergency Response Vehicles (Fire Trucks, Fire Suppression Cart, and Rescue Cart/Truck)	Fire Department	Weekly See List 11	WP 12-FP0033 Inspecting for Mechanical Operability[m], Deterioration[b], Leaks/Spills, and Required Equipment[n]
Forklifts Used for Waste Handling (Electric and Diesel forklifts, Push-Pull Attachment)	Waste Handling	Preoperational [c] See List 8	WP 05-WH1201, WP 05-WH1207, WP 05-WH1401, WP 05-WH1402, WP 05-WH1403, and WP 05-WH1412 Inspecting for Leaks/Spills, Mechanical Operability[m], Deterioration[b], and On board fire suppression system
Automatic on-board fire suppression systems	Fire Protection Engineering	Semi-annually See List 12	WP 12-FP0060 Inspecting for Mechanical Operability[m] and Deterioration[b]
Hazardous Material Response Equipment	Fire Department	Quarterly See List 11	WP 12-FP0033 Inspecting for Deterioration[b], and Required Equipment[n]
Head Lamps	Facility Personnel	Daily[i]	Head lamps are operated daily and are repaired or replaced upon failure
Miners First Aid Station	Fire Department	Quarterly See List 11	WP 12-FP0035 Inspecting for Required Equipment[n]

System/Equipment Name	Responsible Organization	Inspection[a] Frequency and Job Title of Personnel Normally Making Inspection	Procedure Number and Inspection Criteria[h]
Mobile Phones	Facility Personnel	Daily[i]	Mobile Phones are operated daily and are repaired or replaced upon failure
Mine Pager Phones (between surface and underground)	Facility Operations	Monthly/Annually[o] See List 3	WP 04-PC3017 WP 04-PC3018 Testing of Mine Pager Phones at essential locations
MSHA Air Quality Monitor	Maintenance/ Underground Operations	Daily[l] See Lists 1 and 10	WP 12-IH1828 Inspecting for Air Quality Monitoring Equipment Functional Check
Perimeter Fence, Gates, Signs	Security	Daily See List 6	WP 17-SS1023 Inspecting for Deterioration[b] and Posted Warnings
Mine Rescue Self-Contained Breathing Apparatus (**SCBA**)	Mine Rescue Team	30 days See List 5	Inspection for Deterioration[b] and Pressure[g]
Fire Department SCBA	Fire Department	Weekly/monthly See List 11	WP 12-FP0029 Inspecting for Deterioration[b] and Pressure
Site Notification System; Underground Evacuation Alarm System	Facility Operations	Monthly/Annually See List 3	WP 04-PC3017 WP 04-PC3018 Testing of PA and Underground Alarms
Radio Equipment	Facility Personnel	Daily[i]	Radios are operated daily and are repaired or replaced upon failure
Salt Handling Shaft Hoist	Underground Operations	Preoperational [c] See List 1b and c	WP 04-HO1002 Inspecting for Deterioration[b], Safety Equipment, Communication Systems, and Mechanical Operability[m] in accordance with MSHA requirements
Self-Rescuers and Self-Contained Self-Rescuers	Underground Operations	Quarterly See List 1c	WP 04-AU1026 Inspecting for Deterioration[b] and Functionality in accordance with MSHA requirements
Surface TRU Mixed Waste Handling Area [k]	Waste Handling	Preoperational [c] or Weekly [e] See List 8	WP 05-WH1101 Inspecting for Deterioration[b], Leaks/Spills, Required Aisle Space, Posted Warnings, Communication Systems, Container Condition, and Floor coating integrity

System/Equipment Name	Responsible Organization	Inspection[a] Frequency and Job Title of Personnel Normally Making Inspection	Procedure Number and Inspection Criteria[h]
TRU Mixed Waste Decontamination Equipment	Waste Handling	Annually See List 8	WP 05-WH1101 Inspecting for Required Equipment[n]
Underground Openings—Roof Bolts and Travelways	Underground Operations	Weekly See List 1a	WP 04-AU1007 Inspecting for Deterioration[b] of Accessible Areas
Underground— Geomechanical Instrumentation System (GIS)	Geotechnical Engineering	Monthly See List 9	WP 07-EU1301 Inspecting for Deterioration[b]
Underground TRU Mixed Waste Disposal Area	Waste Handling	Preoperational [c] See List 8	WP 05-WH1810 Inspecting for Deterioration[b], Leaks/Spills, mine pager phones, equipment, unobstructed access, signs, debris, and ventilation
Uninterruptible Power Supply (Central UPS)	Facility Operations	Daily See List 3	WP 04-ED1542 Inspecting for Mechanical Operability[m] and Deterioration[b] with no malfunction alarms. Results of this inspection are logged in accordance with WP 04-AD3008.
TDOP Upender	Waste Handling	Preoperational [c] See List 8	WP 05-WH1010 Inspecting for Mechanical Operability[m] and Deterioration[b]
Ventilation Exhaust	Maintenance Operations	Quarterly See List 10 Quarterly See List 10 Semi-annually See List 10	IC413000 (700, 860, and 960 Fans) Flow verification of total mine airflow for fans in service IC041098 (700 Fans) Check for Deterioration[b] and Calibration of Mine Ventilation Rate Monitoring Equipment and flow verification of individual fans IC413005 (860 Fans) IC041087 (960 Fans) Check for Deterioration[b] and Calibration of Mine Ventilation Rate Monitoring Equipment and flow verification of individual fans
Waste Handling Cranes	Waste Handling	Preoperational [c] See List 8	WP 05-WH1407 Inspecting for Mechanical Operability[m], Deterioration[b], and Leaks/Spills

System/Equipment Name	Responsible Organization	Inspection[a] Frequency and Job Title of Personnel Normally Making Inspection	Procedure Number and Inspection Criteria[h]
Waste Hoist	Underground Operations	Preoperational [c] See List 1b and c	WP 04-HO1003 Inspecting for Deterioration[b], Safety Equipment, Communication Systems, and Mechanical Operability[m], Leaks/Spills, in accordance with MSHA requirements
Water Tanks	Facility Operations	Daily See List 3	WP 04-AD3008 Inspecting for Deterioration[b], valve lineup, and water levels. Results of this inspection are logged in accordance with WP 04-AD3008.
Push-Pull Attachment	Waste Handling	Preoperational [c] See List 8	WP 05-WH1401 Inspecting for Damage and Deterioration[b]
Trailer Jockey	Waste Handling	Preoperational [c] See List 8	WP 05-WH1405 Inspecting for Leaks/Spills, Mechanical Operability[m] and Deterioration[b]
~~Explosion-Isolation Walls~~	~~Underground Operations~~	~~Quarterly~~ ~~See List 1~~	~~PM000032~~ ~~Integrity and Deterioration[b] of Accessible Areas~~
Closure Bulkheads~~ in Filled Panels~~	Underground Operations	~~Monthly~~Semi-annually See List 1	PM000011 PM000015 Integrity and Deterioration[b] of Accessible Areas
Bolting Robot	Waste Handling	Preoperational [c] See List 8	WP 05-WH1203 Mechanical Operability[m]
Yard Transfer Vehicle	Waste Handling	Preoperational [c] See List 8	WP 05-WH1205 Mechanical Operability[m], Deterioration[b], Path clear of obstacles and Guards in proper place
Payload Transfer Station	Waste Handling	Preoperational [c] See List 8	WP 05-WH1208 Mechanical Operability[m], Deterioration[b], and Guards in proper place
Monorail Hoist	Waste Handling	Preoperational [c] See List 8	WP 05-WH1202 Mechanical Operability[m], Deterioration[b], and Leaks/Spills
Bolting Station	Waste Handling	Preoperational [c] See List 8	WP 05-WH1203 Mechanical Operability[m], Deterioration[b], and Guards in proper place

Table E-1 (Continued)
Inspection Schedule/Procedures Lists

List 1: Underground Operations

a. Mining Technician *
Senior Mining Technician *
Continuous Mining Specialist *
Senior Mining Specialist *
Mine OPS Supervisor *

b. Waste Hoist Operator
Waste Hoist Shaft Tender

c. U/G Facility Operations* - Self Rescuers
Shaft Technician *

d. Operations Engineer
Supervisor U/G Services*
Senior Operations Engineer*

List 2: Industrial Safety

a. Safety Technician *
Senior Safety Technician *
Safety Specialist *
Safety Engineer *
Industrial Hygienist *

b. Fire Protection Engineering *

List 3: Facility Operations

Facilities Technician *
Facility Operations Roving Watch *
Central Monitoring Room Operator
Operations Engineer
Senior Operations Engineer *
Facility Shift Manager*
Operations Technical Coordinator *

List 4: Facility Engineering

Senior Engineer *

List 5: General

Equipment Custodian*

List 6: Security

Security Protective *
Security Protective Supervisor *

List 8: Waste Handling

Manager, Waste Operations
TRU-Waste Handler

List 9: Geotechnical Engineering

Engineer Technician *
Associate Engineer *
Engineer *
Senior Engineer *
Principal Engineer*

List 10: Maintenance Operations

Maintenance Technician *
Maintenance Specialist *
Senior Maintenance Specialist *
Contractor *

List 11: Fire Department

Qualified Fire Department Personnel

List 12: Fire Protection Engineering

Fire Protection Engineering Representative*
Qualified Fire Department Personnel

Table E-1 (Continued)
Inspection Schedule/Procedures Notes

[a] Inspection may be accomplished as part of or in addition to regularly scheduled preventive maintenance inspections for each item or system. Certain structural systems of the WHB, Waste Hoist and Station A are also subject to inspection following severe natural events including earthquakes, tornados, and severe storms. Structural systems include columns, beams, girders, anchor bolts and concrete walls.

[b] Deterioration includes: obvious visible cracks, erosion, salt build-up, damage, corrosion, loose or missing parts, malfunctions, and structural deterioration.

[c] "Preoperational" signifies that inspections are required prior to the first use during a calendar day. For calendar days in which the equipment is not in use, no inspections are required. For an area this includes: area is clean and free of obstructions (for emergency equipment); adequate aisle space; emergency and communications equipment is readily available, properly located and sign-posted, visible, and operational. For equipment, this includes: checking fluid levels, pressures, valve and switch positions, battery charge levels, pressures, general cleanliness, and that all functional components and emergency equipment is present and operational.

[e] These weekly inspections apply to container storage areas when containers of waste are present for a week or more.

[g] Inspections are performed per manufacturer's maintenance instructions.

[h] Inspections and PM's are not required for equipment that is out of service. However, if compensatory measures have been established to ensure an equivalent level of protection during the period that the equipment is out of service (e.g., required equipment/supplies from an out-of-service emergency vehicle have been temporarily relocated), appropriate inspections will be scheduled, conducted, and documented in the Operating Record, in accordance with Attachment E, Section E-1.

[i] Head Lamps, Mobile Phones, and Radios are not routinely "inspected." They are typically used in day-to-day operations. They are used until they fail, at which time they are replaced and repaired.

[j] Fire extinguisher inspections are performed in accordance with NFPA 10.

[k] Surface CH TRU mixed waste handling areas include the Parking Area Unit, the WHB unit, and unloading areas.

[l] No log forms are used for daily readings. However, readings that are out of tolerance are reported to the CMR and logged by CMR operator. Inspection includes daily functional checks of portable equipment.

[m] Mechanical Operability means that the equipment has been checked and is operating in accordance with site safety requirements (e.g., proper fluid levels and tire pressure; functioning lights, alarms, sirens, and power/battery units; and belts, cables, nuts/bolts, and gears in good condition), as appropriate.

[n] Required Equipment means that the equipment identified in Table D-2 is available and usable (i.e., not expired/depleted and works as designed).

[o] Mine pager phones in non-essential locations are not routinely "inspected". Many are used in day-to-day operations. They are used until they fail, at which time they are repaired. Mine pager phones are used routinely by Underground Operations.

* Positions are not considered RCRA positions (i.e., personnel do not manage or respond to emergencies involving TRU mixed waste).

Table E-1a
RH TRU Mixed Waste Inspection Schedule/Procedures

System/ Equipment Name	Responsible Organization [J]	Inspection [a] Frequency and Job Title of Personnel Normally Making Inspection [J]	Procedure Number (Latest Revision)[l]	Inspection Criteria		
				Deterioration[b]	Leaks/ spills	Other
Cask Transfer Car(s)	Waste Operations	Pre-evolution [c,d,e] See List 1	WP05-WH1701 PM041187 (Semi-Annual)	Yes	NA	Pre-evolution Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication
RH Bay Overhead Bridge Crane	Waste Operations	Preoperational [c,d,e,i] See List 1	WP05-WH1741 PM041232 (Quarterly) PM041117 (Annual)	Yes	Yes	Pre-operational Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication
Facility Cask	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1713 PM041201 (Annual) PM041203 (Annual)	Yes	NA	Pre-evolution Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication. Electrical PM.
RH Bay Cask Lifting Yoke	Waste Operations	Preoperational [c,d,e,i] See List 1	WP05-WH1741 PM041169 (Annual)	Yes	NA	Pre-operational Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication
Facility Cask Transfer Car	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1704 PM041186 (Quarterly) PM041195 (Annual)	Yes	Yes	Pre-evolution Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication Electrical Inspection
Facility Cask Rotating Device	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1713 PM041175 (Annual) PM041176 (Annual)	Yes	Yes	Pre-evolution Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication Electrical Inspection
Facility Grapple	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1721 PM041172 (Quarterly) PM041177 (Annual)	Yes	NA	Pre-evolution Checks and Operating Instructions. Mechanical Inspection for Wear. Non-Destructive Examination
6.25-Ton Grapple Hoist	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1721 PM411028 (Annual)	Yes	Yes	Pre-evolution Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication
Transfer Cell Shuttle Car	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1705 PM041184 (Semi-Annual) PM041222 (Annual)	Yes	Yes	Pre-evolution Pre-operational Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication. Electrical Inspection.

System/ Equipment Name	Responsible Organization [J]	Inspection [a] Frequency and Job Title of Personnel Normally Making Inspection [J]	Procedure Number (Latest Revision)[I]	Inspection Criteria		
				Deterioration[b]	Leaks/ spills	Other
Cask Unloading Room	Waste Operations	Preoperational [c,d,e,f,h,i] See List 1	WP05-WH1744	Yes	NA	Floor integrity
Hot Cell	Waste Operations	Preoperational [c,d,e,f,g,h,i] See List 1	WP05-WH1744	Yes	NA	Floor integrity
Hot Cell Overhead Powered Manipulator	Waste Operations	Preoperational [c,d,e,i] See List 1	WP05-WH1743 PM041215 (Annual) PM041216 (Annual) IC411037 (Annual)	Yes	Yes	Pre-operational Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication. Electrical Inspection. Load Cell Calibration
Hot Cell Bridge Crane	Waste Operations	Preoperational [c,d,e,i] See List 1	WP05-WH1742 PM041217 (Annual) PM041209 (Annual) IC411038 (Annual)	Yes	Yes	Pre-operational Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication. Electrical Inspection. Load Cell Calibration.
Transfer Cell	Waste Operations	Preoperational [c,d,e,f,h,i] See List 1	WP05-WH1744	Yes	NA	Floor integrity
Facility Cask Loading Room	Waste Operations	Preoperational [c,d,e,f,h,i] See List 1	WP05-WH1744	Yes	NA	Floor integrity
Closed Circuit Television Camera	Waste Operations	Preoperational [c,i] See List 1	WP05-WH1757	NA	NA	Operability
Radiation Monitoring Equipment	Radiation Control	Preoperational [c,d,e] See List 2	WP12-HP1245 IC240010 WP12-HP1307 IC534000 WP12-HP1314 (Annual)	Yes	NA	Operability Checks, Functional Checks, Instrument calibrations, Flow Calibration, Efficiency Checks.
Cask Unloading Room Crane	Waste Operations	Preoperational [c,d,e,i] See List 1	WP05-WH1719 PM041190 (Quarterly) PM041191 (Annual) PM041192 (Annual) IC411035 (Annual)	Yes	Yes	Pre-operational Checks and Operating Instructions. Mechanical Inspection for Wear and Lubrication. Electrical Inspection. Load Cell Calibration.

System/ Equipment Name	Responsible Organization [J]	Inspection [a] Frequency and Job Title of Personnel Normally Making Inspection [J]	Procedure Number (Latest Revision)[l]	Inspection Criteria		
				Deterioration[b]	Leaks/ spills	Other
Horizontal Emplacement and Retrieval Equipment or functionally equivalent equipment	Waste Operations	Pre-evolution [c,d,e,f] See List 1	WP05-WH1700 PM052010 (Semi-Annual)[k] PM052011 (Annual) PM052013 PM052012 PM052014 (Annual)	Yes	Yes	Assembly and Operating Instructions. Electrical Inspection. Position Transducer Calibration. Tilt Sensor Calibration.
41-Ton Forklift	Waste Operations	Preoperational [c,d,e,i] See List 1	WP05-WH1602 PM074061 PM052003 (Hours of Use) PM074027 (Quarterly) PM074029 & PM074051 (Annual)	Yes	Yes	Pre-Operational Checks. PM performed every 100 hours of operation, every 500 hours of operation or every 5 Years. Quarterly Engine Emission Test. Annual Electrical Inspection. Annual NDE.
RH Bay	Waste Operations	Preoperational [c,d,e,h,i] See List 1	WP05-WH1744	Yes	NA	Floor integrity
Surface RH TRU Mixed Waste Handling Area	Waste Operations	Preoperational [i] See List 1	WP- 05 WH1744	Yes	Yes	Posted Warning, Communications

Table E-1a (Continued)
RH TRU Mixed Waste Inspection Schedule/Procedures Lists

List 1: Waste Operations

RH Waste Handling Engineer

Qualified TRU-Waste Handler

List 2: Radiological Control

Radiological Control Technician

Table E-1a (Continued)
RH TRU Mixed Waste Inspection Schedule/Procedures Notes

[a] Inspection may be accomplished as part of or in addition to regularly scheduled preventive maintenance inspections for each item or system. Certain structural systems of the WHB are also subject to inspection following severe natural events including earthquakes, tornados, and severe storms. Structural systems include columns, beams, girders, anchor bolts, and concrete walls.

[b] Deterioration includes: visible cracks, erosion, salt build-up, damage, corrosion, loose or missing parts, malfunctions, and structural deterioration.

[c] "Pre-evolution" signifies that inspections are required prior to equipment use in the waste handling process. (An evolution is considered to be from the receipt of a cask into the RH Bay through canister emplacement in the underground.) For an area, preoperational inspection includes: area is clean and free of obstructions (for emergency equipment); adequate aisle space; emergency and communications equipment is readily available, properly located and sign-posted, visible, and operational. For equipment, this includes: checking fluid levels, pressures, valve and switch positions, battery charge levels, pressures, general cleanliness, and that functional components and emergency equipment are present and operational. When the equipment is not in use, no inspections are required.

[d] When equipment needs to be inspected while handling waste (i.e., during waste unloading or transfer operations), general cleanliness and functional components will be inspected to detect any problem that may harm human health or the environment. The inspection will verify that emergency equipment is present.

[e] Inspection of RH TRU mixed waste equipment and areas in the RH Complex applies only after RH TRU mixed waste receipt begins.

[f] The inspection/maintenance activities associated with these pieces of equipment are performed when the RH Complex is empty of RH TRU mixed waste. If contamination is present, a radiation work permit may be needed.

[g] For the Hot Cell and Transfer Cell, if RH TRU mixed waste is present, camera inspections will be performed in lieu of physical inspection.

[h] The integrity of the floor coating will be inspected weekly if RH TRU mixed waste is present.

[i] "Preoperational" signifies that inspections are required prior to the first use in a calendar day.

[J] Responsible organizations refers to the organization that owns the equipment. Preventive Maintenance (PM) procedures are conducted by either mine maintenance or surface operations maintenance personnel and Instrument Calibration (IC) procedures are conducted by instrument and calibration maintenance personnel.

[k] Inspection will be performed after 250 evolutions (actual and training emplacements), if such usage occurs prior to the semi-annual inspection.

[l] Inspections and PM's are not required for equipment that is out of service.

Table E-2
Monitoring Schedule

System/Equipment Name	Responsible Organization	Monitoring Frequency	Purpose
Geomechanical [b]	Geotechnical Engineering	Monthly	To evaluate the geotechnical performance of the underground facility and to detect ground conditions that could affect operational safety
Central Monitoring System	Facility Operations	System Dependent	Monitor and provide status for the following facility parameters: Electrical Power Status [d] Fire Alarm System [e] Ventilation System Status [f] Meteorological Data System [g] Facility Systems (compressors [g], pumps [h], water tank levels [i], waste hoists [j])

[b] Equipment is listed as Underground-Geomechanical Instrumentation System (GIS) in Table E-1.
[d] Equipment listed as Backup Power Supply Diesel Generator in Table E-1.
[e] Equipment listed as Fire Detection and Alarm System in Table E-1.
[f] Equipment listed as Ventilation Exhaust in Table E-1.
[g] Not RCRA equipment.
[h] Equipment listed as Fire Pumps in Table E-1.
[i] Equipment listed as Water Tank Level in Table E-1.
[j] Equipment listed as Waste Hoist in Table E-1.

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ATTACHMENT G

CLOSURE PLAN

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ATTACHMENT G

CLOSURE PLAN

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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 and the Parking Area Unit (**PAU**). 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. 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.

The hazardous waste management units (**HWMUs**) addressed in this Closure Plan include the aboveground HWMU in the WHB, the parking area HWMU, and Panels 1 through 8, each consisting of seven rooms. In addition, this Closure Plan includes Panels 9 and 10 which are the main north-south entries in the underground, a portion of which may be used for waste disposal.

This plan was submitted to the New Mexico Environment Department (**NMED**) ~~and the U.S. Environmental Protection Agency (**EPA**)~~ in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(13)). Closure at the panel level will include the construction of barriers that will contribute to limiting~~to limit~~ the emission of hazardous waste constituents from the panel into the mine ventilation air stream below levels that meet environmental performance standards~~[1] and to mitigate the impacts of methane buildup and deflagration that may be postulated for some closed panels~~. The Post-Closure Plan (Permit Attachment H) includes the implementation of institutional controls to limit access and groundwater monitoring to assess disposal system performance. Until final closure is complete and has been certified in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.115), a copy of the approved Closure Plan and all approved revisions will be on file at the WIPP facility and will be available to the Secretary of

~~[1] The mechanism for air emissions prior to closure is different than the mechanism after closure. Prior to closure, volatile organic compounds (VOC) will diffuse through drum filters based on the concentration gradient between the disposal room and the drum headspace. These VOCs are swept away by the ventilation system, thereby maintaining a concentration gradient that is assumed to be constant. Hence, the VOCs in the ventilation stream are a function of the number of containers only. After closure, the panel air will reach an equilibrium concentration with the drum headspace and no more diffusion will occur. The only mechanism for release into the mine ventilation system is due to pressure that builds up in the closed panel. This pressure arises from the creep closure mechanism that is reducing the volume of the rooms and from the postulated generation of gas as the result of microbial degradation of organic matter in the waste. Consequently, the emissions after panel closure are a direct function of pressurization processes and rates within the panel.~~

the NMED or the U.S. Environmental Protection Agency (**EPA**) Region VI Administrator upon request.

G-1 Closure Plan

This Closure Plan is prepared in accordance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264 Subparts G, I, and X), Closure and Post-Closure, Use and Management of Containers, and Miscellaneous Units. The WIPP underground HWDUs~~,~~ ~~including Panels 1 through 8~~ shown on Figure G-1, will be closed under this Closure Plan~~permit~~ to meet the performance standards in 20.4.1.500 NMAC (incorporating 40 CFR §264.601). The WIPP surface facilities, including Waste Handling Building Container Storage Unit and the Parking Area Container Storage Unit, will be closed in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.178). The Permittees may perform partial closure of the WHB and PAU HWMUs prior to final facility closure and certification. For final facility closure, this plan also includes closure ~~of future waste disposal areas including Panels 9 and 10 and closure~~ and sealing of the facility shafts in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.601).

Following completion of waste emplacement in each underground HWDU, the HWDU will be closed. The Permittees will notify the NMED of the closure of each underground HWDU as specified in the schedule in Figure G-2. For the purpose of this Closure Plan, panel closure is defined as the process of rendering underground HWDUs in the repository inactive and closed according to the facility Closure Plan. The Post-Closure Plan (Permit Attachment H) addresses requirements for future monitoring that are deemed necessary for the post-closure period, ~~including monitoring closed panels~~ prior to final facility closure.

For the purposes of this Closure Plan, final facility closure is defined as closure that will occur when all waste disposal areas are filled or when the WIPP achieves its capacity of 6.2 million cubic feet (ft^3) (175,564 cubic meters (m^3)) of TRU waste. At final facility closure, the surface container storage areas will be closed, and equipment that can be decontaminated and used at other facilities will be cleaned and sent off site. Equipment that cannot be decontaminated plus any derived waste resulting from decontamination will be placed in the last open underground HWDU. ~~Stockpiled salt may be placed in the underground; it may be used as the core material for the berm component of the permanent marker system; or it must be otherwise disposed of in accordance with Sections 2 and 3 of the Minerals Act of 1947 (30 U.S.C. §§602 and 603).~~ In addition, shafts and boreholes which lie within the WIPP Site Boundary and penetrate the Salado Formation (**Salado**) will be plugged and sealed, and surface and subsurface facilities and equipment will be decontaminated and removed. Final facility closure will be completed to demonstrate compliance with the Closure Performance Standards contained in 20.4.1.500 NMAC (incorporating 40 CFR §264.111, 178, and 601).

In the event the Permittees fail to obtain an extension of the hazardous waste permit in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.51) or fail to obtain a new permit in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.10(h)), the Permittees will seek a modification to this Closure Plan in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42) to accommodate a contingency closure. Under contingency closure, storage units will undergo clean closure in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.178); waste handling equipment, shafts, and haulage ways will be inspected for hazardous waste residues (using, among other techniques, radiological surveys to indicate potential hazardous waste releases as described in Permit Attachment G3) and decontaminated as necessary; and underground HWDUs that contain radioactive mixed waste will be closed in accordance with the panel closure design described in this Closure Plan. Final facility closure, however, will be redefined and ~~a request for~~ a time extension for final closure will be requested. A copy of this Closure Plan will be maintained by the Permittees at the WIPP facility and at the U.S. Department of Energy (**DOE**) Carlsbad Field Office. The primary contact person at the WIPP facility is:

Manager, Carlsbad Field Office
U.S. Department of Energy
Waste Isolation Pilot Plant
P. O. Box 3090
Carlsbad, New Mexico 88221-3090
(575) 234-7300

G-1a Closure Performance Standard

The closure performance standard specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.111), states that the closure shall be performed in a manner that minimizes the need for further maintenance; that minimizes, controls, or eliminates the escape of hazardous waste; and that conforms to the closure requirements of §264.178 and §264.601. These standards are discussed in the following paragraphs.

G-1a(1) Container Storage Units

Final or partial closure of the permitted container storage units (the Waste Handling Building Unit and Parking Area Unit) will be accomplished by removing all waste and waste residues. Indication of waste contamination will be based, among other techniques, on the use of radiological surveys as described in Permit Attachment G3. Radiological surveys use very sensitive radiation detection equipment to indicate if there has been a potential release of TRU mixed waste, including hazardous waste components, from a container. This allows the Permittees to indicate potential releases that are not detectable from visible evidence such as stains or discoloration. Visual inspection and operating records will also be used to identify areas where decontamination is necessary. Contaminated surfaces will be decontaminated until radioactivity is below DOE-established radiological protection limits~~free release limits[2]~~. Once surfaces are determined to be free of radioactive waste constituents, they will be tested for hazardous waste contamination. These surface decontamination activities will ensure the removal of waste residues to levels protective of human health and the environment. The facility is expected to require no decontamination at closure because any waste spilled or released during operations will be contained and removed immediately. Solid waste management units listed in Attachment K, Table K-4 will be subject to closure. ~~In the event portions of these units which require decontamination cannot be decontaminated, these portions will be removed and the resultant wastes will be managed as appropriately.~~

Once the container storage units are decontaminated and certified by the Permittees to be clean, no further maintenance is required. The facilities and equipment in these units will be reused for other purposes as needed.

~~[2] The free release criteria for items, equipment, and areas is < 20 dpm/100 cm^2 for alpha radioactivity and < 200 dpm/100 cm^2 for beta-gamma radioactivity.~~

G-1a(2) Miscellaneous Unit

Post-closure migration of hazardous waste or hazardous waste constituents to ground or surface waters or to the atmosphere, above levels that will harm human health or the environment, will not occur due to facility engineering and the geological isolation of the unit. The engineering aspects of closure are centered on the use of panel closures on each of the underground HWDUs and final facility seals placed in the shafts. The design of the panel closure system is based on the criteria that the closure system for closed underground HWDUs will prevent migration of hazardous waste constituents in the air pathway in concentrations above health-based levels beyond the WIPP land withdrawal boundary during the 35 year operational and facility closure period~~ and to withstand any flammable gas deflagration that may occur prior to final facility closure~~.

Consistent with the definitions in 20.4.1.101 NMAC (incorporating 40 CFR §260.10), the process of panel closure is considered partial closure because it is a process of rendering a part of the repository inactive and closed according to the approved underground HWDU partial closure plan. Panel closure will be complete when the panel closure system is emplaced and operational, when that underground HWDU and related equipment and structures have been decontaminated (if necessary), and when the NMED has been notified of the closure.

Shaft seals are designed to provide effective barriers to the inward migration of ground water and the outward migration of gas and contaminated brine over two discrete time periods. Several components become effective immediately and are expected to function for 100 years. Other components become effective more slowly, but provide permanent isolation of the waste. The final shaft seal design is specified in Permit Attachment G2.

The facility will be finally closed ~~(i.e., decontaminated and decommissioned) ~~to minimize the need for continued maintenance. Protection of human health and the environment includes, but is not limited to:

- Prevention of any releases that may have adverse effects on human health or the environment due to the migration of waste constituents in the groundwater or in the subsurface environment [20.4.1.500 NMAC, incorporating 40 CFR §264.601(a)].
- Prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in surface water, in wetlands, or on the soil surface [20.4.1.500 NMAC, incorporating 40 CFR §264.601(b)].
- Prevention of any release that may have adverse effects on human health or the environment due to migration of waste constituents in the air [20.4.1.500 NMAC, incorporating 40 CFR §264.601(c)].

As part of final facility closure, surface recontouring and reclamation will establish a stable vegetative cover, and further surface maintenance will not be necessary to protect human health and the environment. Prior to cessation of active controls, monuments will be emplaced to serve as long-term site markers to discourage activities that would penetrate the facility or impair the ability of the salt formation to isolate the waste from the surface environment for at least 10,000 years. The Federal government will maintain administrative responsibility for the repository site in perpetuity and will limit future use of the area.

If, during panel or final facility closure activities, unexpected events require modification of this Closure Plan to demonstrate compliance with closure performance standards, a Closure Plan amendment will be submitted in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42).

G-1a(3) Post-Closure Care

The post-closure care period will begin after completion of the first panel closure and will continue for 30 years after final facility closure. The post-closure care period may be shortened or lengthened at the discretion of the regulatory agency based on evidence that human health and the environment are being protected or that they are at risk. During the post-closure period, the WIPP shall be maintained in a manner that complies with the environmental performance standards in 20.4.1.500 NMAC (incorporating 40 CFR §264.601). Post-closure activities are described in Permit Attachment H.

G-1b Requirements

The Permit specifies a sequential process for the closure of individual HWMUs at the WIPP. Each underground HWDU will undergo panel closure when waste emplacement in that panel is complete. Following waste emplacement in each underground HWDU, construction-side ventilation will be terminated and waste-disposal-side ventilation will be established in the next underground HWDU to be used, and the underground HWDU containing the waste will be closed. The Permittees will notify the NMED of the closure of each of the underground HWDUs as they are sequentially filled on a HWDU-by-HWDU basis. The HWMUs in the WHB and in the parking area will be closed as part of final facility closure of the WIPP facility.

The Permittees will notify the Secretary of the NMED in writing at least 60 days prior to the date on which closure activities are scheduled to begin.

G-1c Maximum Waste Inventory

The WIPP will receive no more than 6.2 million ft^3 (175,564 m^3) of TRU mixed waste, which may include up to 250,000 ft^3 (7,079 m^3) of remote-handled (**RH**) TRU mixed waste. Excavations are mined as permitted when needed during operations to maintain a reserve of disposal areas. The amount of waste placed in each room is limited by structural and physical considerations of equipment and design. Waste volumes include waste received from off-site generator locations as well as derived waste from disposal and decontamination operations. The maximum volume of TRU mixed waste in a disposal panel is established in Permit Part 4, Table 4.1.1. For closure planning purposes, a maximum achievable volume of 685,100 ft^3 (19,400 m^3) of TRU mixed waste per panel is used. This equates to 662,150 ft^3 (18,750 m^3) of contact-handled (**CH**) TRU mixed waste and 22,950 ft^3 (650 m^3) of RH TRU mixed waste per panel.

The maximum extent of operations during the term of this permit is expected to be Panels 1 through 10~~8~~ as shown on Figure G-1, the WHB Container Storage Unit, and the Parking Area Container Storage Unit. Note that panels 9 and 10 are not authorized for waste emplacement~~scheduled for excavation only~~ under this permit. If other waste management units are permitted during the Disposal Phase, this Closure Plan will be revised to include the additional waste management units. At any given time during disposal operations, it is possible that multiple rooms may be receiving TRU mixed waste for disposal at the same time.

Underground HWDUs in which disposal has been completed (i.e., in which CH and RH TRU mixed waste emplacement activities have ceased) will undergo panel closure.

G-1d Schedule for Closure

For the purpose of establishing a schedule for closure, an operating and closure period of no more than 35 years (25 years for disposal operations and 10 years for closure) is assumed. This operating period may be extended or shortened depending on a number of factors, including the rate of waste approved for shipment to the WIPP facility and the schedules of TRU mixed waste generator sites, and future decommissioning activities.

G-1d(1) Schedule for Panel Closure

The anticipated schedule for the closure of the underground HWDUs ~~known as Panels 3 through 8~~ is shown in Figure G-2. ~~This schedule assumes there will be little contamination within the exhaust drift of the panel.~~ Underground HWDUs should be ready for closure according to the schedule in Table G-1. Future~~These~~ dates are estimates for planning and permitting purposes. Actual dates may vary depending on the availability of waste from the generator sites.

In the schedule in Figure G-2, notification of intent to close occurs 30 days before placing the final waste in a panel. Once a panel is full, the Permittees will initially block ventilation through the panel as described in Permit Attachment A2, Section A2-2a(3) “Subsurface Structures,” and then will assess the closure area for ground conditions and contamination so that a definitive schedule and closure location~~design~~ can be determined. If as the result of this assessment the Permittees determine that a panel closure cannot be emplaced in accordance with the schedule in this Closure Plan, a modification will be submitted requesting an extension to the time for closure.

~~The Permittees will initially block ventilation through Panel 5 as described in Permit Attachment A2, Section A2-2a(3), “Subsurface Structures,” once Panel 5 is full. The Permittees will then install the explosion-isolation wall portion of the panel closure system that is described in Permit Attachment G1, Section 3.3.2, “Explosion- and Construction-Isolation Walls.” Construction of the explosion-isolation wall shall be completed within 180 days after the last receipt of waste in Panel 5. Final closure of Panels 1 through 6 will be completed as specified in this Permit no later than June 30, 2018.~~

~~To ensure continued protection of human health and the environment, the Permittees will initially block ventilation through Panels 3 through 7 as described in Permit Attachment A2, Section A2-2a(3), after waste disposal in each panel has been completed. The Permittees shall continue VOC monitoring in such panels until final panel closure. If the measured concentration, as confirmed by a second sample, of any VOC in a panel exceeds the 95% action level given in Permit Part 4, Table 4.6.3.2, the Permittees will initiate remedial actions as required by Permit Part 4, Section 4.6.3.3. Regardless of the outcome of disposal room VOC monitoring, final closure of Panels 3 and 4 will be completed as specified in this Permit no later than June 30, 2018.~~

G-1d(2) Schedule for Final Facility Closure

The Disposal Phase for the WIPP facility is expected to require a period of 25 years beginning with the first receipt of TRU waste at the WIPP facility and followed by a period ranging from 7 to 10 years for decontamination, decommissioning, and final closure. The Disposal Phase may therefore extend until 2024, and the latest expected year of final closure of the WIPP facility (i.e., date of final closure certification) would be 2034. If, as is currently projected, the WIPP facility is dismantled at closure, all surface and subsurface facilities (except the hot cell portion of the WHB, which will remain as an artifact of the Permanent Marker System [**PMS**]) will be disassembled and either salvaged or disposed in accordance with applicable standards. In addition, asphalt and crushed caliche that was used for paving will be removed, and the area will be recontoured and revegetated in accordance with a land management plan. A detailed closure schedule will be submitted in writing to the Secretary of the NMED, along with the notification of closure. Throughout the closure period, all necessary steps will be taken to prevent threats to human health and the environment in compliance with all applicable Resource Conservation and Recovery Act (**RCRA**) permit requirements. Figure G-3 presents an estimate of a final facility closure schedule based on 84 months to implement final closure.

The schedule for final facility closure is considered to be a best estimate because closure of the facility is driven by policies and practices established for the decontamination, if necessary, and decommissioning of radioactively contaminated facilities. These required activities include extensive radiological contamination surveys and hazardous constituent surveys using, among other techniques, radiological surveys to indicate potential hazardous waste releases. Both types of surveys will be performed at all areas of the WIPP site where hazardous waste were managed. These surveys, along with historical radiological survey records, will provide the basis for release of structures, equipment, and components for disposal or decontamination for release off site. Specifications will be developed for each structure to be removed. A cost benefit analysis will be needed to evaluate decontamination options if extensive decontamination is necessary. Individual equipment surveys, structure surveys, and debris surveys will be required prior to disposition. Size-reduction techniques may be required to dispose of mixed or radioactive waste at the WIPP site. Current DOE policy~~, as reflected in the WIPP facility Safety Analysis Report (**SAR**) (DOE 1997)~~, requires the preparation of a final decommissioning and decontamination (**D&D**) plan immediately prior to final facility closure. In this way, the specific conditions of the facility at the time D&D is initiated will be addressed. Section G-1e(~~2~~3) provides a more detailed discussion of final facility closure activities.

Figure G-3 shows the schedule for the final facility closure consisting of decontamination, as needed, of the TRU waste-handling equipment, and of the aboveground equipment and facilities, including closure of surface HWMUs; decontamination of the shaft and haulage ways; disposal of decontamination derived wastes in the last open underground HWDU; and subsequent closure of this underground HWDU. Subsequent activities will include installation of repository shaft seals.

An overall schedule for final facility closure, showing currently scheduled dates for the start and end of final facility closure activities is shown in Table G-2. The dates assume a startup~~start up~~ date of March 1999 and continued permitting of the WIPP facility until it is filled. Schedule details~~Details~~ for panel closures are shown on Table G-1.

G-1d(3) Extension for Closure Time

As indicated by the closure schedule presented in Figure G-3, the activities necessary to perform facility closure of the WIPP facility may~~will~~ require more than 180 days to complete because of additional stringent requirements for managing radioactive materials. Therefore, the Permit provides an extension of the 180-day final closure requirement in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.113). During the extended closure period, the

Permittees will continue to demonstrate compliance with applicable permit requirements and will take ~~all~~ steps necessary to prevent threats to human health and the environment as a result of TRU mixed waste management at the WIPP facility including ~~all of~~ the applicable measures in Permit Part 2.10 (*Preparedness and Prevention*~~Preparedness and Prevention~~).

In addition, according to the schedules in Figure G-3, the final derived wastes that are generated as the result of decontamination activities will not be disposed of for 16 months after the initiation of final facility closure. In accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.113(a)), the Permit provides an extension of the 90-day limit to dispose of final derived waste resulting from the closure process. This provision is necessitated by the fact that the radioactive nature of the derived waste makes placement in the WIPP repository the best disposition, and the removal of these wastes will, by necessity, take longer than 90 days in accordance with the closure schedules. During this extended period of time, the Permittees will take ~~all~~ steps necessary to prevent threats to human health and the environment, including compliance with ~~all~~ applicable permit requirements. These steps include ~~all of~~ the applicable preparedness and prevention measures in Permit Part 2.10 (*Preparedness and Prevention*)~~Permit Attachment A~~.

Finally, in the event the hazardous waste permit is not renewed as assumed in the schedule, the Permittees will submit a modification to the Closure Plan to implement a contingency closure that will allow the Permittees to continue to operate for the disposal of non-mixed TRU waste. This modification will include a request for an extension of the time for final facility closure. This modified Closure Plan will be submitted to the NMED for approval.

G-1d(4) Amendment of the Closure Plan

If it becomes necessary to amend the Closure Plan for the WIPP facility, the Permittees will submit, in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42), a written notification of or request for a permit modification describing any change in operation or facility design that affects the Closure Plan. The written notification or request will include a copy of the amended Closure Plan for approval by the NMED. The Permittees will submit a written notification of or request for a permit modification to authorize a change in the approved plan, if:

- There are changes in operating plans or in the waste management unit facility design that affect the Closure Plan
- There is a change in the expected year of closure
- Unexpected events occur during panel or final facility closure that require modification of the approved Closure Plan
- Changes in State or Federal laws affect the Closure Plan
- Permittees fail to obtain permits for continued operations as discussed above

The Permittees will submit a written request for a permit modification with a copy of the amended Closure Plan at least 60 days prior to the proposed change in facility design or operation or within 60 days of the occurrence of an unexpected event that affects the Closure Plan. If the unexpected event occurs during final closure, the permit modification will be requested within 30 days of the occurrence. If the Secretary of the NMED requests a modification of the Closure Plan, a plan modified in accordance with the request will be submitted within 60 days of notification or within 30 days, if the change in facility condition occurs during final closure.

G-1e Closure Activities

Closure activities include those instituted for panel closure (i.e., closure of filled underground HWDUs), contingency closure (i.e., closure of surface HWMUs and decontamination of other waste handling areas), and final facility closure (i.e., closure of surface HWMUs, D&D of surface facilities and the areas surrounding the WHB, and placement of repository shaft seals). Panel closure systems will be emplaced to separate areas of the facility and to isolate panels. Permit Attachments G1 and G2 provide panel closure system and shaft seal designs, respectively. All closure activities will meet the applicable quality assurance (**QA**)/quality control (**QC**) program standards in place at the WIPP facility. Facility monitoring procedures in place during operations will remain in place through final closure, as applicable.

G-1e(1) Panel Closure

Following completion of waste emplacement in each underground HWDU~~, disposal-side ventilation will be established in the next panel to be used, and~~ the HWDU~~panel~~ ~~containing the waste~~ will be closed. A WIPP Panel Closure (**WPC**)~~panel closure system~~ will be emplaced in the panel access drifts, in accordance with the design in Permit Attachment G1 and the schedule in Figure G-2 and Table G-1. Alternatively, panels may be closed simultaneously by placing panel closures in the north-south mains. The panel closure system is designed to meet the following requirements that were established by the DOE for the design to comply with 20.4.1.500 NMAC (incorporating 40 CFR §264.601(a)):

- the panel closure system shall contribute to meeting the closure performance standards in Permit Part 6, Section 6.10.1 by mitigating the migration of volatile organic compounds (**VOCs**) from closed panels~~limit the migration of VOCs to the compliance point so that compliance is achieved by at least one order of magnitude~~

- the panel closure system shall consider potential flow of VOCs through the disturbed rock zone (**DRZ**) in addition to flow through closure components

- the panel closure system shall perform its intended functions under loads generated by creep closure of the tunnels

- the panel closure system shall perform its intended function under the conditions of a postulated thermal runaway involving nitrate salt bearing waste~~methane explosion~~

- the nominal operational life of the closure system is 35 years

- the panel closure system may require minimal maintenance per 20.4.1.500 NMAC (incorporating 40 CFR 264.111)~~for each individual panel shall not require routine maintenance during its operational life~~

- the panel closure system shall address the expected~~most severe~~ ground conditions ~~expected~~ in the waste disposal area

- ~~the design class of~~ the panel closure system shall be built of substantial construction and non-combustible material except for flexible flashing used to accommodate salt movement~~IIIb (which means that it is to be built to generally accepted national design and construction standards)~~
- the design and construction shall follow conventional mining practices
- structural analysis shall use data acquired from the WIPP underground
- materials shall be compatible with their emplacement environment and function
- treatment of surfaces in the closure areas shall be considered in the design
- ~~thermal cracking of concrete shall be addressed~~
- ~~during construction,~~ a QA/QC program shall ~~be established to~~ verify material properties and construction ~~practices~~
- construction of the panel closure system shall consider shaft and underground access and services for materials handling

The closure performance standard for air emissions from the WIPP facility is one excess cancer death in one million and a hazard index (**HI**) of 1 for a member of the public living outside the WIPP Site Boundary as specified in Part 6, Section 6.10.1. ~~established in Permit Part 4 and Permit Attachment A2~~. Releases shall be below these limits for the facility to remain in compliance with standards to protect human health and the environment. The ~~following~~ panel closure design has been shown, through analysis, to meet these standards, if emplaced in accordance with the specifications in Permit Attachment G1. Compliance will be demonstrated by the Repository VOC Monitoring Program (**RVMP**) in Permit Attachment N. Compliance with the standards established for the RVMP constitutes compliance with the closure standards in Permit Part 6, Table 6.10.1.

~~The approved design for the panel closure system calls for a composite panel barrier system consisting of a rigid concrete plug with removal of the DRZ, and an explosion-isolation wall.~~ The design basis for this closure is such that the migration of hazardous waste constituents from closed panels during the operational and closure period would result in concentrations ~~well~~ below health-based standards. The source term used as the design basis included the average concentrations of VOCs from CH waste containers as measured in headspace gases through November 2010~~January 1995~~. The VOCs are assumed to have been released by diffusion through the container vents and are removed from the closed room by air leakage that occurs due to ventilation-related pressure differentials~~assumed to be in equilibrium with the air in the panel. Emissions from the closed panel occur at a rate determined by gas generation within the waste and creep closure of the panel~~.

Figures G-4 and G-5 show a diagram of the panel closure design and installation envelopes. Permit Attachment G1 provides the detailed design and the design analysis for the panel closure system. ~~Although the permit application proposed several panel closure design options, depending on the gas generated by wastes and the age of the mined openings, the NMED and EPA determined that only the most robust design option (D) would be approved. This decision does not prevent the Permittees from continuing to collect data on the behavior of the wastes~~

~~and mined openings, or proposing a modification to the Closure Plan in the future, using the available data to support a request for reconsideration of one or more of the original design options. If a design different from Option D as defined in Permit Attachment G1 is proposed, the appropriate permit modification will be sought.~~ The Permittees shall use bulkheads as specified in Attachment G1 for the closure of filled panels. A run-of-mine (**ROM**) salt component will be included in the closure for Panel 10.

G-1e(2) Prerequisite Activities for Panel 6 Final Closure

The NMED-approved WIPP Nitrate Salt Bearing Waste Container Isolation Plan (DOE, 2015) provides for performing prerequisite activities associated with ground control, equipment readiness, work control authorization, and ventilation prior to construction of the final closure in Panel 6. These activities are considered closure activities and will be completed in accordance with the WIPP Nitrate Salt Bearing Waste Container Isolation Plan (DOE, 2015).

G-1e(3~~2~~) Decontamination and Decommissioning

Decontamination is defined as those activities which are performed to remove contamination from surfaces and equipment that are not intended to be disposed of at the WIPP facility. The policy at the WIPP facility will be to decontaminate as many areas as possible or to fix the contaminants to the surface so they are not easily removable, consistent with radiological~~radiation~~ protection policy. Decontamination or fixing are~~is~~ part of ~~all~~ closure activities and are~~is~~ a necessary activity in the clean closure of the surface container management units. Decontamination or fixing determinations are based upon radiological ~~and hazardous constituent~~ surveys.

Decommissioning is the process of removing equipment, facilities, or surface areas from further use and closing the facility. Decommissioning is part of final facility closure only and will involve the removal of equipment, buildings, closure of the shafts, and establishing active and passive institutional controls for the facility. Passive institutional controls are not included in the Permit.

The objective of D&D activities at the WIPP facility is to return the surface to as close to the preconstruction condition as reasonably possible, while protecting the health and safety of the public and the environment. Major activities required to accomplish this objective include, but are not limited to the following:

1. Review of operational records for historical information on releases
2. Visual examination of surface structures for evidence of spills or releases
3. Performance of site contamination surveys
4. Decontamination, if necessary, of usable equipment, materials, and structures including surface facilities and areas surrounding the WHB.
5. Disposal of equipment/materials that cannot be decontaminated but that meet the treatment, storage, and disposal facility waste acceptance criteria (TSDF-WAC) in an underground HWDU
6. Emplacement of ~~final~~ panel closure system in the last HWDU

7. Emplacement of shaft seals[3]

8. Regrading the surface to approximately original contours

9. Initiation of active controls

This Closure Plan will be amended prior to the initiation of final closure activities to specify the methods to be used.

Health and Safety

Before final closure activities begin, radiation protection~~health physics~~ personnel will conduct a hazards survey of the unit(s) being closed. A release of radionuclides could also indicate a release of hazardous constituents. If radionuclides are not detected, sampling for hazardous constituents will still be performed if there is documentation or visible evidence that a spill or release has occurred. The purpose of the hazards survey will be to identify potential contamination concerns that may present hazards to workers during the closure activities and to specify any control measures necessary to reduce worker risk. This survey will provide the information necessary for the health physics personnel to identify worker qualifications, personal protective equipment (**PPE**), safety awareness, work permits, exposure control programs, and emergency coordination that will be required to perform closure related activities.

G-1e(3~~2~~)(a) Determine the Extent of Contamination

The first activities performed as part of decontamination include those needed to determine the extent of any contamination that needs to be removed or fixed prior to decommissioning a facility. This includes activities 1 to 3 above and, as can be seen by the schedules in Figures G-3 and G-4 (Items B and C), these surveys are anticipated to take 10 months to perform, including obtaining the results of any sample analyses. The process of identifying areas that require decontamination of fixing include three sources of information. First, operating records will be reviewed to determine where contamination has previously been found as the result of historical releases and spills. Even though releases and spills in the above ground storage units will have been cleaned up at the time of occurrence, newer equipment and technology may allow further cleaning. Second, surfaces of facilities and structures will be examined visually for evidence of spills or releases. Finally, extensive detailed contamination surveys will be performed to document the level of cleanliness for ~~all~~ surface structures and equipment that are subject to decontamination. If equipment or areas are identified as contaminated, the Permittees will notify NMED as specified in Permit Part 1, and a plan and procedure(s) will be developed and implemented to address decontamination-related questions, including:

- Should the component be decontaminated or disposed of as waste?
- What is the most cost-effective method of decontaminating the component?
- Will the decontamination procedures adequately contain the contamination?

Radiological and hazardous constituent surveys will be used in determining the presence of hazardous waste and hazardous waste residues in areas where spills or releases have

[3] For the purposes of planning, the conclusion of shaft sealing is used by the DOE as the end of closure activities and the beginning of the Post-Closure Care Period.

occurred. Radiological surveys are described in Permit Attachment G3. For contamination that is cleaned up, once~~Once~~ cleanup of the radioactivity has been completed, the surface will be sampled for hazardous constituents specified in Permit Attachment B to determine that they, too, have been cleaned up. Sampling and analysis protocols will be consistent with EPA's document SW-846 (EPA, 1996).

G-1e(3~~2~~)(b) Decontamination Activities

Once the extent of contamination is known, decontamination or fixing activities will be planned and performed. Radiological control and the control of hazardous waste residues are the primary criteria used in the design of decontamination activities. Radiological~~Radiation~~ control procedures require that careful planning and execution be used in decontamination activities to prevent the exposure of workers beyond applicable standards and to prevent the further spread of contamination. Careful control of entry, cleanup, and ventilation are vital components of radiological~~radiation~~ decontamination. The level of care mandated by DOE orders and occupational protection requirements results in closure activities that will exceed the 180 days allowed in 20.4.1.500 NMAC (incorporating 40 CFR §264.113(b)). Decontamination activities are included as item 4 above and are shown on the schedules for contingency closure and final facility closure (Figures G-3 and G-4) as activities D, E, and F. These activities are anticipated to have a duration of 20 months for both contingency closure and for final facility closure. The result of these activities is the clean closure of the surface container management units. Under contingency closure, the other areas that have been decontaminated will not be closed. Instead they will remain in use for continued waste management activities involving non-mixed waste. Under final facility closure, other areas that are decontaminated are eligible for closure.

~~The "Start Clean—Stay Clean" operating philosophy of the WIPP Project will provide for minimum need for decontamination. However, the need for decontamination techniques may arise.~~

Decontamination activities will be coordinated with closure activities so that areas that have been decontaminated will not be recontaminated. All waste resulting from decontamination activities will be surveyed and analyzed for the presence of radioactive contamination and a determination of hazardous constituents specified in Permit Attachment B. The waste will be characterized as hazardous, mixed, or radioactive and will be packaged and handled appropriately. Mixed and radioactive waste may~~will~~ be classified as TRU mixed waste managed in accordance with the applicable Permit requirements. Derived mixed waste collected during decontamination activities that are generated before repository shafts have been sealed will be emplaced in the facility, if appropriate, or will be managed together with decontamination derived waste collected after the underground is closed. This waste will be classified and shipped off site to an appropriate, permitted facility for treatment, if necessary, and for disposal.

Removal of Hazardous Waste Residues

Because of the type of waste management activities that will occur at the WIPP facility, waste residues that may be encountered during the operation of the facility and at closure may include derived waste. Derived wastes result from the management of the waste containers or may be collected as part of the closure activities (such as those during which wipes were used to sample the containers and equipment for potential radioactive contamination or those involving solidified decontamination solutions, the handling of equipment designated for disposal, and the handling of residues collected as a result of spill cleanup). Derived wastes collected during the operation and closure of the WIPP facility will be identified and managed as TRU mixed wastes. These wastes will be disposed in the active underground HWDU. Decontamination and decommissioning~~D&D~~ derived wastes and equipment designated for disposal will be placed in the last underground HWDU panel before closure of that unit.

Surface Container Storage Units

The procedures employed for waste receipt at the WIPP facility minimize the likelihood for any waste spillage to occur on the surface outside the WHB. TRU mixed waste is shipped to the WIPP facility in approved shipping containers (i.e., Contact-Handled or Remote-Handled Packages) that are not opened until they are inside the WHB. Therefore, it is unlikely that soil in the Parking Area Unit or elsewhere in the vicinity of the WHB will become contaminated with TRU mixed waste constituents as a result of TRU mixed waste management activities. An evaluation of the soils in the vicinity of the WHB will only be necessary if an ~~documented~~ event resulting in a release of hazardous waste has occurred outside the WHB.

~~The "Start Clean—Stay Clean" operating philosophy of the WIPP Project will minimize the need for decontamination of the WHB during decommissioning and closure. Procedures for opening shipping containers in the WHB limit the opportunity for waste spillage.~~

Should the need for decontamination of the WHB arise, the following methods may be employed, as appropriate, for the hazardous constituent/contaminant type and extent:

- Chemical cleaning (e.g., water, mild detergent cleanser, and polyvinyl alcohol)
- Nonchemical cleaning (e.g., sandblasting, grinding, high-pressure water spray, scabbler pistons and needle scalers, ice-blast technology, dry-ice blasting)
- Removal of contaminated components such as pipe and ductwork

Waste generated as a result of WHB decontamination activities will be managed as derived waste in accordance with applicable ~~p~~Permit requirements and will be emplaced in the last open underground HWDU for disposal.

Waste Handling Equipment ~~and~~

The waste shaft conveyance and associated waste handling equipment will be decontaminated to background or be disposed as derived waste as part of both contingency and final facility closure. Procedures for detection and sampling will be as described above. Equipment cleanup will be as above using chemical or nonchemical techniques.

Personnel Decontamination

Personal protective equipment (**PPE**)~~PPE~~ worn by personnel performing closure activities in areas determined to be contaminated will be disposed of appropriately. Disposable PPE used in such areas will be placed into containers and managed as TRU mixed waste. Non-disposable PPE will be decontaminated, if possible. Non-disposable PPE that cannot be decontaminated will be managed as TRU mixed waste.

In accordance with DOE policy, TRU mixed waste PPE will be considered to be contaminated with all of the hazardous waste constituents contained in the containers that have been managed within the unit being closed. Wastes collected as a result of closure activities and that may be contaminated with radioactive and hazardous constituents will be considered TRU mixed wastes. These wastes will be managed as derived wastes, as described in Permit Attachment A2. Such waste, collected as the result of closure of the WIPP facility, will be disposed of in the final open underground HWDU.

Cleanup Criteria

Radiological~~Radiation~~ decontamination will be less than or equal to ~~the following levels, or to~~ whatever ~~lesser~~ levels that may be established by DOE Order at the time of cleanup~~:~~.

~~Contamination Type~~	~~Loose~~[4]	~~Fixed plus removable~~
~~alpha contamination (α)~~	~~20 dpm/100 cm²~~	~~500 dpm/100 cm²~~
~~beta-gamma contamination (β-γ)~~	~~200 dpm/100 cm²~~	~~1000 dpm/100 cm²~~

Hazardous waste decontamination will be conducted in accordance with standards in 20.4.1.500 NMAC (incorporating 40 CFR §264) or as incorporated into the Permit.

Final Contamination Sampling and Quality Assurance

Verification samples will be analyzed by an approved laboratory that has been qualified by the DOE according to a written program with strict criteria. The QA requirements of EPA/SW-846, “Test Methods for Evaluating Solid Waste” (EPA, 1996~~1986~~), will be met for hazardous constituent sampling and analyses.

Quality Assurance/Quality Control

Because decisions about closure activities may be based, in part, on analyses of samples of potentially contaminated surfaces and media, a program to ensure reliability of analytical data is essential. Data reliability will be ensured by following a QA/QC program that mandates adequate precision and accuracy of laboratory analyses. Field documentation will be used to document the conditions under which each sample is collected. The documented QA/QC program in place at the WIPP facility will meet applicable RCRA QA requirements.

Field blanks and duplicate samples will be collected in the field to determine potential errors introduced in the data from sample collection and handling activities. To determine the potential for cross-contamination, rinsate blanks (consisting of rinsate from decontaminated sampling equipment) will be collected and analyzed. At least one rinsate blank will be collected for every 20 field samples. Duplicate samples will be collected at a frequency of one duplicate sample for every ten field samples. In no case will less than one rinsate blank or duplicate sample be collected for a field-sampling effort. These blank and duplicate samples will be identified and treated as separate samples. Acceptance criteria for QA/QC hazardous constituent sample analyses will adhere to the most recent version of EPA SW-846 or other applicable EPA guidance.

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[4] ~~The unit “dpm” stands for “disintegration per minute” and is the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.~~

G-1e(3~~2~~)(c) Dismantling

Final facility closure will include dismantling of structures on the surface and in the underground. These are items 6 and 7 above and are represented as Activity G in the final facility closure schedule in Figure G-3~~4~~. During dismantling, priority will be given to contaminated structures and equipment that cannot be decontaminated to assure these are properly disposed of in the remaining open underground HWDU in a timely manner. All such facilities and equipment are expected to be removed and disposed of 16 months after the initiation of closure. Dismantling of the balance of the facility, including those structures and equipment that are not included in the application and are not used for TRU mixed waste management, is anticipated to take an additional 66 months. It should be noted that the placement of D&D waste into the final underground HWDU may, by necessity, involve the placement of uncontainerized bulk materials such as concrete components, building framing, structural members, disassembled or partially disassembled equipment, or containerized materials in non-standard waste boxes. Such placement will only occur if it can be shown that it is protective of human health and the environment and all items are described in an amendment to the Closure Plan. Identification of bulk items is not possible at this time since their size and quantity will depend on the extent of non-removable contamination.

G-1e(3~~2~~)(d) Closure of Open Underground HWDU

The closure of the final underground HWDU is shown by Activity H in Figure G-3. This closure will be consistent with the description in Section G-1e(1) and the design in Permit Attachment G1. Detailed closure schedules for underground HWDUs are given in Figure G-2 and Table G-1.

G-1e(3~~2~~)(e) Final Facility Closure

Final facility closure includes several activities designed to assure both the short-term isolation of the waste and the long-term integrity of the disposal system. These include the placement of plugs in boreholes that penetrate the salt and the placement of the repository sealing system. In addition, the surface will be returned to as near its original condition as practicable, and will be readied for the construction of markers and monuments that will provide permanent marking of the repository location and contents.

Figure G-6 identifies where three existing boreholes overlie the proximate area of the repository footprint. Of these identified boreholes in Figure G-6, all but ERDA-9 are terminated hundreds of feet above the repository horizon. Only ERDA-9, which is accounted for in long-term performance modeling, is drilled through the repository horizon, near the WIPP excavations.

To mitigate the potential for migration beyond the repository horizon, the DOE has specified that borehole seals be designed to limit the volume of water that could be introduced to the repository from the overlying water-bearing zones and to limit the volume of contaminated brine released from the repository to the surface or water-bearing zones.

Borehole plugging activities have been underway since the 1970s, from the early days of the development of the WIPP facility. Early in the exploratory phase of the project, a number of boreholes were sunk in Lea and Eddy counties. After the WIPP site was situated in its current location, an evaluation of all vertical penetrations was made by Christensen and Peterson (1981).

As an initial criterion, any borehole that connects a fluid-producing zone with the repository horizon becomes a plugging candidate.

Grout plugging procedures are routinely performed in standard oil-field operations; however, quantitative measurements of plug performance are rarely obtained. The Bell Canyon Test reported by Christensen and Peterson (1981) was a field test demonstration of the use of cementitious plugging materials and modification of existing industrial emplacement techniques to suit repository plugging requirements. Cement emplacement technology was found to be "generally adequate to satisfy repository plugging requirements." Christensen and Peterson (1981) also report "that grouts can be effective in sealing boreholes, if proper care is exercised in matching physical properties of the local rock with grout mixtures. Further, the reduction in fluid flow provided by even limited length plugs is far in excess of that required by bounding safety assessments for the WIPP." The governing regulations for plugging and/or abandonment of boreholes are summarized in Table G-3.

The proposed repository sealing system design will prevent water from entering the repository and will prevent gases or brines from migrating out of the repository. The proposed design includes the following subsystems and associated principal functions:

- Near-surface: to prevent subsidence at and around the shafts
- Rustler Formation: to prevent subsidence at and around the shafts and to ensure compliance with ~~F~~federal and ~~State of~~ New Mexico groundwater protection requirements
- Salado ~~Formation~~: to prevent transporting hazardous waste constituents beyond the point of compliance specified in Permit Part 5

The repository sealing system will consist of natural and engineered barriers within the WIPP repository that will withstand forces expected to be present because of rock creep, hydraulic pressure, and probable collapses in the repository and will meet the closure requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.601 and §264.111). Permit Attachment G2 presents the final repository sealing system design.

Once shaft sealing is completed, the Permittees will consider closure complete and will provide the NMED with a certification of such within 60 days.

G-1e(3~~2~~)(f) Final Contouring and Revegetation

In the preparation of its Final Environmental Impact Statement (DOE, 1980), the DOE committed to restore the site to as near to its original condition as is practicable. This involves removal of access roads, unneeded utilities, fences, and any other structures built by the DOE to support WIPP operations. Provisions would be left for active post-closure controls of the site and for the installation of long-term markers and monuments for the purpose of permanently marking the location of the repository and waste. Permit Attachment H-1a(1) discusses the active and long-term controls proposed for the WIPP. Installation of borehole seals are anticipated to take 12 months, shaft seals 52 months, and final surface contouring 8 months.

G-1e(3~~2~~)(g) Closure, Monuments, and Records

A record of the WIPP Project shall be listed in the public domain in accordance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.116). Active access controls will be employed for at least the first 100 years after final facility closure. In addition, a passive control system consisting of monuments or markers will be erected at the site to inform future generations of the location of the WIPP repository (see "Permanent Marker Conceptual Design Report" [DOE, 1995~~b~~]).

This Permit requires only a ~~30~~ 30-year post-closure period. This is the maximum post-closure time frame allowed in an initial Permit for any facility, as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.117(a)). The Secretary of the NMED may shorten or extend the post-closure care period at any time in the future prior to completion of the original post-closure period (30 years after the completion of construction of the shaft seals). The Permanent Marker Conceptual Design Report and other provisions during the first 100 years after closure are addressed under another ~~F~~federal regulatory program.

Closure of the WIPP facility will contribute to the following:

- Prevention of the intrusion of fluids into the repository by sealing the shafts
- Prevention of human intrusion after closure
- Minimization of future physical and environmental surveillance

Detailed records shall be filed with local, ~~S~~state, and ~~F~~federal government agencies to ensure that the location of the WIPP facility is easily determined and that appropriate notifications and restrictions are given to anyone who applies to drill in the area. This information, together with land survey data, will be on record with the U.S. Geological Survey and other agencies. The ~~F~~federal government will maintain permanent administrative authority over those aspects of land management assigned by law. Details of post-closure activities are in Permit Attachment H.

G-1e(4~~3~~) Performance of the Closed Facility

20.4.1.500 NMAC (incorporating 40 CFR §264.601) requires that a miscellaneous unit be closed in a manner that protects human health and the environment. The RCRA Part B permit application addressed the expected performance of the closed facility during the ~~30~~ 30-year post closure period. Groundwater monitoring will provide information on the performance of the closed facility during the post-closure care period, as specified in Section H-1a(2) (Monitoring) of Permit Attachment H.

The principal barriers to the movement of hazardous constituents from the facility or the movement of waters into the facility are the halite of the Salado~~ Formation~~ (natural barrier) and the repository seals (engineered barrier). Data and calculations that support this discussion were presented in the permit application. The majority of the calculations performed for the repository are focused on long-term performance and making predictions of performance over 10,000 years. In the short term, the repository is reaching a steady state configuration where the hypothetical brine inflow rate is affected by the increasing pressure in the repository due to gas generation and creep closure. These three phenomena are related in the numerical modeling performed to support the permit application. The modeling parameters, assumptions and methodology were described in detail in the permit application.

G-2 Notices Required for Disposal Facilities

G-2a Certification of Closure

Within 60 days after completion of closure activities for a HWMU (i.e., for each storage unit and each disposal unit), the Permittees will submit to the Secretary of the NMED a certification that the unit (and, after completion of final closure, the facility) has been closed in accordance with the specifications of this Closure Plan. The certification will be signed by the Permittees and by an independent New Mexico registered professional engineer. Documentation supporting the independent registered engineer's certification will be furnished to the Secretary of the NMED with the certification.

G-2b Survey Plat

Within 60 days of completion of closure activities for each underground HWDU, and no later than the submission of the certification of closure of each underground HWDU, the Permittees will submit to the Secretary of the NMED a survey plat indicating the location and dimensions of hazardous waste disposal units with respect to permanently surveyed benchmarks. The plat will be prepared and certified by a professional land surveyor and will contain a prominently displayed note that states the Permittees' obligation to restrict disturbance of the hazardous waste disposal unit. In addition, the land records in the Eddy County Courthouse, Carlsbad, New Mexico, will be updated through filing of the final survey plats.

References

Christensen, C. L., and Peterson, E. W. 1981. "Field-Test Programs of Borehole Plugs in Southeastern New Mexico." In ~~The~~ *The Technology of High-Level Nuclear Waste Disposal Advances in the Science and Engineering of the Management of High-Level Nuclear Wastes*, P. L. Hofman and J. J. Breslin, eds., SAND79-1634C, DOE/TIC-4621, Vol. 1, pp. 354–369. Technical Information Center of the U.S. Department of Energy, Oak Ridge, TN.

DOE, see U.S. Department of Energy

EPA, see U.S. Environmental Protection Agency

U.S. Department of Energy, 1980, "Final Environmental Impact Statement, Waste Isolation Pilot Plant," DOE/EIS 0026, U.S. Department of Energy, Washington, D.C.

U.S. Department of Energy, 1995~~b~~, "Permanent Marker Conceptual Design Report," from Appendix PMR of the *Draft Compliance Certification Application*, Draft-DOE/CAO-2056, U.S. Department of Energy, Carlsbad, NM.

~~U.S. Department of Energy, 1997, "WIPP Safety Analysis Report," DOE/WIPP-95-2065, Revision 1, U.S. Department of Energy, Carlsbad, NM.~~

U.S. Department of Energy, 2015, "WIPP Nitrate Salt Bearing Waste Container Isolation Plan, Revision 2, Waste Isolation Pilot Plant Hazardous Waste Facility Permit Number: NM4890139088-TSDF," May 29, 2015, U.S. Department of Energy, Carlsbad, NM.

U.S. Environmental Protection Agency, 1996, "Test Methods for Evaluating Solid Waste," SW-846, U.S. Environmental Protection Agency, Washington, D.C.

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TABLES

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

HWDU	OPERATIONS START	OPERATIONS END	CLOSURE START	CLOSURE END
PANEL 1	3/99*	3/03*	3/03*	7/03* SEE NOTE 5
PANEL 2	3/03*	10/05*	10/05*	3/06* SEE NOTE 5
PANEL 3	4/05*	2/07*	2/07*	2/07* SEE NOTE 5
PANEL 4	1/07*	5/09*	5/09*	8/09* SEE NOTE 5
PANEL 5	3/09*	7/11*	7/11*	11/11* SEE NOTE 5
PANEL 6	3/11*	1/14*	1/14*	6/18~~*~~ SEE NOTE 5
PANEL 7	9/13*	6/18	7/18	3/19
PANEL 8	6/18	6/20	7/20	3/21
PANEL 9	6/20	1/28	2/28	SEE NOTE 4
PANEL 10	1/28	9/30	10/30	SEE NOTE 4

* Actual month and year

NOTE 1: Only Panels 1 to 4 will be closed under the initial term of this permit. Closure schedules for Panels 5 through 10 are projected assuming the Permit~~new permits~~ will be ~~issued in 2009 and 2019~~renewed.

NOTE 2: The point of closure start is defined as 60 days following notification to the NMED of closure.

NOTE 3: The point of closure end is defined as 180 days following placement of final waste in the panel.

NOTE 4: The time to close these areas may be extended depending on the nature and extent of the disturbed rock zone. The excavations that constitute these panels will have been opened for as many as 40 years so that the preparation for closure may take longer than the time allotted in Figure G-2. If this extension is needed, it will be requested as an amendment to the Closure Plan.

NOTE 5: Installation of the 12-foot explosion-isolation wall for Panels 1, 2, and 5 has been completed. Final closure of Panels 1 through 6 will be completed as specified in this Permit no later than June 30, 2018.

Table G-2
Anticipated Overall Schedule for Closure Activities

ACTIVITY	FINAL FACILITY CLOSURE	
	START	STOP
Notify NMED of Intent to Close WIPP (or to Implement Contingency Closure)	October 2030	N/A
Perform Contamination Surveys in both Surface Storage Areas	October 2030	April 2031
Sample Analysis	December 2030	July 2031
Decontamination as Necessary of both Surface Storage Areas	June 2031	January 2032
Final Contamination Surveys of both Surface Storage Areas	February 2032	September 2032
Sample Analysis	June 2032	January 2033
Prepare and Submit Container Management Unit Closure Certification	February 2033	May 2033
Dispose of Closure-Derived Waste	November 2030	January 2032
Closure of Open Underground HWDU panel	February 2032*	September 2032
Install Borehole Seals	October 2032	September 2033
Install Repository Seals	June 2033	September 2037
Recontour and Revegetate	October 2037	May 2038
Prepare and Submit Final (Contingency) Closure Certification	October 2037	May 2038
Post-closure Monitoring	July 2038	N/A

N/A--Not Applicable

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

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

Table G-3
Governing Regulations for Borehole Abandonment

Federal or State Land	Type of Well or Borehole	Governing Regulation	Summary of Requirements
Both	Groundwater Surveillance	State and Federal regulation in effect at time of abandonment	Monitor wells no longer in use shall be plugged in such a manner as to preclude migration of surface runoff or groundwater along the length of the well. Where possible, this shall be accomplished by removing the well casing and pumping expanding cement from the bottom to the top of the well. If the casing cannot be removed, the casing shall be ripped or perforated along its entire length if possible, and grouted. Filling with bentonite pellets from the bottom to the top is an acceptable alternative to pressure grouting.
Federal	Oil and Gas Wells	43 CFR Part 3160, §§ 3162.3-4	The operator shall promptly plug and abandon, in accordance with a plan first approved in writing or prescribed by the authorized officer.
Federal	Potash	43 CFR Part 3590, § 3593.1	(b) Surface boreholes for development or holes for prospecting shall be abandoned to the satisfaction of the authorizing officer by cementing and/or casing or by other methods approved in advance by the authorized officer. The holes shall also be abandoned in a manner to protect the surface and not endanger any present or future underground operation, any deposit of oil, gas, or other mineral substances, or any aquifer.
State	Oil and Gas Well Outside the Oil-Potash Area	State of New Mexico, Oil Conservation Division, Rule 202 (eff. 3-1-91)	B. Plugging (1) Prior to abandonment, the well shall be plugged in a manner to permanently confine all oil, gas, and water in the separate strata where they were originally found. This can be accomplished by using mud-laden fluid, cement, and plugs singly or in combination as approved by the Division on the notice of intention to plug. (2) The exact location of plugged and abandoned wells shall be marked by the operator with a steel marker not less than four inches (4") in diameter, set in cement, and extending at least four feet (4') above mean ground level. The metal of the marker shall be permanently engraved, welded, or stamped with the operator name, lease name, and well number and location, including unit letter, section, township, and range.
State	Oil and Gas Wells Inside the Oil-Potash Area	State of New Mexico, Oil Conservation Division, Order No. R-111-P (eff. 4-21-88)	F. Plugging and Abandonment of Wells (1) All existing and future wells that are drilled within the potash area, shall be plugged in accordance with the general rules established by the Division. A solid cement plug shall be provided through the salt section and any water-bearing horizon to prevent liquids or gases from entering the hole above or below the salt selection. It shall have suitable proportions—but no greater than three (3) percent of calcium chloride by weight—of cement considered to be the desired mixture when possible.

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FIGURES

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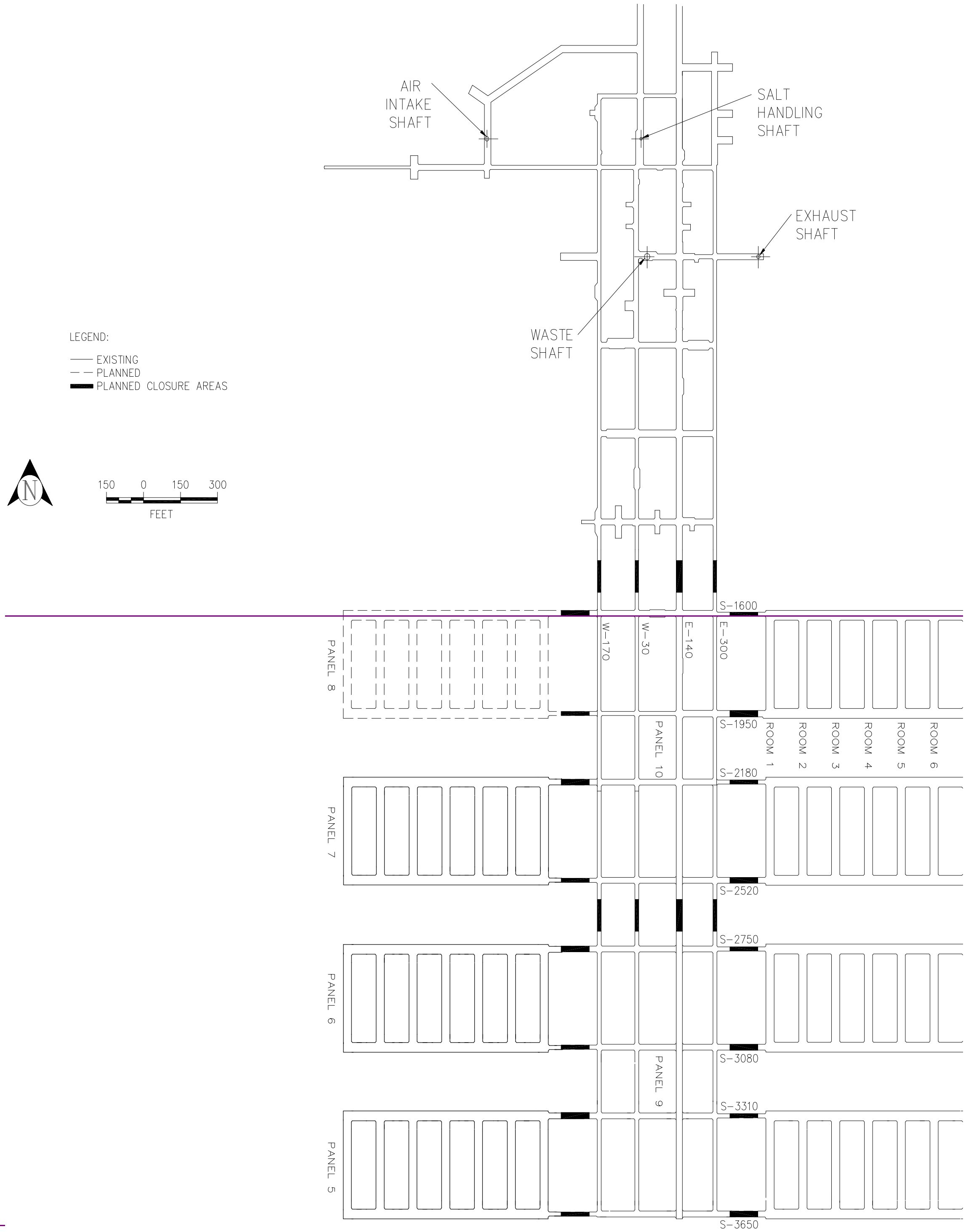
AIR
INTAKE
SHAFT
SALT
HANDLING
SHAFT
EXHAUST
SHAFT
WASTE
SHAFT
LEGEND:
EXISTING
PLANNED
PLANNED CLOSURE AREAS
N
150 0 150 300
FEET
S-1600
W-170
W-30
E-140
E-300
PANEL 8
S-1950
PANEL 10
S-2180
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
PANEL 7
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PANEL 6
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PANEL 9
S-3310
PANEL 5
S-3650

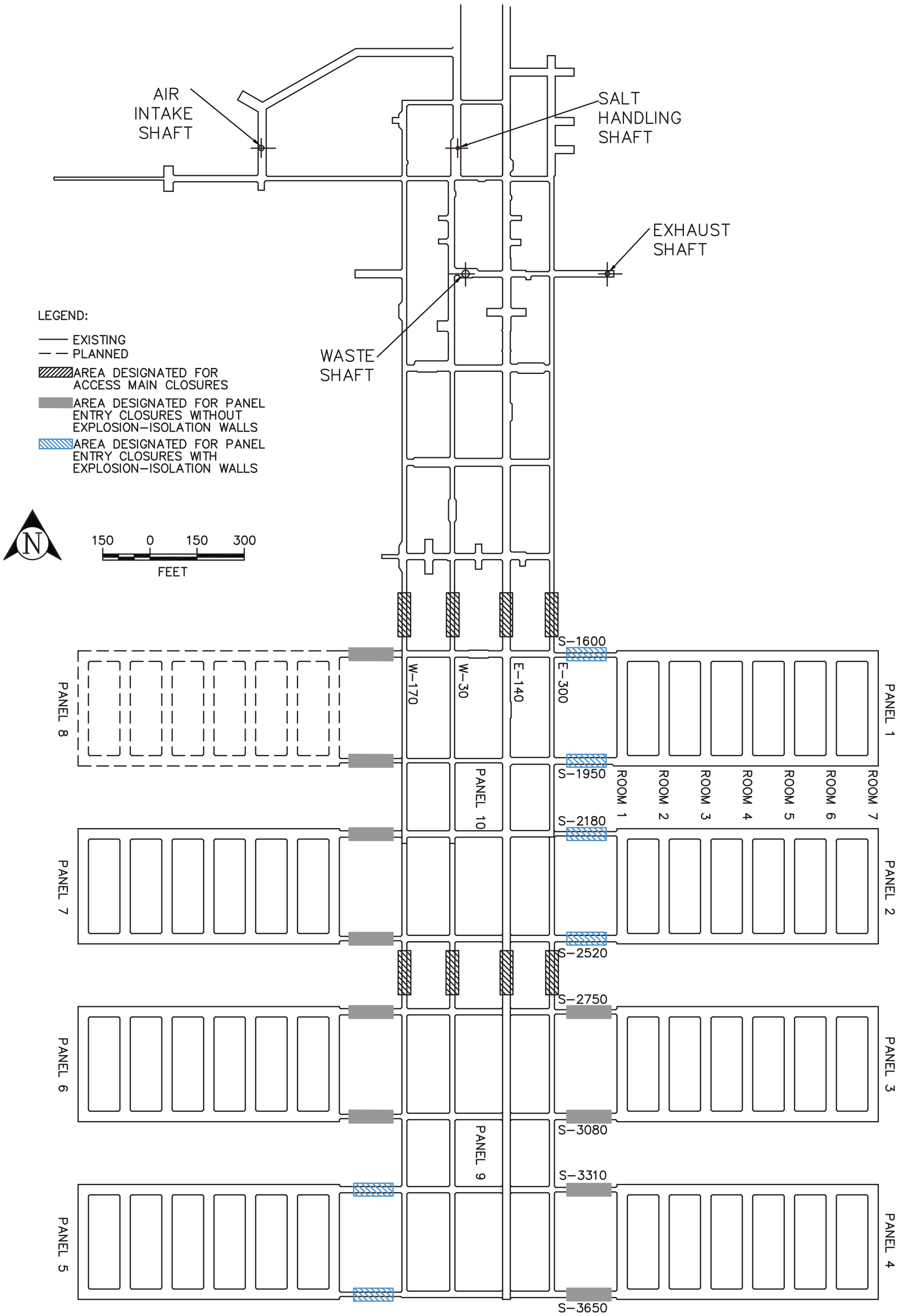


Figure G-1
Location of Underground HWDUs and Anticipated WPC~~Closure~~ Locations

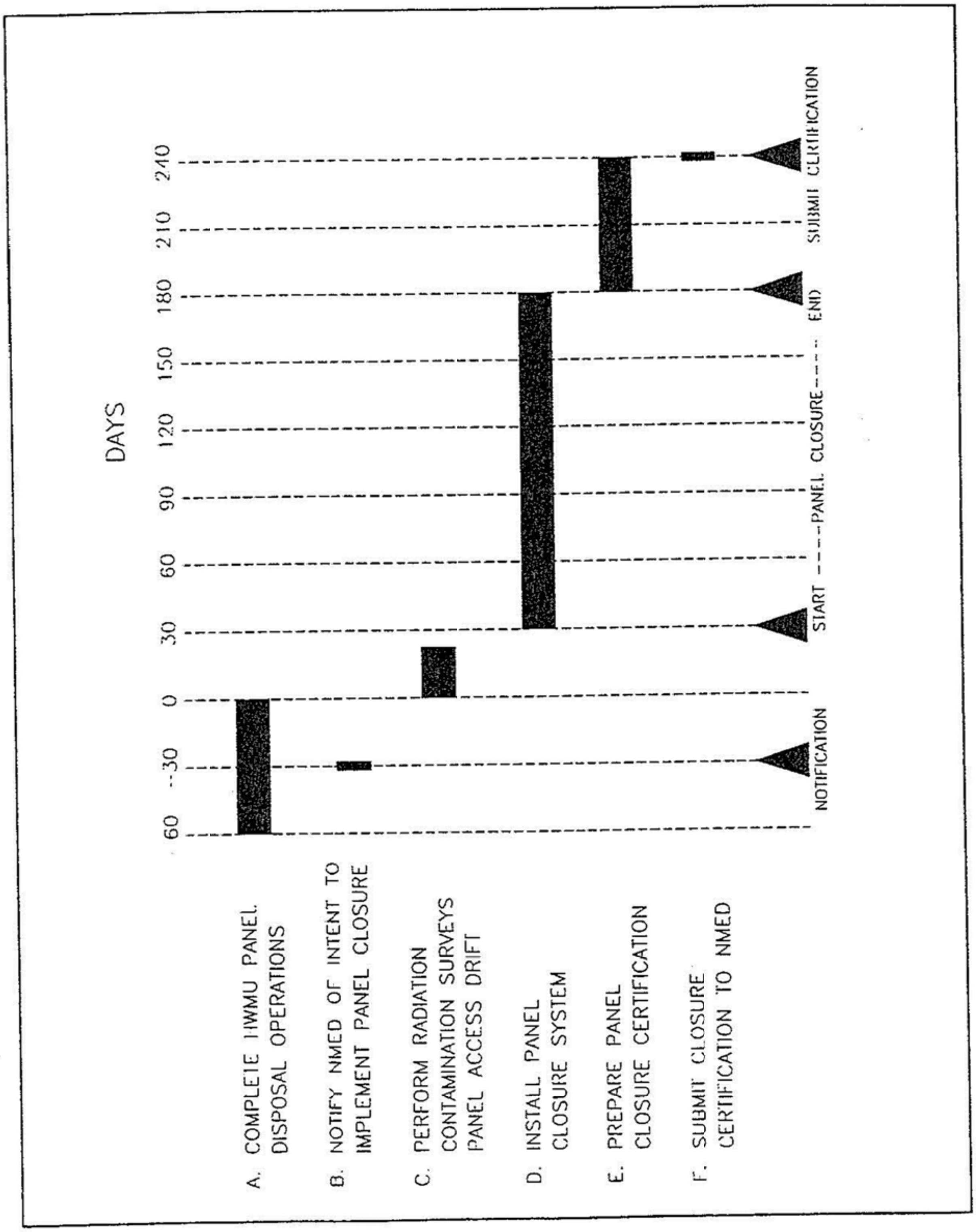


Figure G-2
WIPP Panel Closure Schedule

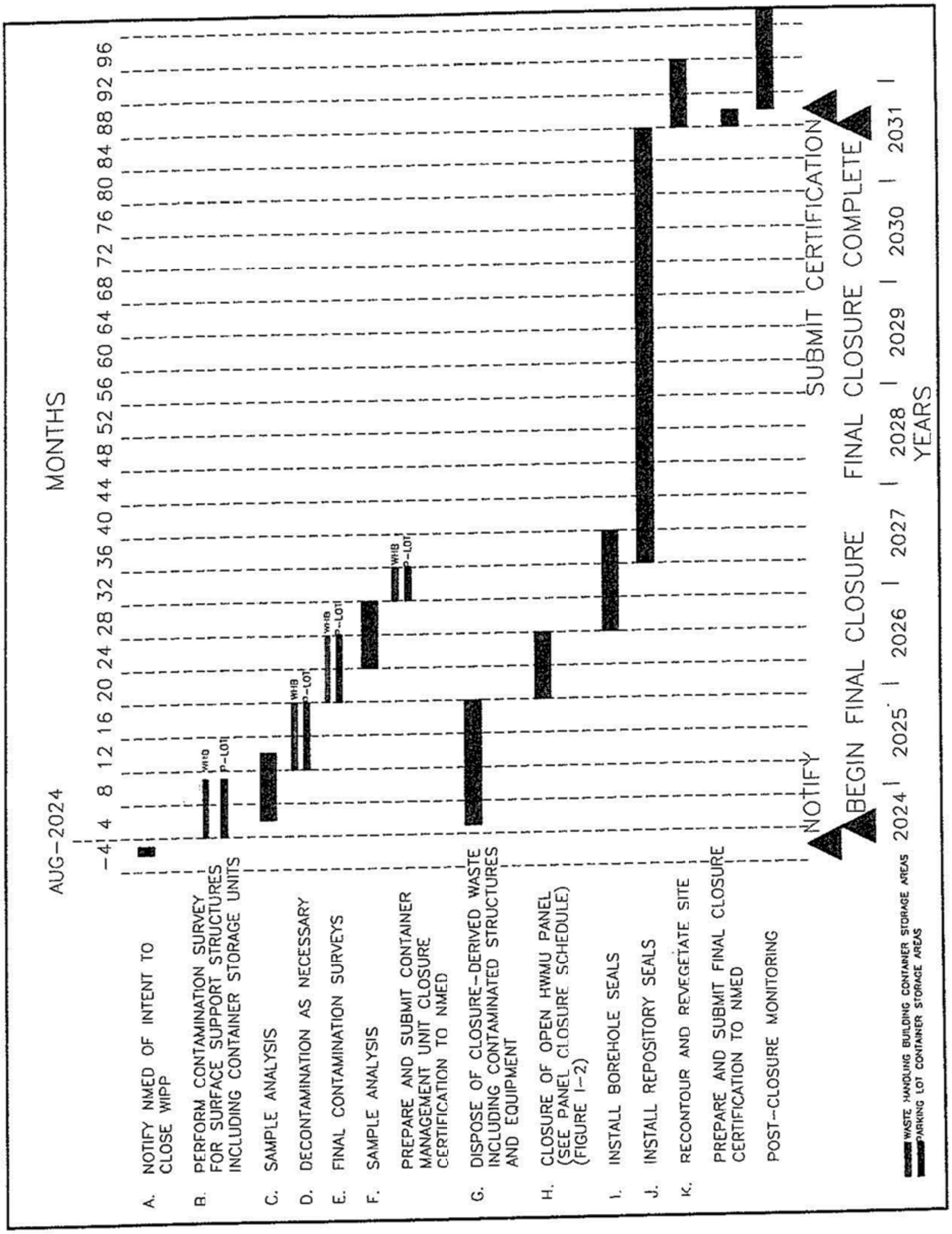
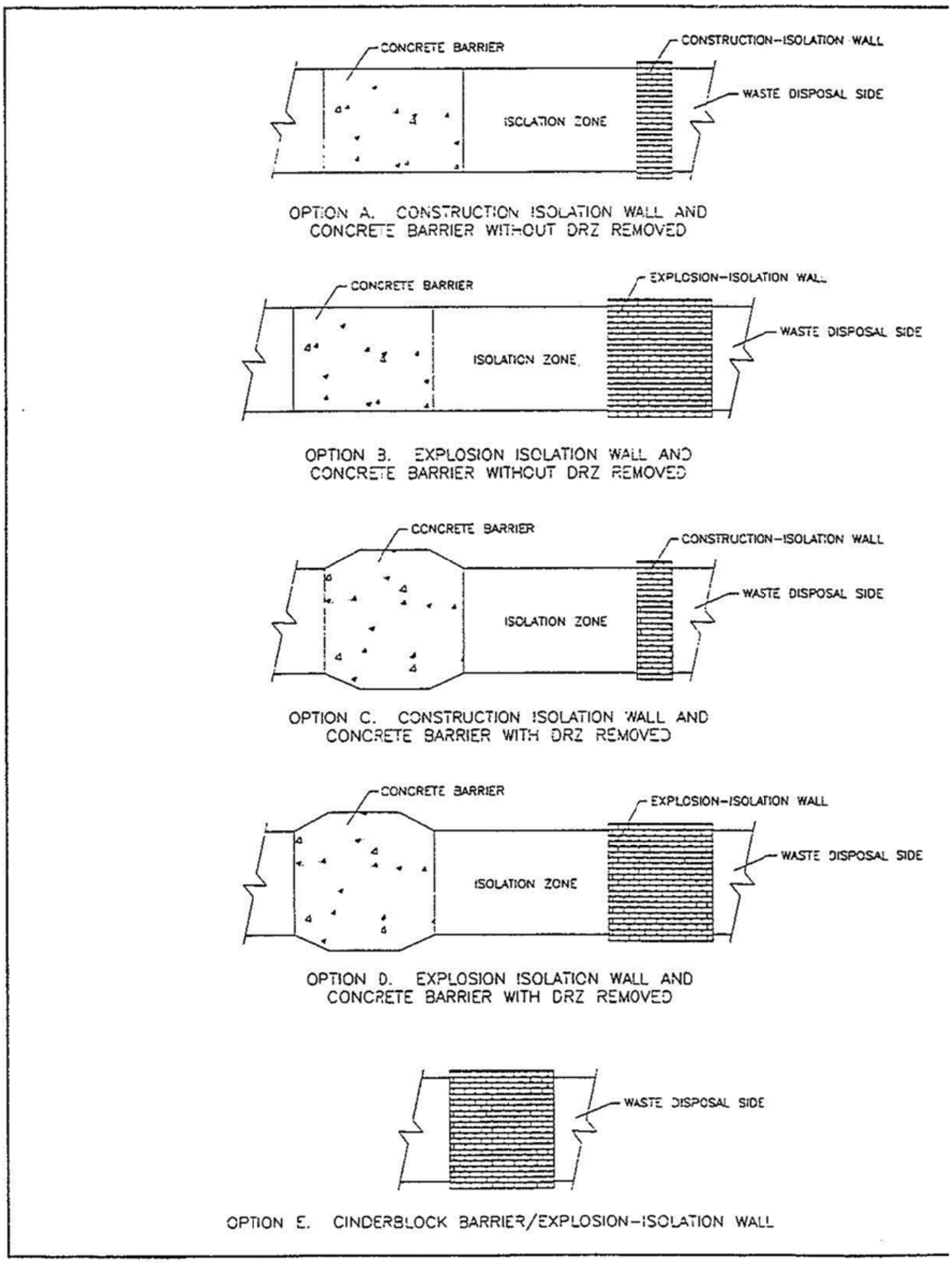


Figure G-3
WIPP Facility Final Closure 84-Month Schedule


CONCRETE BARRIER
CONSTRUCTION-ISOLATION WALL
WASTE DISPOSAL SIDE
ISOLATION ZONE
OPTION A. CONSTRUCTION ISOLATION WALL AND CONCRETE BARRIER WITHOUT DRZ REMOVED
CONCRETE BARRIER
EXPLOSION-ISOLATION WALL
WASTE DISPOSAL SIDE
ISOLATION ZONE
OPTION B. EXPLOSION ISOLATION WALL AND CONCRETE BARRIER WITHOUT DRZ REMOVED
CONCRETE BARRIER
CONSTRUCTION-ISOLATION WALL
WASTE DISPOSAL SIDE
ISOLATION ZONE
OPTION C. CONSTRUCTION ISOLATION WALL AND CONCRETE BARRIER WITH DRZ REMOVED
CONCRETE BARRIER
EXPLOSION-ISOLATION WALL
WASTE DISPOSAL SIDE
ISOLATION ZONE
OPTION D. EXPLOSION ISOLATION WALL AND CONCRETE BARRIER WITH DRZ REMOVED
WASTE DISPOSAL SIDE
OPTION E. CINDERBLOCK BARRIER/EXPLOSION-ISOLATION WALL

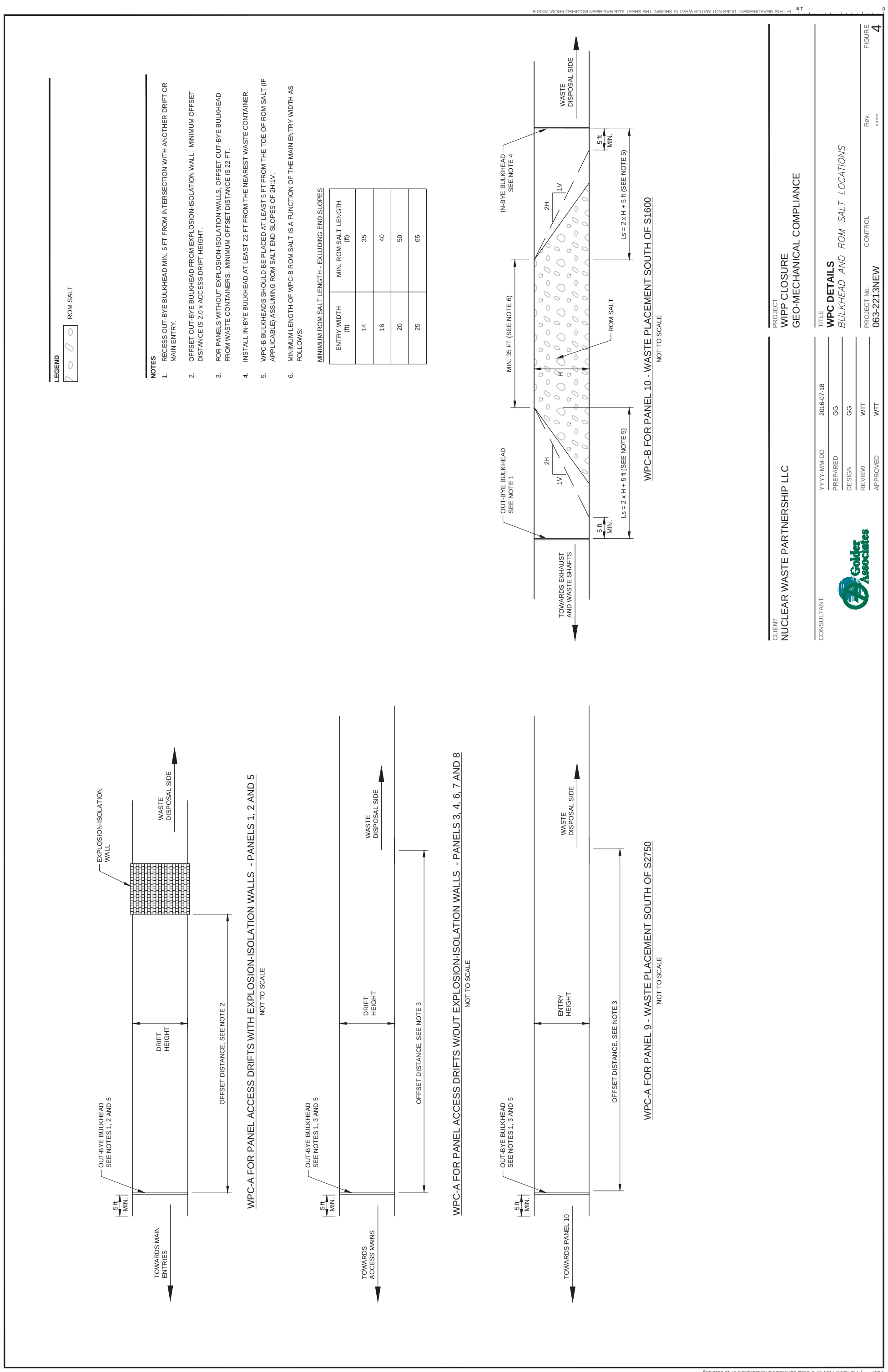
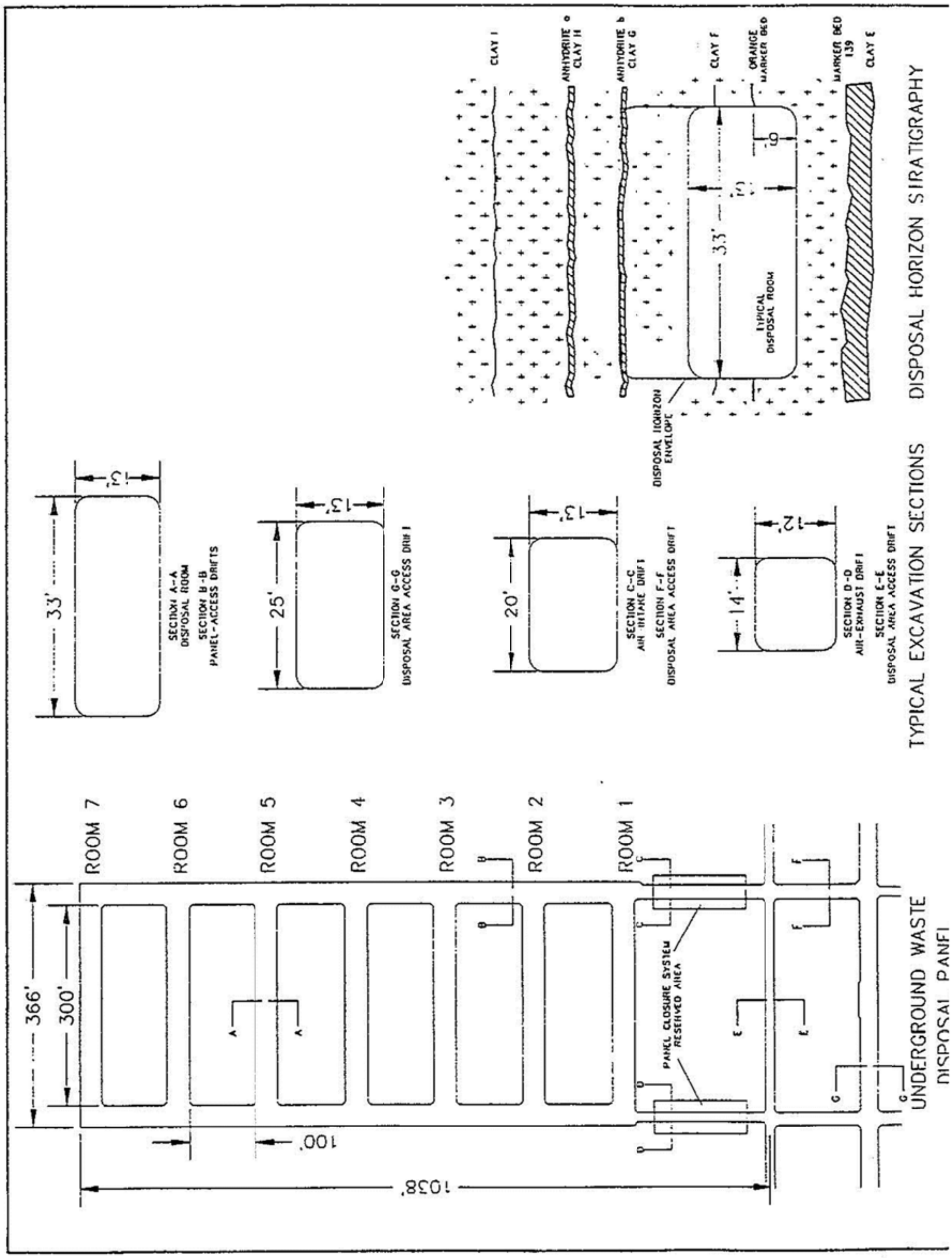


Figure G-4

~~Design of a Panel Closure System~~ <u>**Bulkhead and ROM Salt Locations**</u>


UNDERGROUND WASTE
DISPOSAL PANEL
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7
366'
300'
100'
1038'
PANEL CLOSURE SYSTEM RESERVED AREA
TYPICAL EXCAVATION SECTIONS
SECTION A-A DISPOSAL ROOM
SECTION B-B PANEL-ACCESS DRIFTS
33'
13'
SECTION G-G DISPOSAL AREA ACCESS DRIFT
25'
13'
SECTION C-C AIR INTAKE DRIFT
SECTION F-F DISPOSAL AREA ACCESS DRIFT
20'
13'
SECTION D-D AIR-EXHAUST DRIFT
SECTION E-E DISPOSAL AREA ACCESS DRIFT
14'
12'
DISPOSAL HORIZON STRATIGRAPHY
CLAY I
ANHYDRITE a
CLAY H
ANHYDRITE b
CLAY G
CLAY F
ORANGE MARKER BED
MARKER BED 139
CLAY E
TYPICAL DISPOSAL ROOM
DISPOSAL HORIZON ENVELOPE
33'
6'

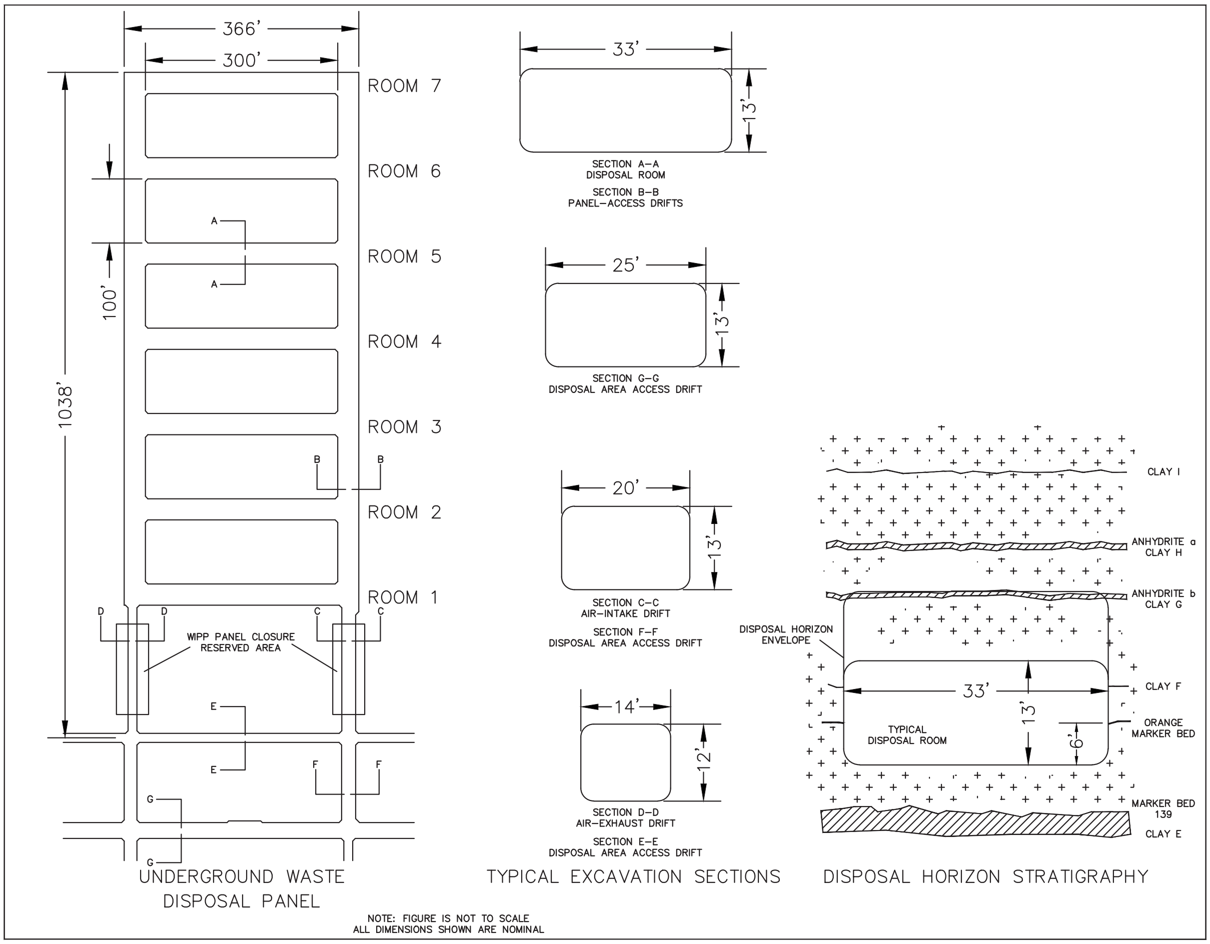
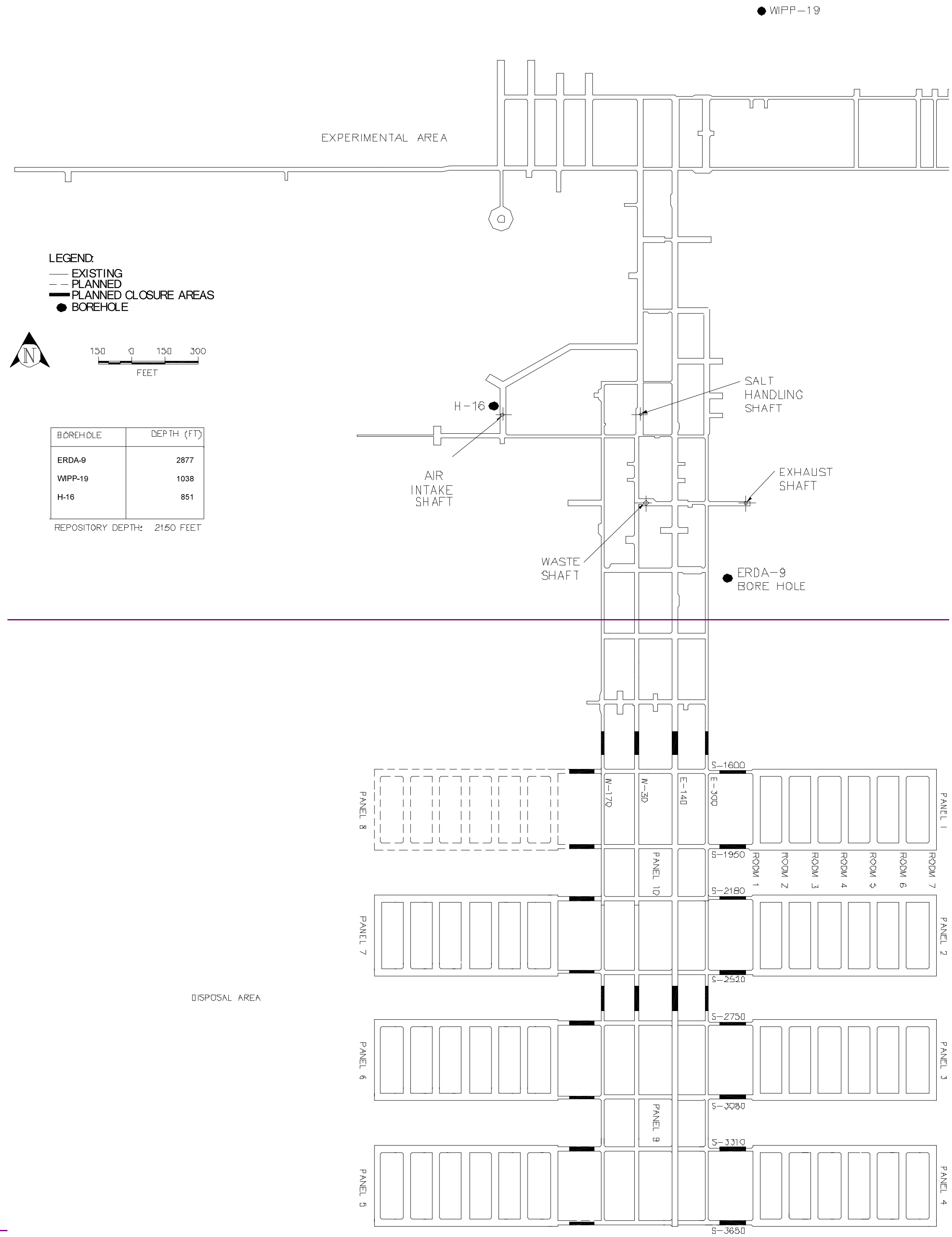
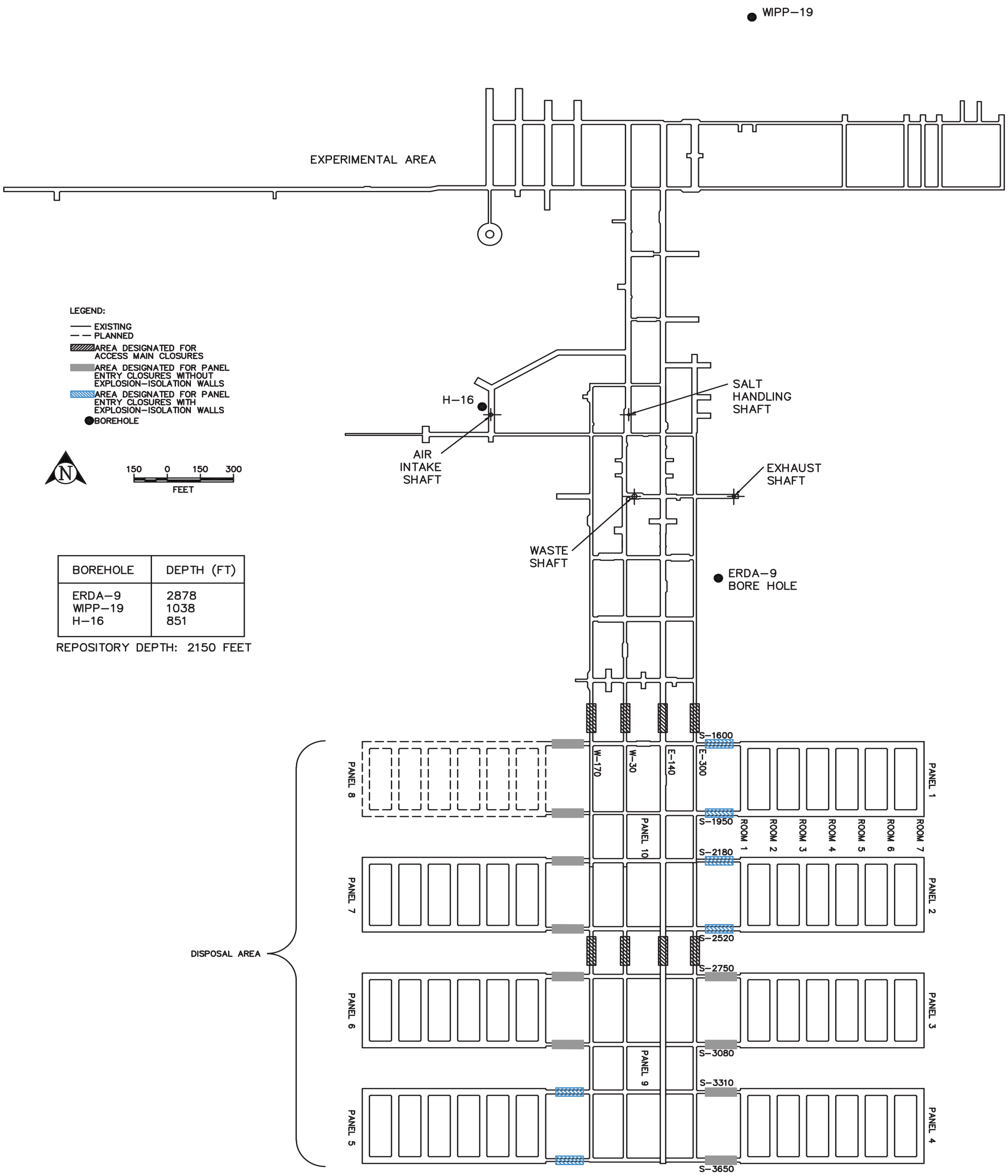


Figure G-5
Typical Disposal Panel


WIPP-19
EXPERIMENTAL AREA
LEGEND:
EXISTING
PLANNED
PLANNED CLOSURE AREAS
BOREHOLE
150 0 150 300
FEET
BOREHOLE DEPTH (FT)
ERDA-9 2877
WIPP-19 1038
H-16 851
REPOSITORY DEPTH: 2150 FEET
H-16
SALT HANDLING SHAFT
AIR INTAKE SHAFT
EXHAUST SHAFT
WASTE SHAFT
ERDA-9 BORE HOLE
S-1600
W-170
W-30
E-140
E-300
PANEL 8
PANEL 1
S-1950
PANEL 10
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7
S-2180
PANEL 7
PANEL 2
S-2520
DISPOSAL AREA
S-2750
PANEL 6
PANEL 3
S-3080
PANEL 9
S-3310
PANEL 5
PANEL 4
S-3650



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

ATTACHMENT G1

WIPP PANEL CLOSURE DESIGN DESCRIPTION AND SPECIFICATIONS~~DETAILED DESIGN REPORT FOR AN OPERATION PHASE PANEL CLOSURE SYSTEM~~

Adapted from the October 2016 Design Report – WIPP Panel Closure~~DOE/WIPP 96-2150~~

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ATTACHMENT G1

WIPP PANEL CLOSURE DESIGN DESCRIPTION AND SPECIFICATIONS~~DETAILED DESIGN REPORT FOR AN OPERATION PHASE PANEL CLOSURE SYSTEM~~

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~~*Appendices A through F are not included in the Permit.~~

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LIST OF ABBREVIATIONS/ACRONYMS

~~ACI~~	~~American Concrete Institute~~
~~AISC~~	~~American Institute for Steel Construction~~
~~*CFR~~	~~Code of Federal Regulations~~
~~cm~~	~~centimeter~~
~~°C~~	~~degrees celsius~~
~~°F~~	~~degrees Fahrenheit~~
~~DOE~~	~~U.S. Department of Energy~~
~~DRZ~~	~~disturbed rock zone~~
~~EEP~~	~~Excavation Effects Program~~
~~ESC~~	~~expansive salt-saturated concrete~~
~~FLAC~~	~~Fast Lagrangian Analysis of Continua~~
~~ft~~	~~foot (feet)~~
~~GPR~~	~~ground-penetrating radar~~
~~Kips~~	~~1,000 pounds~~
~~m~~	~~meter(s)~~
~~MB 139~~	~~Marker Bed 139~~
~~MOC~~	~~Management and Operating Contractor (Permit Section 1.5.3)~~
~~MPa~~	~~megapascal(s)~~
~~MSHA~~	~~Mine Safety and Health Administration~~
~~NMAC~~	~~New Mexico Administrative Code~~
~~NMED~~	~~New Mexico Environment Department~~
~~NaCl~~	~~sodium chloride~~
~~NMVP~~	~~no-migration variance petition~~
~~psi~~	~~pound(s) per square inch~~
~~RCRA~~	~~Resource Conservation and Recovery Act~~
~~SMC~~	~~Salado Mass Concrete~~
~~TRU~~	~~transuranic~~
~~VOC~~	~~volatile organic compound(s)~~
~~WIPP~~	~~Waste Isolation Pilot Plant~~
Permit	WIPP Hazardous Waste Facility Permit
RCRA	Resource Conservation and Recovery Act
ROM	run-of-mine

VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant
WPC	WIPP Panel Closure

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ATTACHMENT G1

~~DETAILED DESIGN REPORT FOR AN OPERATION PHASE PANEL CLOSURE SYSTEM~~

~~Executive Summary~~

~~**Scope.** Under contract to the Management and Operating Contractor (**MOC**), IT Corporation has prepared a detailed design of a panel-closure system for the Waste Isolation Pilot Plant (**WIPP**). Preparation of this detailed design of an operational-phase closure system is required to support a Resource Conservation and Recovery Act (**RCRA**) Part B permit application. This report describes the detailed design for a panel-closure system specific to the WIPP site. The recommended panel-closure system will adequately isolate the waste-emplacement panels for at least 35 years.~~

~~The report was modified to make it a part of the RCRA Permit issued by the New Mexico Environment Department. The primary change required in the original report was to specify that Panel Closure Design Options A, B, C and E are not approved as part of the facility Permit. Option D is the most robust of the original group of options, and it was specified in the Permit as the design to be constructed for all panel closures. The concrete to be used for panel closures is salt-saturated Salado Mass Concrete as specified in Permit Attachment G1, Appendix G, instead of the proposed plain concrete. The Permittees may submit proposals to modify the Permit (Part 2), the Closure Plan (Permit Attachment G) and this Appendix (identified as Permit Attachment G1) in the future, as specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.42).~~

~~Other changes included in this version of the report revised for the permit are minor edits to regulatory citations, deletion of references to the No Migration Variance Petition (no longer required under 40 CFR §268.6), and movement of all figures to the end of the document. Appendices A through F in the original document are not included in this Permit Attachment. Although those Appendices were important in demonstrating that the panel closures will meet the performance standards in the hazardous waste regulations, they do not provide design details or plans to be implemented as Permit requirements. References to these original Appendices were modified to indicate that they were part of the permit application, but are not included in the Permit. In contrast, Appendix G (Technical Specifications) and Appendix H (Design Drawings) are necessary components of future activities and are retained as parts of this Permit Attachment.~~

~~**Purpose.** This report provides detailed design and material engineering specifications for the construction, emplacement, and interface-grouting associated with a panel-closure system at the WIPP repository, which would ensure that an effective panel-closure system is in place for at least 35 years. The panel-closure system provides assurance that the limit for the migration of volatile organic compounds (**VOC**) will be met at the point of compliance, the WIPP site boundary. This assurance is obtained through the inherent flexibility of the panel-closure system. The panel-closure system will be located in the air-intake and air-exhaust drifts (Figure G1-1). The system components have been designed to maintain their intended functional requirements under loads generated from salt creep, internal pressure, and a postulated methane explosion. The design complies with regulatory requirements for a panel-closure system promulgated by RCRA and the Mine Health and Safety Administration (**MSHA**). The design uses common construction practices according to existing standards.~~

~~**Background.** The engineering design considers a range of expected subsurface conditions at the location of a panel-closure system. The geology is predominantly halite with interbedded anhydrite at the repository horizon. During the operational period, the panel-closure system would be subject to creep from the surrounding host rock that contains trace amounts of brine.~~

~~During the conceptual design stage, two air-flow models were evaluated: (1) unrestricted flow and (2) restricted flow through the panel-closure system. The "unrestricted" air flow model is defined as a model in which the gas pressure that develops is at or very near atmospheric pressure such that there exists no back pressure in the disposal areas. Flow is unrestricted in this model. The "restricted" air flow model is defined as a model in which the back pressure in the waste emplacement panels develops due to the restriction of flow through the barrier, and the surrounding disturbed rock zone. The analysis was based on an assumed gas generation rate of 8,200 moles per panel per year (0.1 moles per drum per year) due to microbial degradation, an expected volumetric closure rate of 28,000 cubic feet (800 cubic meters) per year due to salt creep, the expected headspace concentration for a series of nine VOCs, and the expected air dispersion from the exhaust shaft to the WIPP site boundary. The analysis indicated that the panel-closure system would limit the concentration of each VOC at the WIPP site boundary to a small fraction of the health-based exposure limits during the operational period.~~

~~**Alternate Designs.** Various options were evaluated considering active systems, passive systems, and composite systems. Consideration of the aforementioned factors led to the selection of a passive panel-closure system consisting of an enlarged tapered concrete barrier which will be grouted at the interface and an explosion-isolation wall. This system provides flexibility for a range of ground conditions likely to be encountered in the underground repository. No other special requirements for engineered components beyond the normal requirements for fire suppression and methane explosion or deflagration containment exist for the panel-closure system during the operational period.~~

~~The panel-closure system design incorporates mitigative measures to address the treatment of fractures and therefore minimizes the potential migration of contaminants. The design includes excavating the disturbed rock zone (**DRZ**) and emplacing an enlarged concrete barrier.~~

~~To be effective, the excavation and installation of the panel-closure system must be completed within a short time frame to minimize disturbance to the surrounding salt. A rigid concrete barrier will promote interface stress buildup, as fractures are expected to heal with time. For this purpose, the main concrete barrier would be tapered to reduce shear stress and to increase compressive stress along the interface zone.~~

~~**Design Classification.** Procedure WP 09-CN3023 (Westinghouse, 1995a) was used to establish a design classification for the panel-closure system. It uses a decision-flow-logic process to designate the panel-closure system as a Class IIIB structure. This is because during the methane explosion the concrete barrier would not fail.~~

~~**Design Evaluations.** To investigate several key design issues, design evaluations were performed. These design evaluations can be divided into those that satisfy (1) the operational requirements of the system and (2) the structural and material requirements of the system.~~

~~The conclusions reached from the evaluations addressing the operational requirements are as follows:~~

- ~~Based on an air-flow model used to predict the mass flow rate of carbon tetrachloride through the panel-closure system for the alternatives, the air-flow analysis suggests that the fully enlarged barrier provides the highest protection for restricting VOCs during the operational period of 35 years.~~

- ~~Results of the Fast Lagrangian Analysis of Continua (**FLAC**) analyses show that the recommended enlarged configuration is a circular rib-segment excavated to Clay G and under MB 139. Interface grouting would be performed at the upper boundary of the concrete barrier.~~

- ~~The results of the transverse plane-strain models show that higher stresses would form in MB 139 following excavation, but that after installation of the panel-closure system, the barrier confinement will result in an increase in barrier-confining stress and a reduction in shear stress. The main concrete barrier would provide substantial uniform confining stresses as the barrier is subjected to secondary salt creep.~~

- ~~The removal of the fractured salt prior to installation of the main concrete barrier would reduce the potential for flexure. The fracturing of MB 139 and the attendant fracturing of the floor could reduce structural load resistance (structural stiffness), which could initially result in barrier flexure and shear. With the removal of MB 139, the fractured salt stiffens the surrounding rock and results in the development of more uniform compression.~~

- ~~The trade-off study also showed that a panel-closure system with an enlarged concrete barrier with the removal of the fractured salt roof and anhydrite in the floor was found to be the most protective.~~

~~The conclusions reached from the design evaluations addressing the structural and material requirements of the panel-closure system are as follows:~~

- ~~Existing information on the heat of hydration of the concrete supports placing concrete with a low cement content to reduce the temperature rise associated with hydration. Plasticizers might be used to achieve the required slump at the required strength. A thermal analysis, coupled with a salt creep analysis, suggests installation of the enlarged barrier at or below ambient temperatures to adequately control hydration temperatures.~~

- ~~In addition to installation at or below ambient temperatures, the concrete used in the main barrier would exhibit the following:~~

    - ~~An 8 inch (0.2 meter) slump after 3 hours of intermittent mixing~~

    - ~~A less-than-25-degree Fahrenheit heat rise prior to installation~~

    - ~~An unconfined compressive strength of 4,000 pounds per square inch (psi) (28 megapascals [MPa]) after 28 days~~

- ~~Volume stability~~
- ~~Minimal entrained air.~~

- ~~The trace amounts of brine from the salt at the repository horizon will not degrade the main concrete barrier for at least 35 years.~~

- ~~In 20 years, the open passage above the waste stack would be reduced in size. Further, rooms with bulkheads at each end would be isolated in the panel. It is unlikely that a long passage with an open geometry would exist; therefore, the dynamic analysis considered a deflagration with a peak explosive pressure of 240 psi (1.7 MPa).~~

- ~~The heat-transfer analysis shows that elevated temperatures would occur within the salt and the explosion-isolation wall; however, the elevated temperatures will be isolated by the panel-closure system. Temperature gradients will not significantly affect the stability of the wall.~~

- ~~The fractures in the roof and floor could be affected by expanding gas products reaching pressures on the order of 240 psi (1.7 MPa). Because the peak internal pressure from the deflagration is only one fifth of the pressure, fractures could not propagate beyond the barrier.~~

~~A composite system is selected for the design with various components to provide flexibility. These design options are described below.~~

~~**Design Options.** Figure G1-2 illustrates the options developed to satisfy the requirements for the panel-closure system. The basis for selecting an option depends on conditions at the panel-closure system locations as would be documented by future subsurface investigations. As noted earlier, Option D is the only option approved for construction as part of the facility permit issued by the NMED.~~

~~While no specific requirements exist for barricading inactive waste areas under the MSHA, their intent is to safely isolate these abandoned areas from active workings using barricades of "substantial construction." A previous analysis (DOE, 1995) examined the issue of methane gas generation from transuranic waste and the potential consequence in closed areas. The principal concern is whether an explosive mixture of methane with an ignition source would result in deflagration. A concrete block wall of sufficient thickness will be used to resist dynamic and salt creep loads.~~

~~It was shown (DOE, 1995) that an explosive atmosphere may exist after approximately 20 years.~~

~~**Design Components.** The enlarged concrete barrier location within the air-intake and air-exhaust drifts will be determined following observation of subsurface conditions. The enlarged concrete barrier will be composed of salt-saturated Salado Mass Concrete with sufficient unconfined compressive strength. The barrier will consist of a circular rib segment excavated into the surrounding salt where the central portion of the barrier will extend just beyond Clay G and MB 139. FLAC analyses showed that plain concrete will develop adequate confined compressive strength.~~

~~The enlarged concrete barrier will be placed in four cells, with construction joints formed perpendicular to the direction of potential air flow. The concrete will be placed through 6-inch (15.2 centimeter) diameter steel pipes and will be vibrated from outside the formwork. The formwork is designed to withstand the hydrostatic loads that would occur during installation with minimal bracing onto exposed salt surfaces. This will be accomplished by a series of steel plates that are stiffened by angle iron, with load reactions carried by spacer rods. Some exterior bracing will be required when the concrete is poured into the first cell at the location for the enlarged concrete barrier. All structural steel will be American Society of Testing and Materials [grade] A36 in conformance with the latest standards specified by the American Institute for Steel Construction. After concrete placement, the formwork will be left in place and will stiffen the enlarged concrete barrier if nonuniform reactive loadings should occur after panel closure.~~

~~After completion of the enlarged concrete barrier installation, it will be grouted through a series of grout supply and air return lines that terminate in grout boxes. The boxes will be mounted near the top of the barrier. The grout will be injected through one set of lines and returned through a second set of air lines.~~

~~An explosion-isolation wall, constructed with concrete-blocks, will mitigate the effects of a methane explosion. The explosion-isolation wall would consist of 3,500 psi (24 MPa) concrete blocks mortared together with a bonding agent. The concrete-block wall design complies with MSHA requirements, because it consists of noncombustible materials of "substantial construction." The concrete-block walls will be keyed into the salt. For the WIPP, an explosion-isolation wall is designed to resist loading from salt creep.~~

~~The compliance of the detailed design was evaluated against the design requirements established for the panel-closure system. The design complies with all aspects of the design basis established for the panel-closure system.~~

~~1.0 Introduction~~

~~The Waste Isolation Pilot Plant (**WIPP**) repository, a U.S. Department of Energy (**DOE**) research facility located near Carlsbad, New Mexico, is approximately 2,150 feet (ft) (655 meters [m]) below the surface, in the Salado Formation. The WIPP facility consists of a northern experimental area, a shaft-pillar area, and a waste-emplacement area. The WIPP facility will be used to dispose transuranic (**TRU**) mixed waste.~~

~~One important aspect of future repository operations at the WIPP is the activities associated with closure of waste-emplacement panels. Each panel consists of air-intake and air-exhaust drifts, panel-access drifts, and seven rooms (Figure G1-1). After completion of waste-emplacement activities, each panel will be closed, while waste emplacement may be occurring in the other panel(s). The closure of individual panels during the operational period will be conducted in compliance with project-specific health, safety, and environmental performance criteria.~~

~~1.1 Scope~~

~~This report provides information on the detailed design and material engineering specifications for the construction, installation, and interface grouting associated with a panel-closure system for a minimum operational period of 35 years. The panel-closure system design provides assurance that the limit for the migration of volatile organic compounds (**VOC**) will be met at the~~

~~point of compliance, the WIPP site boundary. This assurance is obtained through the inherent flexibility of the panel closure system. The panel-closure system will be located in the air-intake and air-exhaust drifts to each panel (Figure G1-1). The panel-closure system design maintains its intended functional requirements under loads generated from salt creep, internal panel pressure, and a postulated methane explosion. The design complies with regulatory requirements for a panel-closure system promulgated by the Resource Conservation and Recovery Act (**RCRA**) and Mine Safety and Health Administration (**MSHA**) (see citations in Section 1.3 below).~~

~~Figure G1-3 illustrates the design process used for preparing the detailed design. The design process commenced with the evaluation of the performance requirements of the panel-closure system through review of the work performed in developing the conceptual design and the "Underground Hazardous Waste Management Unit Closure Criteria for the Waste Isolation Pilot Plant Operation Phase" (Westinghouse, 1995b). The various design evaluations were performed to address specific design-implementation issues identified by the project. The results of these design evaluations are presented in this report.~~

~~1.2 Design Classification~~

~~Procedure WP 09-CN3023 (Westinghouse, 1995a) was used to establish a design classification for the panel-closure system. The design classification for the panel-closure system evolved from addressing the short-term operational issues regarding the reduction of VOC migration. Figure G1-4 shows the decision flow logic process used to designate the panel-closure system as a Class IIIB structure.~~

~~1.3 Regulatory Requirements~~

~~The following subsections discuss the regulatory requirements specified in RCRA and MSHA for the panel-closure system.~~

~~1.3.1 Resource Conservation and Recovery Act (40 CFR §264 and §270)~~

~~In accordance with 20.4.1.500 NMAC, incorporating Title 40, Code of Federal Regulations (**CFR**), Part 264, Subpart X (40 CFR §264, Subpart X), "Miscellaneous Units," and 20.4.1.900 NMAC, incorporating 40 CFR §270.23, "Specific Part B Information Requirements for Miscellaneous Units," a RCRA Part B permit application has been submitted for the WIPP facility.~~

~~1.3.2 Protection of the Environment and Human Health~~

~~The WIPP RCRA Part B permit application indicates that VOCs must not exceed health-based standards beyond the WIPP site boundary. Worker exposure to VOCs, and VOC emissions to non-waste workers or to the nearest resident will not pose greater than a 10^{-6} excess cancer risk in order to meet health-based standards. The panel-closure system design incorporates measures to mitigate VOC migration for compliance with these standards.~~

~~1.3.3 Closure Requirements 20.4.1.500 NMAC~~

~~The Permittees will notify the Secretary of the New Mexico Environment Department in writing at least 60 days prior to the date on which partial and final closure activities are scheduled to begin.~~

~~1.3.4 Mining Safety and Health Administration~~

~~The significance of small natural-gas occurrences within the WIPP repository is within the classification of Category IV for natural gas under the MSHA (30 CFR 57, Subpart T) (MSHA, 1987). These regulations include the hazards of methane gas and volatile dust. Category IV "applies to mines in which non-combustible ore is extracted and which liberate a concentration of methane that is not explosive nor capable of forming explosive mixtures with air based on the history of the mine or the geological area in which the mine is located." For "barriers and stoppings," the regulations provide for noncombustible materials (where appropriate) for the specific mine category and require that "barriers and stoppings" be of "substantial construction." Substantial construction implies construction of such strength, material, and workmanship that the barrier could withstand air blasts, methane detonation or deflagration, blasting shock, and ground movement expected in the mining environment.~~

~~1.4 Report Organization~~

~~This report presents the engineering package for the detailed design of the panel-closure system. Chapter 2.0 presents the design evaluations. Chapter 3.0 describes the design and Chapter 4.0 presents the Constructability Design Calculations Index. Chapter 5.0 shows the technical specifications. Chapter 6.0 presents the design drawings. The conclusions are presented in Chapter 7.0 and the references presented in Chapter 8.0. Appendices to this report provide detailed information to support the information contained in Chapters 2.0 through 7.0 of this report.~~

~~2.0 Design Evaluations~~

~~This chapter in the Part B permit application presented the results of the various design evaluations that support the panel-closure system: (1) analyses addressing the operational requirements, and (2) analyses addressing the structural and material requirements. These evaluations were important in demonstrating that the panel closures will adequately restrict releases of VOCs and will be structurally stable during the operations phase of the WIPP. However, these evaluations are not necessary as part of the facility permit and have been deleted from this edited document.~~

~~3.0 Design Description~~

~~This chapter presents the final design selected from the evaluations performed in the previous chapter. It presents design modifications to cover a range of conditions that may be encountered in the underground and describes the design components for the panel-closure system. Finally, information is presented on the proposed construction for the panel-closure system.~~

~~3.1 Design Concept~~

~~The composite panel-closure system proposed in the permit application included (1) a standard concrete barrier, rectangular in shape, or (2) an enlarged tapered concrete barrier. Options (1) and (2) were both proposed to be grouted along the interface and may contain explosion- or construction-isolation walls. Figure G1-2 illustrates these design components. The construction methods and materials to be used to implement the design have been proven in previous mining and construction projects. The standard concrete barrier without DRZ removal was intended to apply to future panel air-intake and air-exhaust drifts where the time duration between excavation and barrier emplacement is short. The enlarged concrete barrier with DRZ removal and explosion-isolation wall is the only option approved in the RCRA facility Permit. The design concept for the enlarged concrete barrier incorporates:~~

- ~~A concrete barrier that is tapered to promote the rapid stress buildup on the host rock. The stiffness was selected to provide rapid buildup of compressive stress and reduction in shear stress in the host rock.~~

- ~~The enlarged barrier requires DRZ removal just beyond Clay G and MB 139, and to a corresponding distance in the ribs to keep the tapered shape approximately spherical. The design includes DRZ removal and thereby limits VOC flow through the panel-closure system.~~

- ~~The design of the approved panel-closure system includes an explosion-isolation wall designed to provide strength and deformational serviceability during the operational period. The length was selected to assure that uniform compression develops over a substantial portion of the structure and that end-shear loading that might result in fracturing of salt into the back is reduced.~~

~~3.2 Design Options~~

~~The design options consist of the following:~~

- ~~An enlarged concrete barrier with the DRZ removed and a construction-isolation wall~~

- ~~An enlarged concrete barrier with the DRZ removed and an explosion-isolation wall (This is the only option approved in the RCRA facility Permit.)~~

- ~~A rectangular concrete barrier without the DRZ removed and a construction-isolation wall~~

- ~~A rectangular concrete barrier without the DRZ removed and an explosion-isolation wall.~~

~~In each case, interface grouting will be used for the upper barrier/salt interface to compensate for any void space between the top of the barrier and the salt. The process for selecting these options was proposed to depend on the subsurface conditions at the panel-closure system locations described in the following subsections.~~

~~Observation boreholes will be drilled into the roof or floor of the new air-intake and air-exhaust drifts and will be used for observation of fractures and bed separation. Observations can be made in the boreholes using a small video camera, or a scratch rod. A scratch rod survey will be performed in accordance with the current Excavation Effects Program (**EEP**) procedure.~~

~~The EEP was initiated in 1986 with the occurrence of fractures in Site and Preliminary Design Validation Room 3. The purpose of the EEP is to study fractures that develop as a result of underground excavation at the WIPP and to monitor those fractures. Borehole inspections have been successful for determining the fracturing and bed separation in the host rock. These inspections have been performed since 1983 (Francke and Terrill, 1993). This technique in addition to the above will be used to determine the optimum location for the panel-closure system.~~

~~Since the enlarged barrier is required to be constructed for all panel closures, the proposed DRZ investigations are not required as part of the RCRA facility Permit.~~

~~3.3 Design Components~~

~~The following subsections present system and components design features.~~

~~3.3.1 Concrete Barrier~~

~~The enlarged concrete barrier consists of Salado Mass Concrete, with sufficient unconfined compressive strength and with an approximately circular cross-section excavated into the salt over the central portion of the barrier (Figure G1-5). The enlarged concrete barrier will be located at the optimum locations in the air-intake and air-exhaust drifts with the central portion extending just beyond Clay G and MB 139.~~

~~The enlarged concrete barrier will be placed in four cells, with construction joints perpendicular to the direction of potential air flow. The concrete strength will be selected according to the standards specified by the latest edition of the ACI code for plain concrete. The concrete will be placed through 6-inch- (15-cm)-diameter steel pipes and vibrated from outside the formwork. The formwork is designed to withstand the hydrostatic loads during construction, with minimal bracing onto exposed salt surfaces. This will be accomplished by placing a series of steel plates that are stiffened by angle iron, with load reactions carried by spacer rods. The spacer rods will be staggered to reduce potential flow along the rod surfaces through the barrier. Some exterior bracing will be required when the first cell is poured. All structural steel will be ASTM A36, with detailing, fabrication, and erection of structural steel in conformance with the latest edition of the AISC steel manual (AISC, 1989). After concrete placement, the formwork will be left in place.~~

~~The above design is for the most severe conditions expected to be encountered at the WIPP.~~

~~3.3.2 Explosion- and Construction-Isolation Walls~~

~~An explosion-isolation wall, consisting of concrete-blocks, will mitigate the effects of a postulated methane explosion. The explosion-isolation wall consists of 3,500-psi (24-MPa) concrete blocks mortared together with cement (Figure G1-6).~~

~~The concrete block wall design complies with MSHA requirements (MSHA, 1987) because it uses incombustible materials of substantial construction. The explosion-isolation wall will be placed into the salt for support. The explosion-isolation walls are designed to resist creep loading from salt deformation. In the absence of the postulated methane explosion, the design was proposed to be simplified to a construction-isolation wall. The construction-isolation wall design provides temporary isolation during the time the main concrete barrier is being constructed. The construction-isolation wall was not approved as part of the RCRA facility Permit.~~

~~3.3.3 Interface Grouting~~

~~After construction of the main concrete barrier, the interface between the main concrete barrier and the salt will be grouted through a series of grout-supply and air-return lines that will terminate in grout distribution collection boxes. The openings in these boxes will be protected during concrete placement (Figure G1-7). The grout boxes will be mounted near the top of the barrier. The grout will be injected through one distribution system, with air and return grout flowing through a second distribution system.~~

~~3.4 Panel-Closure System Construction~~

~~The construction methods and materials to be used to implement the design have been proven in previous mining and construction projects. The design uses common construction practices according to existing standards. The proposed construction sequence follows completion of the waste-emplacement activities in each panel: (1) Perform subsurface exploration to determine the optimum location for the panel closure system, (2) select the appropriate design option for the location, (3) prepare surfaces for the construction- or explosion-isolation walls, (4) install these walls, (5) excavate for the enlarged concrete barrier (if required), (6) install concrete formwork, (7) emplace concrete for the first cell, (8) grout the completed cell, and (9) install subsequent formwork, concrete and grout until completion of the enlarged concrete barrier. (Step 2 above is not required as part of the RCRA facility Permit, because there are no design options to choose between.)~~

~~The explosion-isolation wall will be located approximately 30 feet from the main concrete barrier. The host rock will be excavated 6 inches (15 cms) around the entire perimeter prior to installing the explosion-isolation wall. The surface preparation will produce a level surface for placing the first layer of concrete blocks. Excavation may be performed by either mechanical or manual means.~~

~~Excavation for the enlarged concrete barrier will be performed using mechanical means, such as a cutting head on a suitable boom. The existing roadheader at the main barrier location in each drift is capable of excavating the back and the portions of the ribs above the floor level. Some manual excavation may be required in this situation as well. If mechanical means are not available, drilling boreholes and an expansive agent can be used to fragment the rock (Fernandez et al., 1989). Excavation will follow the lines and grades established for the design.~~

~~The roof will be excavated to just above Clay G and then the floor to just below MB 139 to remove the DRZ. The tolerances for the enlarged concrete-barrier excavation are +6 to 0 inches (+15 to 0 cm). In addition, loose or spalling rock from the excavation surface will be removed to provide an appropriate surface abutting the enlarged concrete barrier. The excavations will be performed according to approved ground control plans.~~

~~Following completion of the roof excavation for the enlarged barrier, the floor will be excavated. If mechanical means are not available, drilling boreholes and using an expansive agent to fragment the rock (Fernandez et al., 1989) is a method that can be used. Expansive agents would load the rock salt and anhydrite, producing localized tensile fracturing in a controlled manner, to produce a sound surface.~~

~~A batch plant at the surface or underground will be prepared for batching, mixing, and delivering the concrete to the underground in sufficient quantity to complete placement of the concrete within one form cell. The placement of concrete will be continuous until completion, with a time for completing one section not to exceed 10 hours, allowing an additional 2 hours for cleanup of equipment.~~

~~Pumping equipment suitable for placing the concrete into the forms will be provided at the main concrete barrier location. After transporting, and prior to pumping, the concrete will be remixed to compensate for segregation of aggregate during transport. Batch concrete will be checked at the surface at the time of mixing and again at the point of transfer to the pump for slump and temperature. Admixtures may be added at the remix stage in accordance with the batch design.~~

~~4.0 Design Calculations~~

~~Table G1-1 summarizes calculations to support the construction details for an explosion-isolation wall, construction-isolation wall, and structural steel formwork for concrete barriers up to 29-ft high. The codes for the explosion-isolation and construction-isolation wall are specified by the Uniform Building Code (International Conference of Building Officials, 1994), with related seismic design requirements. The external loads for the solid block wall are as developed in the methane-explosion and fracture propagation design evaluations.~~

~~Table G1-1~~
~~Constructability Design Calculations Index~~

~~Section~~	~~Design Area~~	~~Category~~
~~1.0~~	~~Explosion-isolation wall~~	~~W~~
~~2.0~~	~~Explosion-isolation wall seismic check~~	~~S~~
~~3.0~~	~~Formwork design~~	~~F~~

~~The structural formwork for all cells is designed in accordance with the AISC guidelines on allowable stress (AISC, 1989). Lateral pressures are developed using ACI 347R-88, using a standard concrete weighing 150 pounds per cubic foot (2,410 kg/m^3) with a slump of 8 inches (20 cm) or less. Design loadings reflect full hydrostatic head of concrete, with lifts spaced at 4 ft (1.2 m) intervals from bottom to top through portals, with no external vibration. All forms will remain in place.~~

~~5.0 Technical Specifications~~

~~The specifications are in the engineering file room at the WIPP and are the property of the MOC. These specifications are included as an attachment in Appendix G and summarized in Table G1-2.~~

~~Table G1-2~~
~~Technical Specifications for the WIPP Panel-Closure System~~

~~Division 1 - General Requirements~~	
~~Section 01010~~	~~Summary of Work~~
~~Section 01090~~	~~Reference Standards~~
~~Section 01400~~	~~Contractor Quality Control~~
~~Section 01600~~	~~Material and Equipment~~
~~Division 2 - Site Work~~	
~~Section 02010~~	~~Mobilization and Demobilization~~
~~Section 02222~~	~~Excavation~~
~~Section 02722~~	~~Grouting~~
~~Division 3 - Concrete~~	
~~Section 03100~~	~~Concrete Formwork~~
~~Section 03300~~	~~Cast-in-Place Concrete~~
~~Division 4 - Masonry~~	
~~Section 04100~~	~~Mortar~~
~~Section 04300~~	~~Unit Masonry System~~

~~6.0 Drawings~~

~~The drawings (Appendix H) are in the engineering file room at the WIPP and are the property of the MOC and summarized in Table G1-3.~~

~~Table G1-3~~
~~Panel-Closure System Drawings~~

~~**Drawing Number**~~	~~**Title**~~
~~762447-E1~~	~~Title Sheet~~
~~762447-E2~~	~~Underground Waste Disposal Plan~~
~~762447-E3~~	~~Air Intake Drift Construction Details~~
~~762447-E4~~	~~Air Exhaust Drift Construction Details~~
~~762447-E5~~	~~Construction and Explosion Barrier Construction Details~~
~~762447-E6~~	~~Grouting and Miscellaneous Details~~

~~7.0 Conclusions~~

~~This chapter presents the conclusions for the detailed design activities of the panel-closure system. A design basis, including the operational requirements, the structural and material requirements, and the construction requirements, was developed that addresses the governing regulations for the panel-closure system. Table G1-4 summarizes the design basis for the panel-closure system and the compliance with the design basis. The panel-closure system design incorporates mitigative measures to address the treatment of fractures and therefore counter the potential migration of VOCs. Several alternatives were evaluated for the treatment of fractures. These included excavation and emplacement of a fully enlarged barrier with removal of the DRZ, excavation of the roof and emplacement of a partially enlarged barrier, and emplacement of a standard barrier with formation grouting.~~

~~To investigate several key design issues and to implement the design, design evaluations were performed. These design evaluations can be divided into evaluations satisfying the operational requirements of the system and evaluations satisfying the structural and materials requirements of the system. The conclusions reached from the evaluations addressing the operational requirements are as follows:~~

- ~~Based on an air-flow model used to predict the mass flow rate of carbon tetrachloride through the panel-closure system for the alternatives, the air-flow analysis suggests that the fully enlarged barrier is the most protective for restricting VOCs during the operational period of 35 years.~~

- ~~Results of the FLAC analyses show that the recommended enlarged configuration is a circular rib-segment excavated to Clay G and under MB 139. Interface grouting would be performed at the upper boundary of the concrete barrier.~~

- ~~The results of the transverse plane-strain models show that high stresses would form in MB 139 following excavation, but that after installation of the panel-closure system, an increase in barrier-confining stress and a reduction in shear stress would result. The concrete barrier would provide substantial uniform confining stresses as the barrier is subjected to secondary salt creep.~~

- ~~The removal of the fractured salt prior to installation of the main concrete barrier would reduce the potential for flexure. With the removal of MB 139, the fractured salt stiffens the surrounding rock and results in the development of more uniform compression.~~

- ~~The trade-off study also showed that a panel-closure system with an enlarged concrete barrier with the removal of the fractured salt roof and anhydrite in the floor was found to be the most protective.~~

~~Table G1-4~~
~~Compliance of the Design with the Design Requirements~~

~~Type of Requirement~~	~~Requirement~~	~~Section~~	~~Compliance with Requirement~~	~~Notes on Compliance~~
~~Operational~~	~~Individual panels shall be closed in accordance with the schedule of actual waste emplacement.~~	~~2.1.1~~	~~Complies~~	~~Gas-flow models used for design are based on the waste-emplacement operational schedule.~~
	~~The panel-closure system shall provide assurance that the limit for the migration of volatile organic compounds (**VOC**) of concern will be met at the point of compliance. To achieve this assurance, the design shall consider the potential flow of VOCs through the several components of the disturbed rock zone and the panel-closure system.~~	~~2.1.1, 2.1.2~~	~~Complies~~	~~Gas-flow modeling shows that the VOC flow is less than the design migration limit.~~
	~~The panel-closure system shall comply with its intended functional requirements under loads generated from creep closure and any internal pressure that might develop in the disposal panel under reasonably anticipated conditions.~~	~~2.1.2, 4.0~~	~~Complies~~	~~Stress analyses and design calculations show that the panel-closure system performs as intended.~~
	~~The panel-closure system shall comply with its intended functional requirements under a postulated methane explosion.~~	~~2.2.3, 2.2.4, 4.0~~	~~Complies~~	~~The methane explosion studies, fracture propagation studies, and supporting design calculations show that the panel-closure system performs as intended.~~
	~~The operational life of the panel-closure system shall be at least 35 years.~~	~~2.1.1~~	~~Complies~~	~~Gas-flow modeling and analyses shows satisfactory performance for at least 35 years.~~
	~~The panel-closure system for each individual panel shall not require routine maintenance during its operational life.~~	~~3.2~~	~~Complies~~	~~Passive design components require no routine maintenance.~~
	~~The panel-closure system shall address the most severe ground conditions expected in the panel entries. If actual conditions are found to be more favorable, this design can be simplified and still satisfy the operational requirements of the system.~~	~~2.1.1 2.1.3 3.2~~	~~Complies~~	~~Design is based upon flow and structural analyses for the most severe expected ground conditions. If conditions are less severe, simpler design options are used. The various design options accommodate all expected conditions.~~

~~Type of Requirement~~	~~Requirement~~	~~Section~~	~~Compliance with Requirement~~	~~Notes on Compliance~~
~~Design configuration and essential features~~	~~The panel-closure system shall be emplaced in the air-intake and air-exhaust drifts identified by Westinghouse (1995c)~~	~~3.2~~	~~Complies~~	~~The design shows placement in the designated areas for panel closure.~~
	~~The panel-closure system shall consist of a concrete barrier and construction-isolation and explosion-isolation walls with dimensions to satisfy the operational requirements of the system.~~	~~3.2, 3.3~~	~~Complies~~	~~The panel-closure system design uses the identified components with dimensions to satisfy the operational requirements of the system.~~
~~Safety~~	~~The design class for the panel-closure system shall be IIIb. Design and construction shall follow conventional mining and construction practices.~~	~~3.4~~	~~Complies~~	~~Components are designed according to Class IIIb. The construction sequence for the design followed conventional mining practices.~~
	~~The structural analysis for the underground shall use the empirical data acquired from the WIPP Excavation Effects Program.~~	~~2.1.2~~	~~Complies~~	~~The structural analysis uses properties that model creep closure for stress analyses from data acquired in the WIPP Excavation Effects Program.~~
~~Structural and material~~	~~The panel-closure system materials shall be compatible with their emplacement environment and function. Surface treatment between the host rock and the panel-closure system shall be considered in the design.~~	~~2.2.1~~	~~Complies~~	~~The material compatibility studies showed no degradation of materials and no need for surface treatment.~~
	~~The selection and placement of concrete in the concrete barrier shall address potential thermal cracking due to the heat of hydration.~~	~~2.2.2~~	~~Complies~~	~~The heat generation studies show that hydration temperatures are controlled by appropriate selection of cement type and placement temperature.~~
	~~The panel-closure system shall sustain the dynamic pressure and subsequent temperature generated by a postulated methane explosion.~~	~~2.2.3, 2.2.4, 4.0~~	~~Complies~~	~~The methane explosion study shows that the explosion-isolation wall protects the concrete barrier from pressure loading and thermal loading. The fracture propagation study shows that the system performs as intended.~~

~~Type of Requirement~~	~~Requirement~~	~~Section~~	~~Compliance with Requirement~~	~~Notes on Compliance~~
~~Construction~~	~~The panel-closure system shall use to the extent possible normal construction practices according to existing standards.~~	~~3.4~~	~~Complies~~	~~The specifications include normal construction practices used in the underground at WIPP and according to the most current steel and concrete specifications.~~
	~~During construction of the panel-closure system, a quality assurance/quality control program shall be established to verify material properties and construction practices.~~	~~3.4~~	~~Complies~~	~~The specifications include materials testing to verify material properties and construction practices.~~
	~~The construction specification shall take into account the shaft and underground access capacities and services for materials handling.~~	~~3.4~~	~~Complies~~	~~The specifications allow construction within the capacities of underground access.~~

~~The conclusions reached from the design evaluations addressing the structural and material requirements of the panel-closure system are as follows:~~

- ~~Existing information on the heat of hydration of the concrete supports placing concrete with a low cement content to reduce the temperature rise associated with hydration. The slump at the required strength would be achieved through the use of plasticizers. A thermal analysis coupled with a salt creep analysis suggest installation of the enlarged barrier at or below ambient temperatures to adequately control hydration temperatures.~~

- ~~In addition to installation at or below ambient temperatures, the concrete used in the main concrete barrier would exhibit the following:~~

    - ~~An 8 inch (0.2 meter) slump after 3 hours of intermittent mixing~~
    - ~~A less-than-25-degree Fahrenheit heat rise prior to installation~~
    - ~~An unconfined compressive strength of 4,000 psi (28 MPa) after 28 days~~
    - ~~Volume stability~~
    - ~~Minimal entrained air.~~

- ~~The trace amounts of brine from the salt at the repository horizon should not degrade the main concrete barrier for at least 35 years.~~

- ~~In 20 years, the open passage above the waste stack would be reduced in size. Further, rooms with bulkheads at each end would be isolated in the panel. It is unlikely that a long passage with an open geometry would exist; therefore, the dynamic analysis considered a deflagration with a peak explosive pressure of 240 psi (1.7 MPa).~~

- ~~The heat-transfer analysis shows that elevated temperatures would occur within the salt and the explosion-isolation wall; however, the elevated temperatures will be isolated by the panel-closure system. Temperature gradients will not significantly affect the stability of the wall.~~

- ~~The fractures in the roof and floor could be affected by expanding gas products reaching pressures of the order of 240 psi (1.7 MPa). Because the peak internal pressure from the deflagration is only one fifth of the pressure, fractures could not propagate beyond the wall.~~

~~The design options proposed to satisfy the design requirements for the panel-closure system include (1) a standard barrier, rectangular in shape, or (2) an enlarged concrete barrier, approximately spherical in shape. Options (1) and (2) will be grouted at the interface and may contain explosion- or construction-isolation walls. Only the enlarged barrier with an explosion-isolation wall is approved as part of the RCRA facility Permit.~~

~~The design provides flexibility to satisfy the design migration limit for the flow of VOCs out of the panels. An enlarged concrete barrier would be selected where the air-intake and air-exhaust drifts have aged and where there is fracturing resulting in significant flow of VOCs. These conditions apply to the most severe ground conditions in the air-intake and air-exhaust drifts of Panel 1. If ground conditions are more favorable, such as might be the case for future panel~~

~~entries, the design was proposed to be simplified to a standard concrete barrier rectangular in shape, with a construction isolation wall. GPR and observation boreholes are available for detecting the location and extent of fractures in the DRZ. These methods may be used to select the optimum location within each entry and exhaust drift for the enlarged barrier panel-closure system.~~

~~The design is presented in this report as a series of calculations, engineering drawings, and technical performance specifications. The drawings illustrate the construction details for the system. The technical performance specifications cover the general requirements of the system, site work, concrete, and masonry. Information on the proposed construction method is also presented.~~

~~The design complies with all aspects of the design basis established for the WIPP panel-closure system. The design can be constructed in the underground environment with no special requirements at the WIPP.~~

~~8.0 References~~

~~American Institute of Steel Construction (AISC), 1989, “Specification for the Design of Structural Steel Buildings,” *AISC Manual of Steel Construction*, American Institute of Steel Construction, Inc., New York, New York.~~

~~Fernandez, J. A., T. E. Hinkebein, and J. B. Case, 1989, “Selected Analyses to Evaluate the Effect of the Exploratory Shafts on Repository Performance at Yucca Mountain,” *SAND85-0598,* Sandia National Laboratories, Albuquerque, New Mexico.~~

~~Francke, C. T., and L. J. Terrill, 1993, “The Excavation Effects Program at the Waste Isolation Pilot Plant,” *Innovative Mine Design for the 21st Century, Proceedings of the International Congress on Mine Design, August 23–26, 1993,* W. F. Bowden and J. F. Archibald, eds., Kingston, Ontario, Canada.~~

~~International Conference of Building Officials, 1994, The Uniform Building Code, 1994, ISSN0896-9655, International Conference of Building Officials, Whittier, California.~~

~~IT Corporation (IT), 1993, “Ground-Penetrating Radar Surveys at the WIPP Site,” January 1991 to February 1992, contractor report for Westinghouse Electric Corporation, Carlsbad, New Mexico.~~

~~Mine Safety and Health Administration (MSHA), 1987, “Safety Standards for Methane in Metal and Nonmetal Mines,” *Title 30, Code of Federal Regulations (CFR), Part 57 (30 CFR 57)*, U.S. Department of Labor, Mine Safety and Health Administration, Washington, D.C.~~

~~U.S. Department of Energy (DOE), 1995, “Conceptual Design for Operational Phase Panel Closure Systems,” *DOE-WIPP-95-2057,* U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.~~

~~Westinghouse Electric Corporation (Westinghouse), 1995a, “Design Classification Determination,” *WP 09-CN3023,* Rev. 0, Westinghouse Electric Corporation, Waste Isolation Division, Carlsbad, New Mexico.~~

~~Westinghouse Electric Corporation (Westinghouse), 1995b, “Underground Hazardous Waste Management Unit Closure Criteria for the Waste Isolation Pilot Plant Operational Phase, Predecisional Draft,” *WID/WIPP-Draft-2038*, February 1995, Westinghouse Electric Corporation, Waste Isolation Division, Carlsbad, New Mexico.~~

~~Westinghouse Electric Corporation (Westinghouse), 1995c, “Underground Facilities Typical Disposal Panel,” *WID/WIPP-DWG 51-W-214-W*, Revision 0, Westinghouse Electric Corporation, Waste Isolation Division, Carlsbad, New Mexico.~~

~~FIGURES~~

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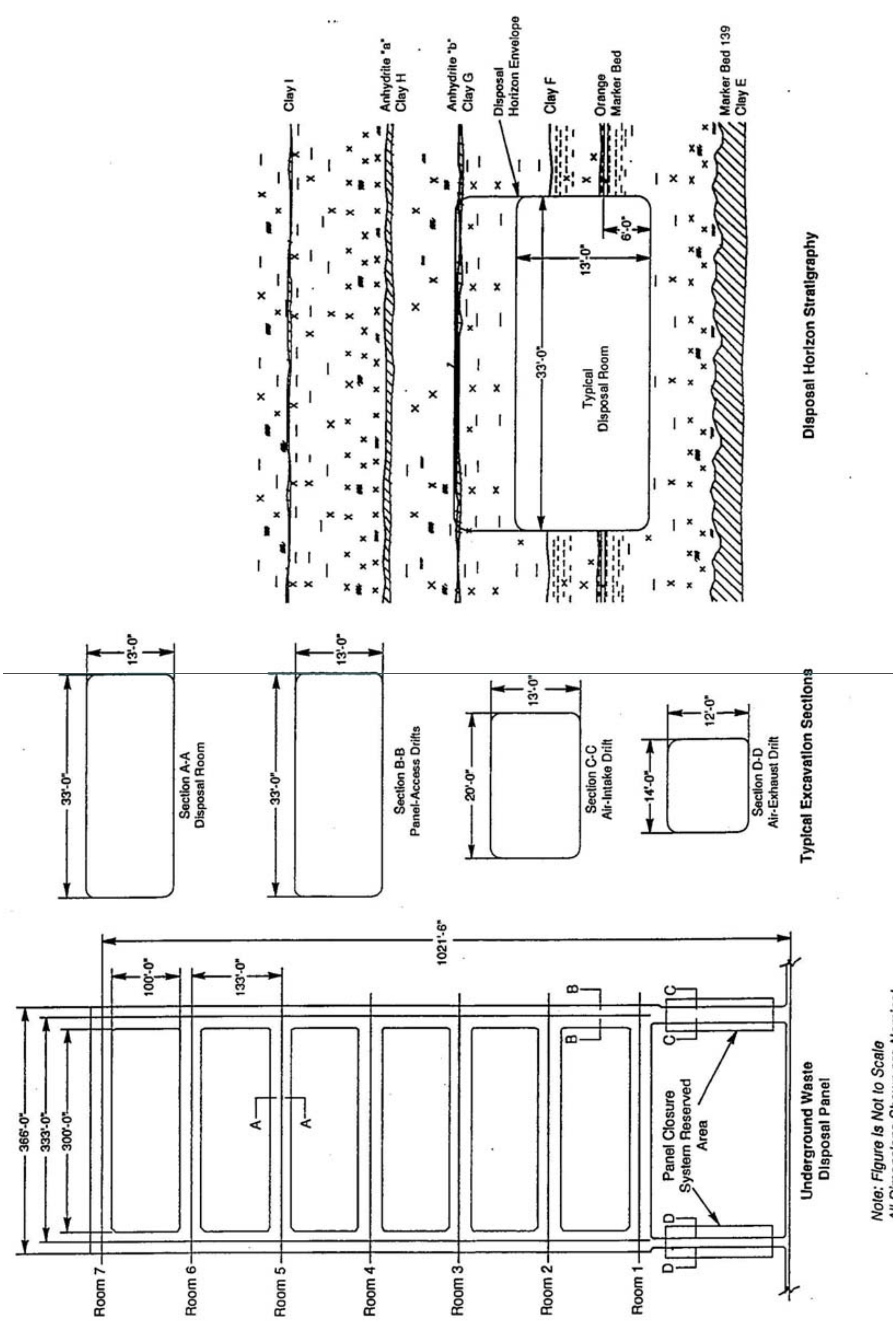
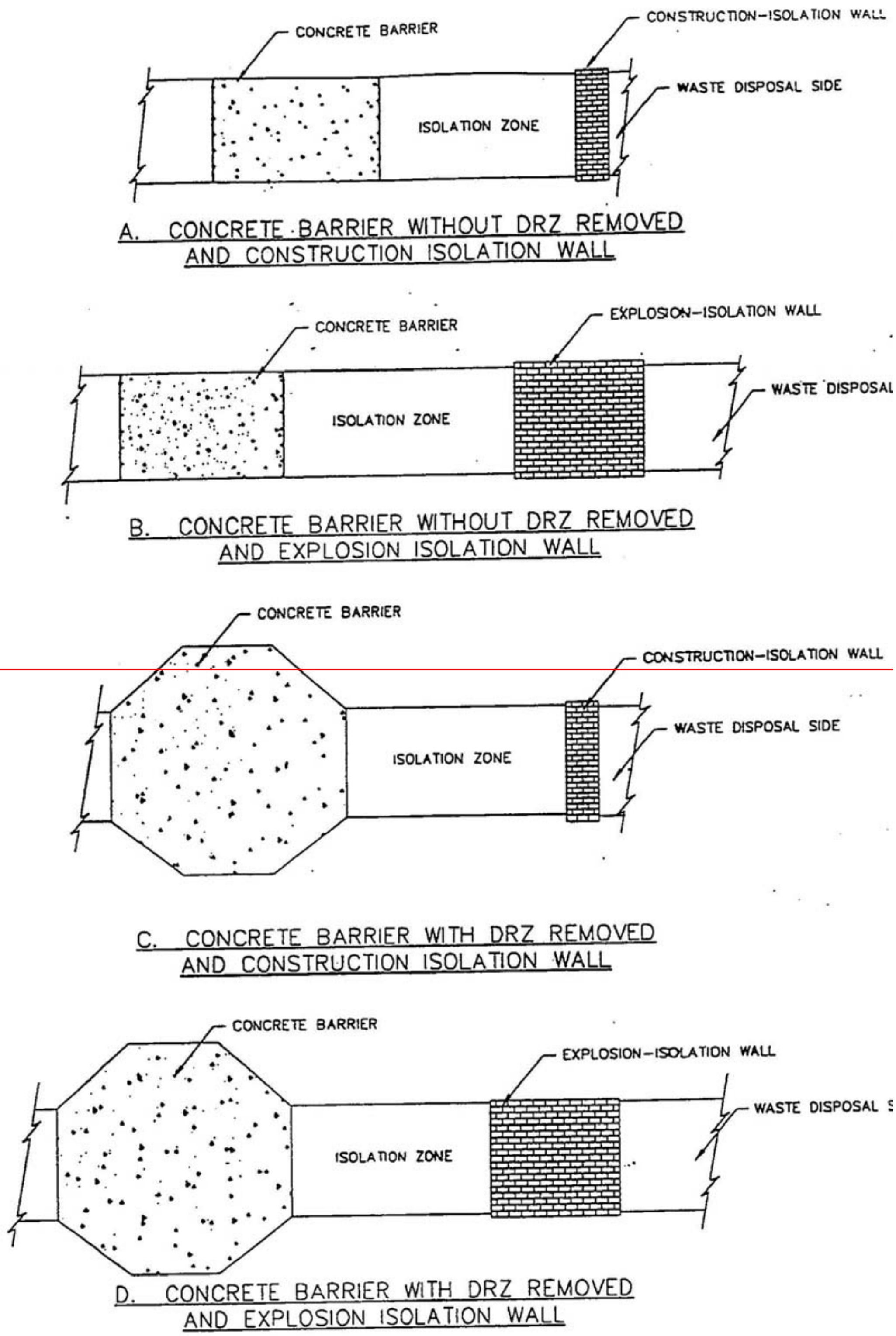
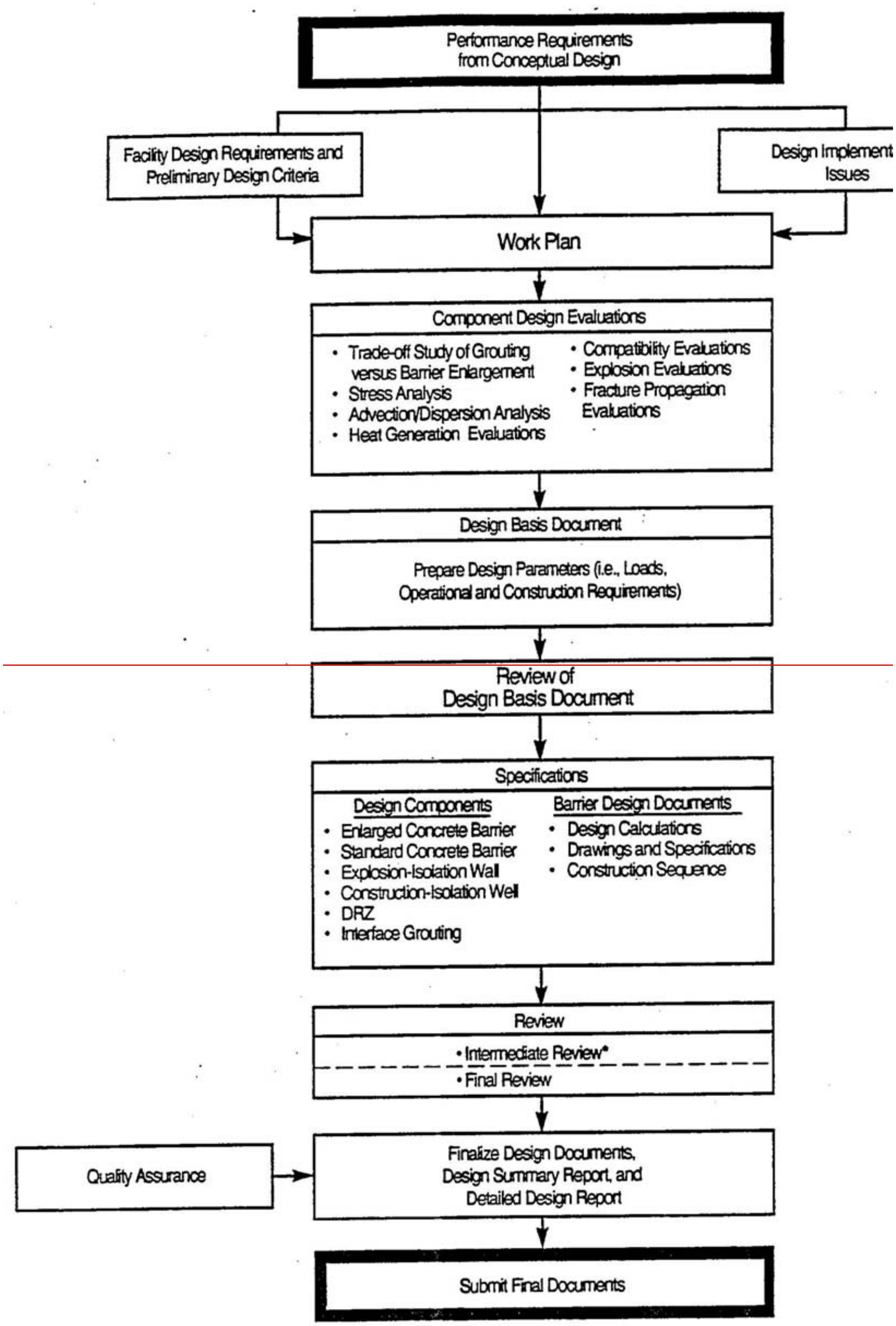


~~**Figure G1-1**~~
~~**Typical Facilities—Typical Disposal Panel**~~



~~Figure G1-2~~
~~Main Barrier with Wall Combinations~~



~~**Figure G1-3**~~
~~**Design Process for the Panel-Closure System**~~

A. Select a system structure or component for classification. (Start with a mitigating item)

B. Is the system, structure, or component required to mitigate the consequences of an accident?

C. Would the system, structure, or component failure result in loss of safety functions of a Design Class I components?

D. Does the system, structure, or component provide any function related to nuclear materials?

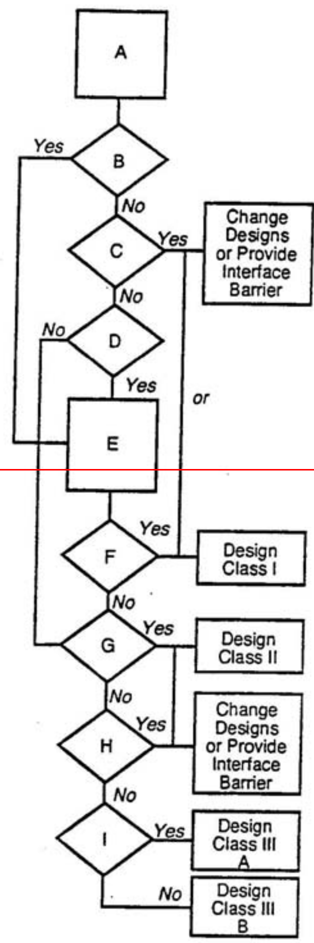
E. Select a conservative accident scenario and perform safety analysis.

F. Does the cumulative radiological consequences following the accident exceed 25 Rem whole body or 75 Rem organ dose commitment to an individual at the Zone I boundary

G. Does the structure, system, operation or component conform to the Class II criteria as defined in Attachment 2?

H. Would the structure, system, operation or component failure result in loss of the required function of a Class II component?

I. Are special design requirements necessary to ensure that failure of the system, structure, or component will NOT result in a significant shutdown of the facility or inhibit accessibility or maintainability of required equipment or have special significance to health and safety of operations personnel?



B. ______YES __X__ NO
Descibe requirement

C. ______YES __X__ NO
Failure mode and affected clas

D. ______YES __X__ NO
Describe function

E. ______YES __N/A__ NO
Attach safety analysis

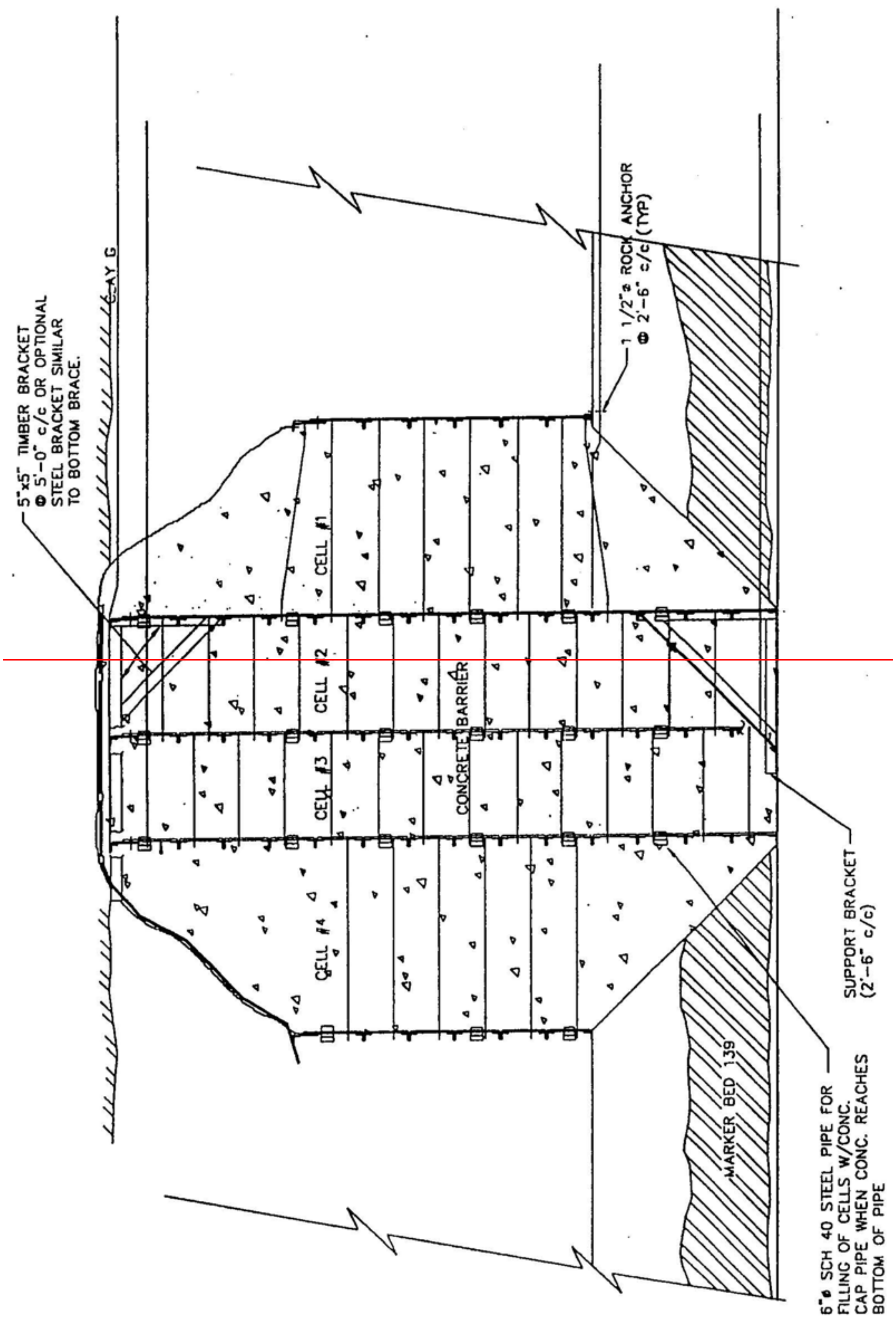
~~F. ______YES ______NO~~
Calculate dose rates
N/A

(Attach calculations to this form)
G. ______YES __X__ NO
Criteria
N/A

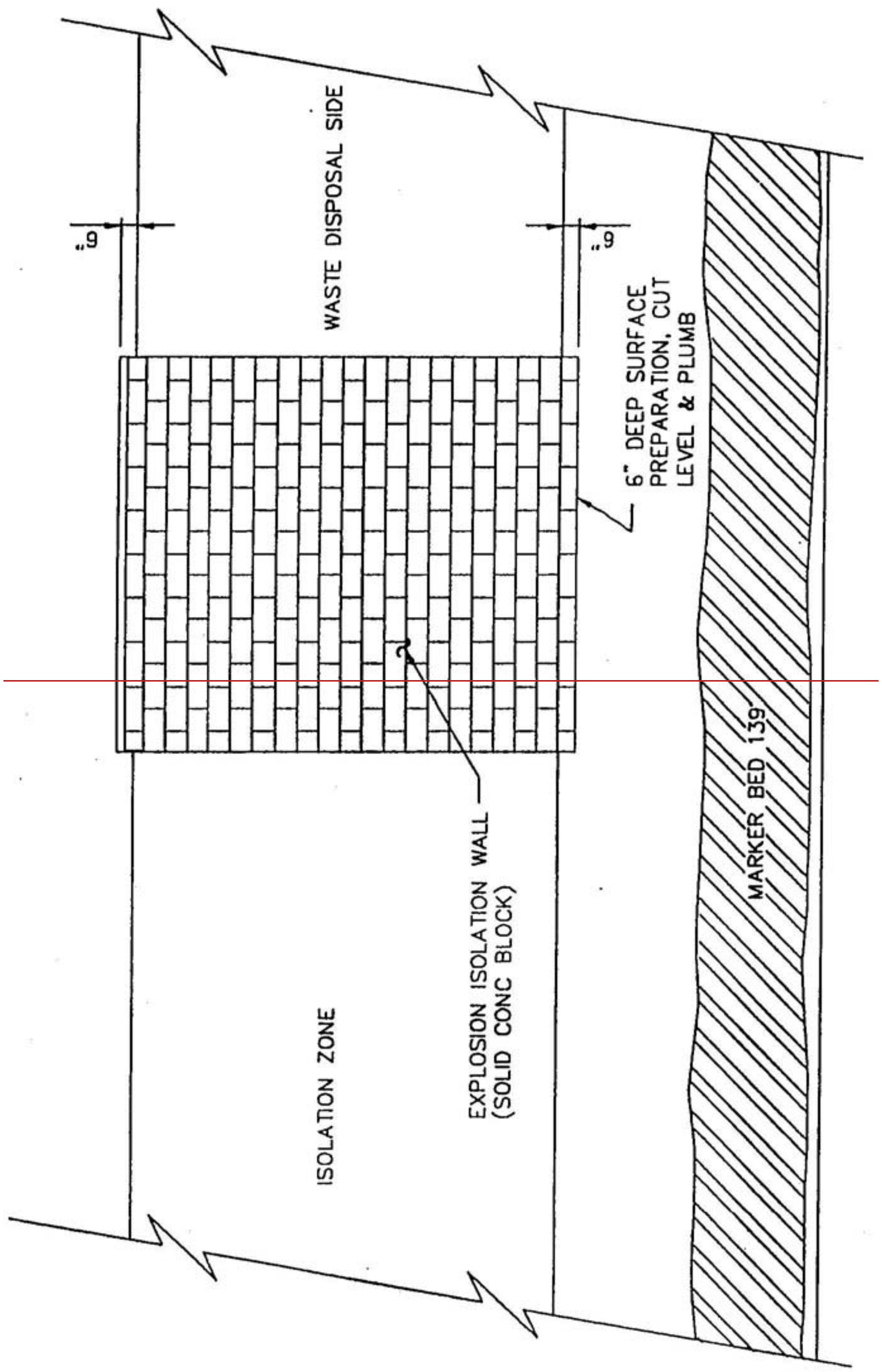
H. ______YES __X__ NO
Failure mode and affected Class

I. ______YES __X__ NO
Requirements

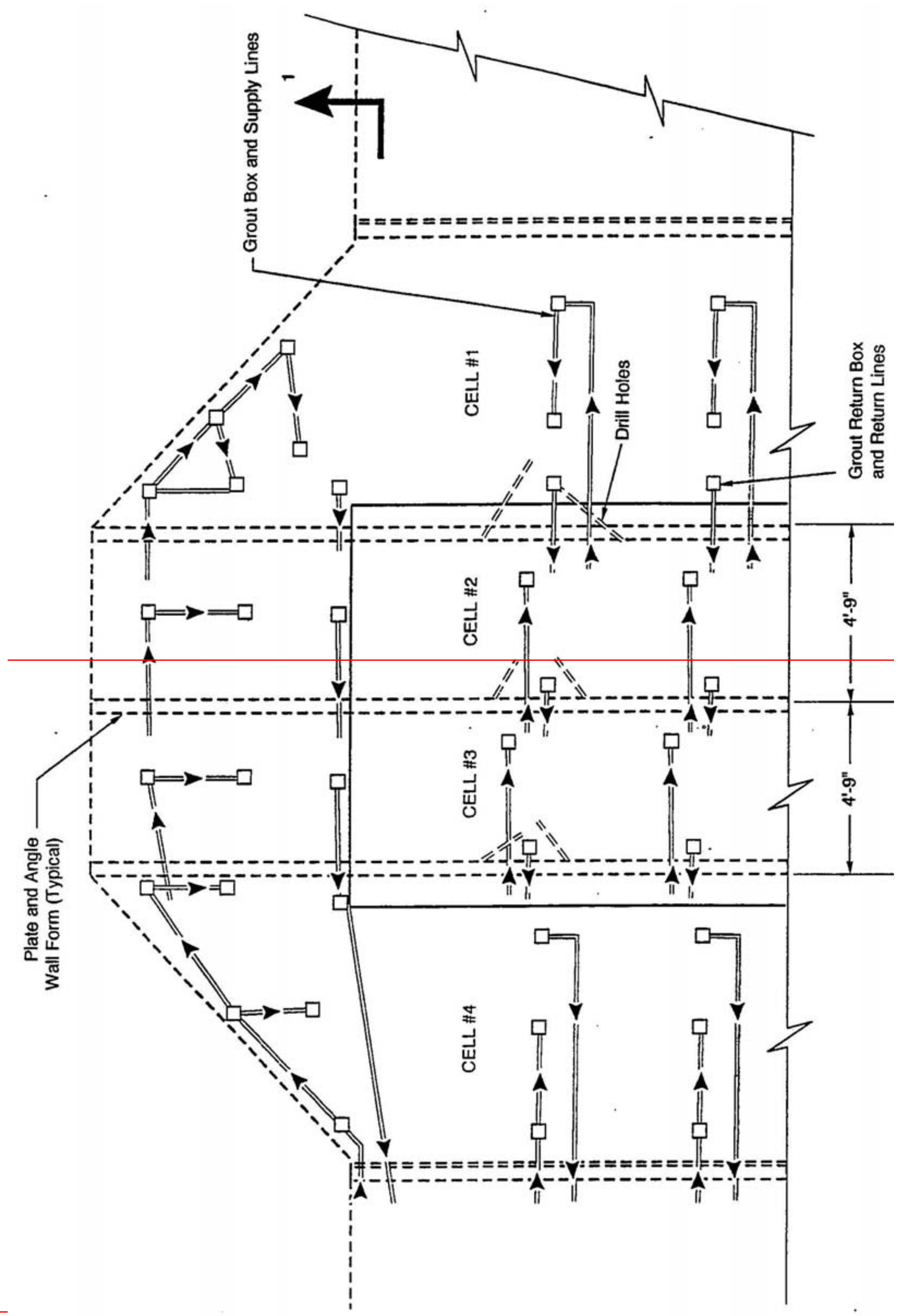
~~Figure G1-4~~
~~Design Classification of the Panel-Closure System~~



~~**Figure G1-5**~~
~~**Concrete Barrier with DRZ Removal**~~



~~Figure G1-6~~
~~Explosion-Isolation Wall~~



~~Figure G1-7~~
~~Grouting Details~~

WIPP PANEL CLOSURE DESIGN DESCRIPTION AND SPECIFICATIONS

G1-1 Introduction

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

The design discussed in this attachment is based on the Design Report, prepared by Golder Associates (Golder, 2016). Calculations demonstrating compliance with the volatile organic compounds (**VOC**) emission standards are included with the Design Report. Calculations addressing the performance of the WPC under the geometries in the access drifts and main entries, including an assessment of the required length of the run-of-mine (**ROM**) salt component, are also included in the Design Report. The specifications for standard steel bulkheads and ROM salt are included as Attachment G1 Appendix G1-A *Technical Specifications* and Attachment G1 Appendix G1-B *Drawings*.

G1-2 WPC Description

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

G1-2a Permit Design Requirements

The applicable design requirements are provided in Permit Attachment G, Section G-1e(1). The WPC meets these design requirements as documented in the Design Report.

G1-2b Design Component Descriptions

The following subsections present a description of the WPC components. Individual specifications address shaft and underground access and materials handling, construction quality control, treatment of surfaces in the closure areas, and applicable design and construction standards.

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

The WPC-B design for the closure installed in the main entries north of Panel 10 (north of S-1600) consists of ROM salt between in-bye and out-bye bulkheads as shown in Figure G1-2.

G1-2b(1) Steel Bulkhead

A bulkhead (Figure G1-3) serves to close panels by blocking ventilation to the intake and exhaust access drifts of the panel and preventing personnel access. This use of a bulkhead is a standard practice and the closure bulkhead shall be constructed as a typical WIPP facility bulkhead. The bulkhead will consist of a steel member frame covered with sheet metal. Telescoping tubular steel or functionally equivalent material shall be used to bolt the bulkhead to the floor and roof. Flexible flashing material such as a rubber conveyor belt (or other appropriate material) will be attached to the steel frame and the salt as a gasket, thereby providing an effective yet flexible blockage to ventilation air. The steel bulkheads will be maintained for as long as they are accessible to workers. In this regard, accessible bulkheads will be repaired, renovated, or replaced as required. Permit Attachment E, Table E-1 provides the schedule for inspecting panel closure bulkheads.

G1-2b(2) ROM Salt

Run-of-mine salt material from mining operations will be used in the main entries north of Panel 10. The salt will be emplaced to a specified design length based on geomechanical calculations described in detail in the Design Report.

G1-3 Constructability

The WPC-A and WPC-B can be constructed using available technologies for the construction of bulkheads. The use of bulkheads is a standard practice at the WIPP facility and the closure bulkheads will be constructed as typical WIPP facility bulkheads. Run-of-mine salt is available from mining operations in sufficient quantities. The construction methods and materials required for the ROM salt placement north of Panel 10 will use available technologies as discussed in the Design Report.

Conventional WIPP facility mining practices will be used for the WPC construction. Work packages will be prepared for the fabrication and installation of steel bulkheads and will list the materials used, the equipment used, special precautions, and limitations. Each work package will address location-specific prerequisites for installing the closure components, will contain the bulkhead specifications, as appropriate, and the location where the closure components are to be installed. Details on the conventional mining practices and work package preparation are discussed in the Design Report and, further construction details are given in the technical specifications included in Attachment G1, Appendix G1-A.

G1-4 Technical Specifications

The technical specifications are included in Attachment G1, Appendix G1-A, and are listed in Table G1-1.

G1-5 Drawings

The drawings are included in Attachment G1, Appendix G1-B and are listed in Table G1-2.

G1-6 References

Golder Associates Inc. (Golder). 2016. Design Report – WIPP Panel Closure report number 0632213 R1 Rev 1, Lakewood, Colorado, October 2016.

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TABLES

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Table G1-1 WIPP Panel Closure Technical Specifications

Division 1 – General Requirements	
Section 01010	**Summary of Work**
Section 01090	Reference Standards
Section 01400	Contractor Quality Control
Section 01600	Material and Equipment
Division 2 – Site Work	
Section 02010	Mobilization and Demobilization
Section 02222	Excavation
Division 3 – WPC Components	
Section 03100	Run-of-Mine Salt
Section 03200	Steel Bulkheads

Table G1-2 WIPP Panel Closure Drawings

Drawing Number	Title
262-001	WIPP Panel Closure (WPC) Title Sheet
262-002	WPC Locations
262-003	Typical Panel Layout and Mined Entry Cross-Sections
262-004	WPC Details – Bulkhead and ROM Salt Locations
262-005	WPC Details – Bulkhead Front-View and Attachment Detail

FIGURES

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Figure G1-1
WPC Locations

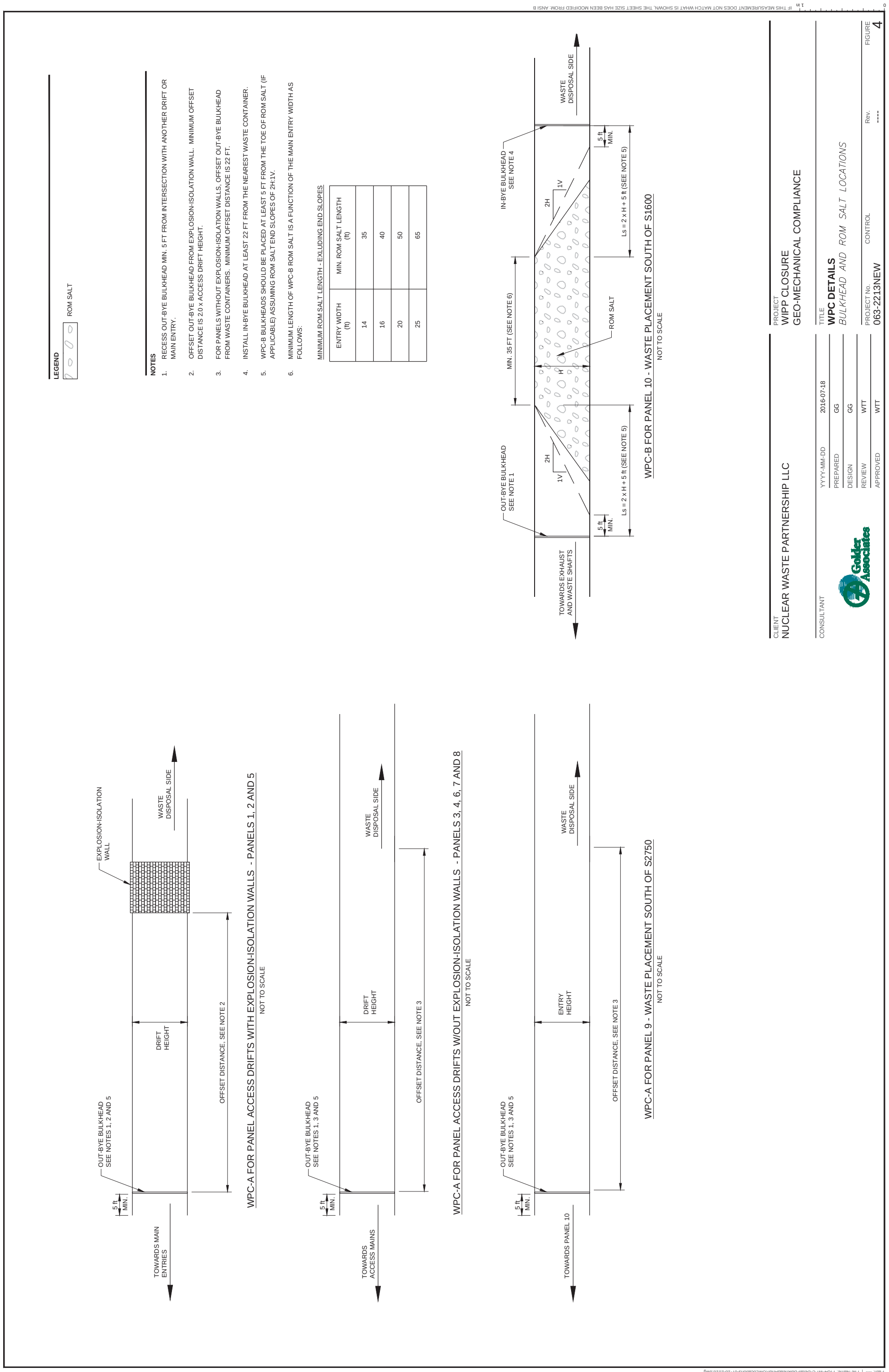

Figure G1-2
WPC Details – Bulkhead and Run-of-Mine Salt Locations

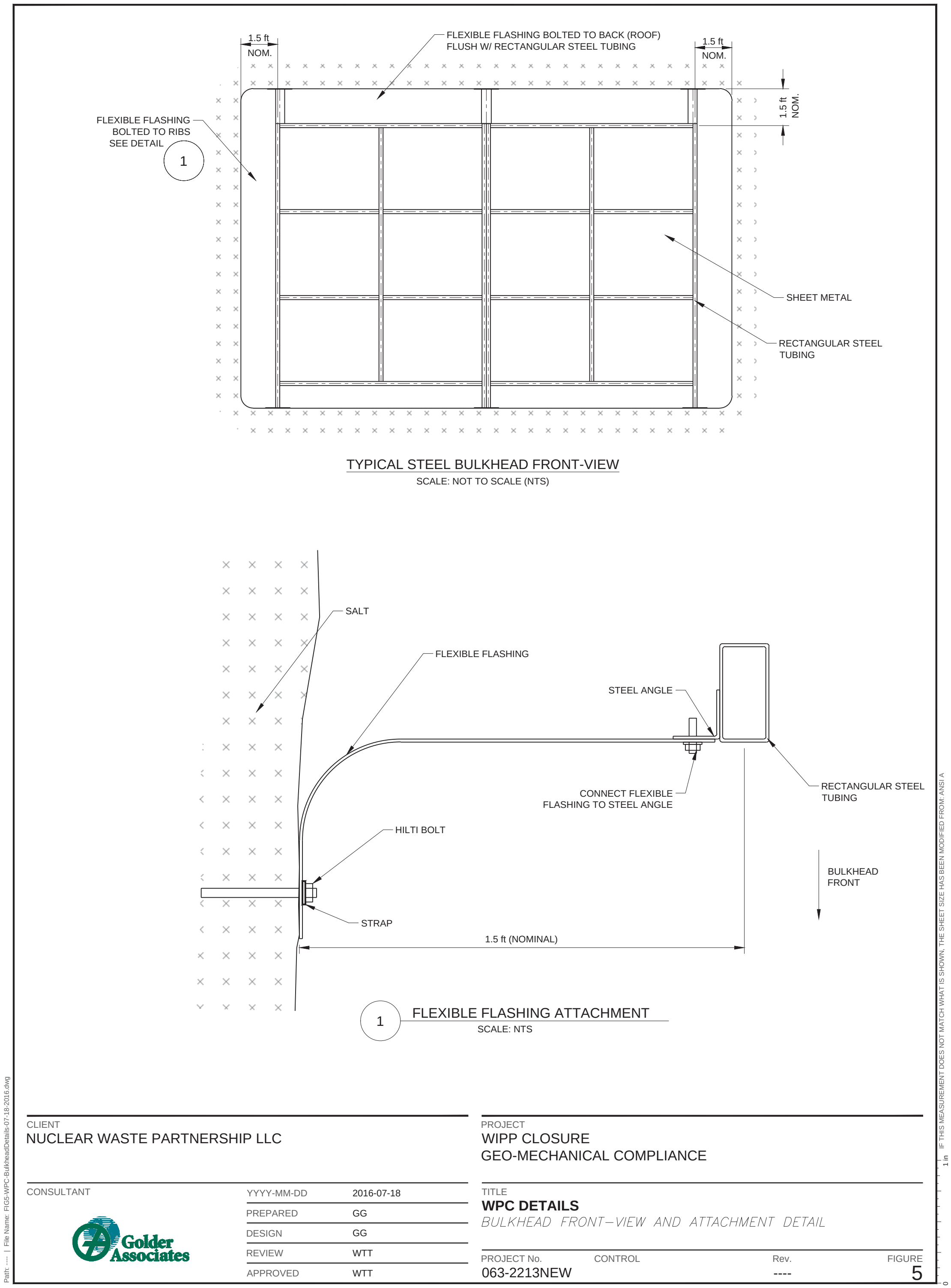

Figure G1-3
WPC Details – Bulkhead Front-View and Attachment Detail

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ATTACHMENT G1
APPENDIX G1-A

TECHNICAL SPECIFICATIONS

WIPP PANEL CLOSURE
WASTE ISOLATION PILOT PLANT
CARLSBAD, NEW MEXICO

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ATTACHMENT G1
APPENDIX G1-A

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

LIST OF TABLES

DIVISION 1 – GENERAL REQUIREMENTS

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Section 01010 – Summary of Work

Part 1 – General

1.1 Scope

This section includes the following:

- Scope of Work
- Definitions and Abbreviations
- List of Drawings
- Work by Others
- Contractors Use of Site
- Contractors Use of Facilities
- Work Sequence
- Work Plan
- Health and Safety Plan (**HASP**)
- Contractor Quality Control Plan (**CQCP**)
- Submittals

1.2 Scope of Work

The contractor shall furnish all labor, materials, equipment, and tools to construct Waste Isolation Pilot Plant (**WIPP**) Panel Closure (**WPC**), including the WPC-A for Panels 1 through 9, and the WPC-B to the north of Panel 10. Each WPC-A in each of Panels 1-9 consists of a single steel bulkhead while the WPC-B north of Panel 10 will include dual bulkheads with run-of-mine (**ROM**) salt installed between. Nuclear Waste Partnership LLC (**NWP**) may elect to perform any portion or all of the work herein. Details are as follows:

- Install WPC-A in the air-intake and the air-exhaust drifts of Panel 1, 2, and 5 with the explosion-isolation walls (block walls), as shown on the drawings and described in these specifications. The WPC-A consists of an out-bye steel bulkhead. Alternatively, install WPC-A in the main entries and cross-drifts in order to close multiple panels simultaneously based on the direction of the geotechnical engineer.

- Install WPC-A in the air-intake and the air-exhaust drifts of Panel 3, 4, 6, 7, and 8 without the explosion-isolation walls (block walls), as shown on the drawings and described in these specifications. The WPC-A consists of an out-bye steel bulkhead. Alternatively, install WPC A in access mains and cross-drifts in order to close multiple panels simultaneously based on the direction of the geotechnical engineer.

- Install WPC-A in the main entries between Panels 9 and 10, as shown on the drawings and described in these specifications. The WPC-A consists of an out-bye steel bulkhead.

- Install WPC-B in the main entries north of Panel 10, as shown on the drawings and described in these specifications. The WPC-B consists of an in-bye and an out-bye steel bulkhead with ROM salt installed between.

Unless otherwise agreed by NWP, the contractor shall use NWP supplied equipment underground. Such use shall be coordinated with NWP and may include the use of NWP qualified operators.

The scope of work shall include but not necessarily be limited to the following units of work:

- Develop work plan, HASP, and CQCP, and submit for approval
- Prepare and submit any other plans requiring approval
- Mobilize to site
- Coordinate construction with WIPP operations
- Perform the following operations for the air-intake drift and the air-exhaust drift that do not contain block walls (Panels 3, 4, 6, 7, and 8):
    - Prepare the surfaces for the out-bye steel bulkhead placement
    - Construct the out-bye steel bulkhead
    - Clean up construction areas in underground and above ground
    - Submit required record documents
    - Demobilize from site
- Perform the following operations for the air-intake drift and the air-exhaust drift with block walls (Panels 1, 2, and 5):
    - Prepare the surfaces for the out-bye steel bulkhead placement
    - Construct the out-bye steel bulkhead
    - Clean up construction areas in underground and above ground
    - Submit required record documents
    - Demobilize from site
- Perform the following operations for the main entries between Panels 9 and 10:
    - Prepare the surfaces for the out-bye steel bulkhead placement
    - Construct the out-bye steel bulkhead
    - Clean up construction areas in underground and above ground
    - Submit required record documents
    - Demobilize from site
- Perform the following operations for the main entries north of Panel 10:
    - Prepare the surfaces for the in-bye steel bulkhead placement
    - Construct the in-bye steel bulkhead
    - Prepare the surfaces for the ROM salt placement
    - Place ROM salt material in multiple layers
    - Prepare surfaces for the out-bye steel bulkhead placement
    - Construct the out-bye steel bulkhead
    - Clean up construction areas in underground and above ground
    - Submit required record documents
    - Demobilize from site

1.3 Definitions and Abbreviations

Definitions

Block wall – Existing mortared concrete block wall adjacent to the panel waste disposal area as shown in the drawings; also known as explosion-isolation wall

Creep – Viscoplastic deformation of salt under deviatoric stress

Partial closure – The process of rendering a part of the hazardous waste management unit in the underground repository inactive and closed according to approved facility closure plans

Run-of-mine (**ROM**) salt – A salt backfill obtained from mining operations and emplaced in an uncompacted state

Volatile organic compound (**VOC**) – Any VOC with Hazardous Waste Facility Permit emission limits

Nuclear Waste Partnership LLC (**NWP**) – the construction management authority

Abbreviations/Acronyms

ACI	American Concrete Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
CQCP	Contractor Quality Control Plan
DOE	U.S. Department of Energy
DWG	drawing
EPA	U.S. Environmental Protection Agency
HASP	Health and Safety Plan
JHA	Job Hazard Analysis
LHD	load haul dump
LLC	Limited Liability Corporation
MSHA	U.S. Mine Safety and Health Administration
NWP	Nuclear Waste Partnership LLC
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant
WPC	WIPP Panel Closure

1.4 List of Drawings

The following drawings were prepared as a part of the WPC design report (Attachment G1, Appendix G1-B, Drawings):

DWG 262-001	WIPP Panel Closure (**WPC**) Title Sheet
DWG 262-002	WPC Locations
DWG 262-003	Typical Panel Layout and Mined Entry Cross-Sections
DWG 262-004	WPC Details – Bulkhead and ROM Salt Locations

DWG 262-005 WPC Details – Bulkhead Front-View and Attachment Detail

1.5 Work by Others

Survey

All survey work to locate, control, confirm, and complete the work will be performed by NWP. All survey work for record purposes will be performed by NWP. NWP may elect to perform certain portions or all of the work. The work performed by the NWP will be defined prior to the contract. Unless otherwise agreed by NWP, the contractor shall use underground equipment furnished by NWP for construction of the steel bulkheads and placement of ROM salt. Underground mining personnel who are qualified for the operation of such underground construction equipment may be made available to the contractor. The use of NWP equipment shall be coordinated with NWP.

1.6 Contractor's Use of Site

Site Conditions

The WIPP site is located near Carlsbad in southeastern New Mexico, as shown on the drawings. The underground arrangements and location of the WIPP waste disposal panels are shown on the drawings. The work is to construct steel bulkheads in the air-intake drifts, air-exhaust drifts, and main access drifts between Panels 9 and 10 after cessation of the disposal phase in the specific panel. The work may include installation of steel bulkheads at alternative locations. Alternative locations will be specified by the NWP geotechnical engineer prior to installation activities. Dual bulkheads will be emplaced in the main entries north of Panel 10 after cessation of all disposal activities, and ROM salt placed between these bulkheads at a length to be specified by NWP. The waste disposal panels are located approximately 2,150 feet (655 meters) below the ground surface. The contractor shall visit the site, and become familiar with the site and site conditions, prior to preparing a bid proposal.

Contractor's Use of Site

Areas at the ground surface will be designated for the contractor's use in assembling and storing his equipment and materials. The contractor shall utilize only those areas so designated.

Limited space within the underground area will be designated for the contractor's use for storage of material and setup of equipment.

1.7 Contractor's Use of Facilities

Existing facilities at the site available for use by the contractor are:

- Waste shaft conveyance
- Salt skip hoist
- 460-volt AC, 3-phase power
- Water (underground, at waste shaft only) (above ground, at a location designated by NWP)

Additional information on mobilization and demobilization to these facilities is presented in Section 02010.

1.8 Work Sequence

Work sequence shall be as shown on the drawings and as directed by NWP. NWP will designate the order in which panels are to be closed.

1.9 Work Plans

The contractor shall prepare work plans fully describing the proposed fabrication, installation, and construction for each WIPP panel closure. The work plan shall define proposed materials, equipment, and construction methods. The work plan shall state supporting processes, procedures, materials safety data sheets, and regulations by reference. The work plans shall address precautions related to the Job Hazards Check List. The work plan shall address limitations such as hold and witness points. The work plans shall address prerequisites for work. NWP shall approve the work plan and no work shall be performed prior to approval of the work plan.

1.10 Health and Safety Plan (HASP)

The contractor shall obtain, review, and agree to applicable portions of the existing WIPP Safety Manual, WP 12-1. The contractor shall prepare a project-specific HASP taking into account applicable sections of the WIPP Safety Manual. Personnel performing work shall be qualified to work underground. Personnel operating heavy construction equipment shall be qualified to operate such equipment. The contractor shall also perform a Job Hazard Analysis (**JHA**) in accordance with WP 12-1. NWP shall approve the HASP and JHA and no work shall be performed prior to approval of the HASP and JHA.

1.11 Contractor Quality Control Plan (CQCP)

The contractor shall prepare a CQCP identifying all personnel and procedures necessary to produce an end product that complies with the contract requirements. The CQCP shall comply with applicable NWP requirements, including operator training and qualification; and Section 01400, Contractor Quality Control, of this specification. NWP shall approve the CQCP and no work shall be performed prior to approval of the CQCP.

1.12 Submittals

Submittals shall be in accordance with NWP submittal procedures and as required by the individual specifications.

Part 2 – Products

Not used.

Part 3 – Execution

Not Used.

END OF SECTION

Section 01090 – Reference Standards

Part 1 – General

1.1 Scope

This section includes the following:

- Provision of Reference Standards at Site
- Acronyms used in Contract Documents for Reference Standards

1.2 Quality Assurance

For products or workmanship specified by association, trade, or Federal Standards, the contractor shall comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

Conform to reference by date of issue current on the date of the owner-contractor agreement.

The contractor shall obtain, at the contractor's own expense, a copy of the standards referenced in the individual specification sections and shall maintain that copy at the job site until completion and acceptance of the work.

Should specified reference standards conflict with the contract documents, the contractor shall request clarification from Nuclear Waste Partnership LLC (**NWP**) before proceeding.

1.3 Schedule of References

Various publications referenced in other sections of the specifications establish requirements for the work. These references are identified by document number and title. The addresses of the organizations responsible for these publications are listed below.

ANSI	American National Standards Institute 25 West 43rd Street New York, New York 10036 Ph: 212-642-4900 Fax: 212-398-0023
ASTM	ASTM International 100 Barr Harbor Drive P.O. Box C700 West Conshohocken, Pennsylvania 19428-2959 Ph: 610-832-9585 Fax: 610-832-9555

CFR	Code of Federal Regulations Government Printing Office 732 North Capital Street, NW Washington, District of Columbia 20401-0001 Ph: 202-512-1800 Fax: 202 512-2104
EPA	Environmental Protection Agency 1445 Ross Avenue, Suite 1200 Dallas, Texas 75202-2733 Ph: 214-665-2200
FTM-STD	Federal Test Method Standards Standardization Documents Order Desk, Building 4D 700 Robbins Avenue Philadelphia, Pennsylvania 19111-5094 Ph: 215-697-2179 Fax: 215-697-2978
NIST	National Institute of Standards and Technology 100 Bureau Drive, Stop 1000 Gaithersburg, Maryland 20899-1000 Ph: 301-975-6478 Fax: 301-975-8295
NTIS	National Technical Information Service U.S. Department of Commerce 5301 Shawnee Road Alexandria, Virginia 22312 Ph: 703-605-6000 Fax: 703-605-6900

Part 2 – Products

Not used.

Part 3 – Execution

Not used.

END OF SECTION

Section 01400 – Contractor Quality Control

Part 1 – General

1.1 Scope

This section includes the following:

- Contractor Quality Control Plan (**CQCP**)
- Reference Standards
- Quality Assurance
- Tolerances
- Testing Services
- Inspection Services
- Submittals

1.2 Related Sections

- 01090 – Reference Standards
- 01600 – Material and Equipment
- 02222 – Excavation
- 03100 – Run-of-Mine Salt

1.3 Contractor Quality Control Plan (CQCP)

The contractor shall prepare a CQCP describing the methods to be used to verify the performance of the engineered components of the Waste Isolation Pilot Plant (**WIPP**) Panel Closure (**WPC**). The quality control plan for the run-of-mine (**ROM**) salt shall detail the methods the contractor proposes to meet the minimum requirements, and the standard quality control test methods to be used to verify compliance with minimum requirements. Equipment methods employed shall be traceable to standard quality control tests as approved in the CQCP. No work shall be performed prior to Nuclear Waste Partnership LLC (**NWP**) approval of the CQCP.

1.4 References and Standards

Refer to individual specification sections for standards referenced therein, and to Section 01090, Reference Standards, for general listing. Additional standards will be identified in the CQCP.

Standards referenced in this section are as follows:

ASTM E 329-01b	Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E 543-02	Standard Practice for Agencies Performing Nondestructive Testing

1.5 Quality Assurance

The contractor shall:

- Monitor suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality
- Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship
- Perform work with qualified persons to produce required and specified quality

1.6 Tolerances

The contractor shall:

- Monitor excavation, fabrication, and tolerances to produce acceptable work. The contractor shall not permit tolerances to accumulate.

1.7 Testing Services

Unless otherwise agreed by NWP, the contractor shall employ an independent firm qualified to perform the testing services and other services specified in the individual specification sections, and as may otherwise be required by NWP. Testing and source quality control may occur on or off the project site.

The testing laboratory, if used, shall comply with applicable sections of the reference standards and shall be authorized to operate in the State of New Mexico.

Testing equipment shall be calibrated at reasonable intervals traceable either to the standards from the National Institute of Standards and Technology or to accepted values of natural physical constants.

1.8 Inspection Services

The contractor may employ an independent firm to perform inspection services as a supplement to the contractor's quality control as specified in the individual specification sections, and as may be required by NWP. Inspection may occur on or off the project site.

The inspection firm shall comply with applicable sections of the reference standards.

1.9 Submittals

The contractor shall submit a CQCP as described herein.

Prior to start of work, if a testing laboratory is used, the contractor shall submit for approval the testing laboratory name, address, telephone number, and name of responsible officer of the firm, as well as a copy of the testing laboratory compliance with the referenced American Society for Testing and Materials (**ASTM**) standards, and a copy of the report of laboratory facilities inspection made by Materials Reference Laboratory of National Institute of Standards and Technology with memorandum of remedies of any deficiencies reported by the inspection.

The contractor shall submit the names and qualifications of personnel proposed to perform the required inspections, along with their individual qualifications and certifications. Once approved by NWP, these personnel shall be available as may be required to promptly and efficiently complete the work.

Part 2 – Products

Not used.

Part 3 – Execution

3.1 General

The contractor is responsible for quality control and shall establish and maintain an effective quality control system. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the contract requirements. The quality control system shall cover construction operations, both on site and off site, and shall be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work on the job. The project superintendent in this context is the individual with the responsibility for the overall management of the project, including quality and production.

3.2 Contractor Quality Control Plan

3.2.1 General

The contractor shall supply, not later than 30 days after receipt of notice to proceed, the CQCP, which implements the requirements of the Contract. The CQCP shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. Construction shall not begin until the CQCP is approved by NWP.

3.2.2 Content of the CQCP

The CQCP shall cover construction operations, both on site and off site, including work by subcontractors, fabricators, suppliers, and purchasing agents and shall include, as a minimum, the following items:

- A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the Contractor Quality Control (**CQC**) staff shall implement the control system for all aspects of the work specified.
- The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- A description of CQCP responsibilities and a delegation of authority to adequately perform the functions described in the CQCP, including authority to stop work.

- Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off-site fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with NWP submittal procedures.

- Control, verification, and acceptance testing procedures as may be necessary to ensure that the work is completed to the requirements of the drawings and specifications.

- Procedures for tracking deficiencies from identification, through acceptable corrective action, to verification that identified deficiencies have been corrected.

- Reporting procedures, including proposed reporting formulas.

3.2.3 Acceptance of Plan

Acceptance of the contractor's plan is conditional. NWP reserves the right to require the contractor to make changes in the CQCP and operations, including removal of personnel, if necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQCP, the contractor shall notify NWP in writing of any proposed change. Proposed changes are subject to acceptance by NWP.

3.3 Tests

3.3.1 Testing Procedure

The contractor shall perform specified or required tests to verify that control measures are adequate to complete the work to contract requirements. Upon request, the contractor shall furnish, at the contractor's own expense, duplicate samples of test specimens for testing by NWP. The contractor shall perform, as necessary, the following activities and permanently record the results:

- Verify that testing procedures comply with contract requirements.

- Verify that facilities and testing equipment are available and comply with testing standards.

- Check test instrument calibration data against certified standards.

- Verify that recording forms and test identification control number system, including the test documentation requirements, have been prepared.

- Record the results of tests taken, both passing and failing. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by NWP, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility will be provided directly to NWP.

- The contractor may elect to develop an equipment specification with construction parameters based upon test results of a test section of ROM salt. The equipment specification based upon construction parameters shall be traceable to standard test results identified in the CQCP. Specification paragraph reference, location where construction parameters were taken, and the sequential control number identifying the construction parameters will be given. If approved by NWP, actual construction parameter reports may be submitted later with a reference to the recording of construction parameters, location, time, and date taken.

3.4 Testing Laboratory

The testing laboratory, if used, shall provide qualified personnel to perform specified sampling and testing of products in accordance with specified standards, and the requirements of contract documents.

Reports indicating results of tests, and compliance or noncompliance with the contract documents will be submitted in accordance with NWP submittal procedures. Testing by an independent firm does not relieve the contractor of the responsibility to perform the work to the contract requirements.

3.5 Inspection Services

The inspection firm shall provide qualified personnel to perform specified inspection of products in accordance with specified standards.

Reports indicating results of the inspection and compliance or noncompliance with the contract documents will be submitted in accordance with NWP submittal procedures.

Inspection by the independent firm does not relieve the contractor of the responsibility to perform the work to the contract requirements.

3.6 Completion Inspection

3.6.1 Pre-Final Inspection

At appropriate times and at the completion of the work, the contractor shall conduct an inspection of the work and develop a "punch list" of items that do not conform to the drawings and specifications. The contractor shall then notify NWP that the work is ready for inspection. NWP will perform this inspection to verify that the work is satisfactory and appropriately complete. A "final punch list" will be developed as a result of this inspection. The contractor shall ensure that the items on this list are corrected and notify NWP so that a final inspection can be scheduled. Any items noted on the final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work.

3.6.2 Final Acceptance Inspection

The final acceptance inspection will be formally scheduled by NWP based upon notice from the contractor. This notice will be given to NWP at least 14 days prior to the final acceptance inspection. The contractor shall assure that the specific items previously identified as unacceptable, along with the remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.

3.7 Documentation

The contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form approved by NWP.

3.8 Notification of Noncompliance

NWP will notify the contractor of any noncompliance with the foregoing requirements. The contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the contractor fails or refuses to comply promptly, NWP may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the contractor.

END OF SECTION

Section 01600 – Material and Equipment

Part 1 – General

1.1 Scope

This section includes the following:

- Equipment
- Products
- Transportation and Handling
- Storage and Protection
- Substitutions

1.2 Related Sections

- 01010 – Summary of Work
- 01400 – Contractor Quality Control
- 02010 – Mobilization and Demobilization
- 02222 – Excavation
- 03100 – Run-of-Mine Salt

1.3 Equipment

The contractor shall specify proposed equipment in the work plan. Power equipment for use underground shall be either electrical or diesel-engine driven. All diesel-engine equipment shall be certified for use underground at the Waste Isolation Pilot Plant (**WIPP**) site.

1.4 Products

The contractor shall specify in the work plan, or in subsequently required submittals, the proposed products including, but not limited to steel bulkheads and run-of-mine (**ROM**) salt. The proposed products shall be supported by laboratory test results as required by the specifications. Products shall be subject to approval by Nuclear Waste Partnership LLC (**NWP**).

1.5 Transportation and Handling

The contractor shall:

- Transport and handle products in accordance with manufacturer's instructions.

- Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

- Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.6 Storage and Protection

The contractor shall:

- Store and protect products in accordance with manufacturers' instructions.
- Store with seals and labels intact and legible.
- Store sensitive products in weather-tight, climate-controlled enclosures in an environment favorable to product.
- Provide ventilation to prevent condensation and degradation of products.
- Store loose granular materials (other than ROM salt) on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.
- Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- Arrange storage of products to permit access for inspection and periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.7 Substitutions

1.7.1 Equipment Substitutions

The contractor may substitute equipment for that proposed in the work plan subject to NWP approval.

1.7.2 Product Substitutions

The contractor may not substitute products after the proposed products have been approved by NWP unless he can demonstrate that the supplier/source of that product no longer exists in which case he shall submit alternate products with lab test results to NWP for approval.

Part 2 – Products

Not used.

Part 3 – Execution

Not used.

END OF SECTION

DIVISION 2 – SITE WORK

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Section 02010 – Mobilization and Demobilization

Part 1 – General

1.1 Scope

This section includes the following:

- Mobilization of Equipment and Facilities to Site
- Use of Site
- Use of Existing Facilities
- Demobilization of Equipment and Facilities
- Site Cleanup

1.2 Related Sections

- 01010 – Summary of Work
- 01600 – Material and Equipment

Part 2 – Products

Not used.

Part 3 – Execution

3.1 Mobilization of Equipment and Facilities to Site

Upon authorization to proceed, the contractor shall mobilize the contractor's equipment and facilities to the jobsite. Equipment and facilities shall be as specified and as defined in the contractor's work plan.

Nuclear Waste Partnership LLC (**NWP**) will provide utilities at designated locations. The contractor shall be responsible for hookups and tie-ins required for contractor operations.

The contractor shall be responsible for providing his own office, storage, and sanitary facilities.

Areas will be designated for the contractor's use in the underground area near the Waste Isolation Pilot Plant (**WIPP**) Panel Closure (**WPC**) installation. These areas are limited.

3.2 Use of Site

The contractor shall use only those areas specifically designated for use by NWP. The contractor shall limit on-site travel to the specific routes required for performance of work, and designated by NWP.

3.3 Use of Existing Facilities

Existing facilities available for use by the contractor are as follows:

- Waste shaft conveyance
- Salt skip hoist

- 460-volt AC, 3-phase power
- Water underground at waste shaft only
- Water on surface at location designated by NWP

The contractor shall arrange for use of the facilities with NWP and coordinate contractor actions and requirements with ongoing NWP operations.

Use of water in the underground will be restricted. No washout or cleanup will be permitted in the underground except as designated by NWP. Aboveground washout or cleanup of equipment will be allowed in the areas designated by NWP.

The contractor is cautioned to be aware of the physical dimensions of the waste conveyance and the air lock.

The contractor shall be responsible for any damage incurred by the existing site facilities as a result of contractor operations. Any damage shall be reported immediately to NWP and repaired at the contractor's cost.

3.4 Demobilization of Equipment and Facilities

At completion of work, the contractor shall demobilize contractor equipment and facilities from the job site. Contractor's equipment and materials shall be removed and disturbed areas restored. Utilities shall be removed to their connection points unless otherwise directed by NWP. Any equipment that becomes radiologically contaminated will be managed in accordance with NWP radiological protection policies.

3.5 Site Cleanup

At conclusion of the work, the contractor shall remove trash, waste, debris, excess construction materials, and restore the affected areas to their prior condition, to the satisfaction of NWP. A final inspection will be conducted by NWP and the contractor before final payment is approved. Any trash, waste, debris, excess construction materials that become radiologically contaminated will be managed in accordance with NWP radiological protection policies.

END OF SECTION

Section 02222 – Excavation

Part 1 – General

1.1 Scope

This section includes the following:

- Excavation for Surface Preparation and Leveling of Areas for Steel Bulkhead and ROM Salt Placement
- Disposing of Excavated Materials
- Field Measurements and Survey

1.2 Related Sections

- 01010 – Summary of Work
- 01600 – Material and Equipment

1.3 Reference Documents

Krieg, R.D., 1984. Reference Stratigraphy and Rock Properties for the Waste Isolation Pilot Plant, SAND83-1908, Sandia National Laboratories, Albuquerque, New Mexico.

1.4 Field Measurements and Survey

Survey required for performance of the work will be provided by Nuclear Waste Partnership LLC (**NWP**).

Part 2 – Products

Not used.

Part 3 – Execution

3.1 Excavation for Surface Preparation and Leveling of Areas for Steel Bulkhead and ROM Salt Placement

The contractor shall inspect the areas designated for placement of the Waste Isolation Pilot Plant (**WIPP**) Panel Closure (**WPC**) components (run-of-mine (**ROM**) salt and steel bulkheads) and remove any loose material. If loose material is found, the contractor shall excavate and prepare the surface by removing loose material and cleaning rock surfaces. The surface preparation of the floor shall produce a surface suitable for anchoring the steel bulkhead base components and for placing the first layer of ROM salt (as applicable). Excavation may be performed by either mechanical or manual means. Use of explosives is prohibited.

3.2 Disposing of Excavated Materials

The contractor shall dispose of excavated materials as directed by NWP. No excavated materials from radiologically controlled areas will be disposed of without prior approval of NWP.

3.3 Field Measurements and Survey

Survey required for performance of the work will be provided by NWP. The contractor shall protect survey control points, benchmarks, etc., from damage by his operations. NWP will verify that the contractor has excavated to the required lines and grades. No salt shall be emplaced until approved by NWP.

END OF SECTION

DIVISION 3 – WPC COMPONENTS

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SECTION 03100 – Run-of-Mine Salt

Part 1 – General

1.1 Scope

This section includes the following:

- Salt Placement

1.2 Related Sections

- 01010 – Summary of Work
- 01400 – Contractor Quality Control
- 01600 – Material and Equipment

1.3 Submittals for Review and Approval

The salt emplacement method, dust control plan and other safety-related material shall be approved by Nuclear Waste Partnership LLC (**NWP**).

1.4 Quality Assurance

The contractor shall perform the work in accordance with the Contractor Quality Control Plan (**CQCP**).

Part 2 – Products

2.1 Salt Material

The salt is run-of-mine (**ROM**) salt and requires no grading or compaction. The salt shall be free of foreign organic material.

Part 3 – Execution

3.1 General

The contractor shall furnish labor, material, equipment, and tools to handle and place the salt.

The contractor shall use underground equipment and underground mine personnel as required in Part 1.5, Work by Others in Section 01010, Summary of Work. NWP will supply ROM salt. The contractor shall make suitable arrangements for transporting and placing the ROM salt.

3.2 Installation

Run-of-mine salt shall be transported to the Waste Isolation Pilot Plant (**WIPP**) Panel Closure (**WPC**)-B installation area north of Panel 10 after the construction of the in-bye steel bulkhead. The ROM salt is not required to achieve a specified density.

Salt may be emplaced in layers to facilitate the construction. The ROM salt is emplaced in layers to achieve minimum lengths shown in Table 1. The lengths reported in Table 1 do not include sloped ends of the ROM salt plug. Extents of the ROM salt emplacement are designated in the drawings.

There shall be no gap left between ROM salt and roof or sidewalls. Hand placement or push plates can be used to fill the voids if necessary. The approximate lengths and slope inclines are specified in the drawings. Emplacement of the ROM salt at natural angle of repose is acceptable.

Table 1 Minimum ROM Salt Lengths

Entry Width (feet)	Minimum ROM Salt Length[1] (feet)
14	35
16	40
20	50
25	65

Note:
1. Reported ROM length dimensions do not include end slopes of the ROM salt plug.

3.3 Field Quality Control

The contractor shall provide a Quality Control Inspector to inspect the emplacement of salt.

END OF SECTION

SECTION 03200 – Steel Bulkheads

Part 1 – General

1.1 Scope

This section includes the following:

- Steel Bulkhead Installation

1.2 Related Sections

- 01010 – Summary of Work
- 01400 – Contractor Quality Control
- 01600 – Material and Equipment

1.3 Submittals for Review and Approval

The method of installation, construction equipment, and construction materials shall be approved by Nuclear Waste Partnership LLC (**NWP**).

1.4 Quality Assurance

The contractor shall perform the work in accordance with the Contractor Quality Control Plan (**CQCP**).

Part 2 – Products

2.1 Bulkhead Material

Construction material, including steel profiles, sheet metal, flexible flashing, and connectors/bolts shall be approved by NWP prior to construction.

Part 3 – Execution

3.1 General

The contractor shall furnish all labor, material, equipment, and tools to install steel bulkheads at the locations specified in the drawings. The contractor shall use underground equipment and underground mine personnel as required in Part 1.5, Work by Others, in Section 01010, Summary of Work.

3.2 Fabrication

Bulkheads will be fabricated on the surface or in the underground in a location designated by NWP.

3.3 Installation

In-bye steel and out-bye steel bulkheads shall be installed in the designated WPC areas approved by the NWP as specified in the drawings. The contractor shall not commence installation activities without prior inspection of the ground conditions as documented in the Health and Safety Plan (**HASP**) per Section 01010 of these specifications and without prior approval by NWP.

3.4 Field Quality Control

The contractor shall provide a Quality Control Inspector to inspect the steel bulkhead installation if requested by NWP prior to contract.

3.5 Product Acceptance

The contractor shall arrange for the pre-final inspection and final product inspection as described in Part 3.6, Section 01400, of these specifications. The resolution of noncompliance issues will be conducted as described in Part 3.8, Section 01400, of these specifications.

END OF SECTION

ATTACHMENT G1
APPENDIX G1-B

DRAWINGS

WIPP PANEL CLOSURE
WASTE ISOLATION PILOT PLANT
CARLSBAD, NEW MEXICO

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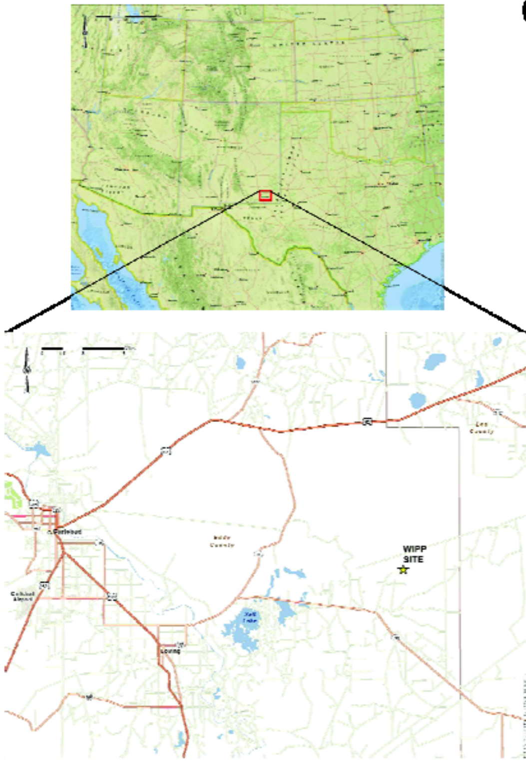
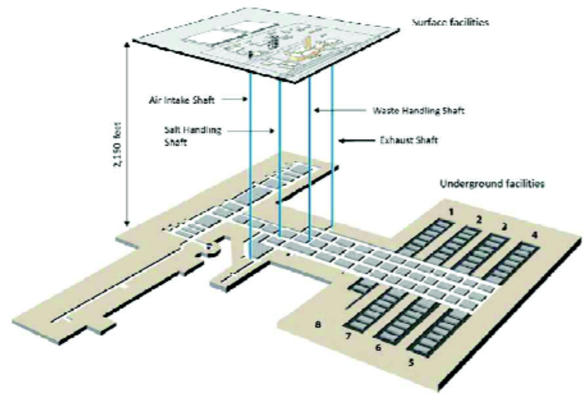
WIPP PANEL CLOSURE
CARLSBAD, NEW MEXICO



INDEX OF DRAWINGS	
DRAWING NO.	TITLE
262-001	WIPP PANEL CLOSURE (WPC) TITLE SHEET
262-002	[illegible]
262-003	[illegible]
262-004	[illegible]
262-005	[illegible]



CLIENT
NUCLEAR WASTE PARTNERSHIP LLC

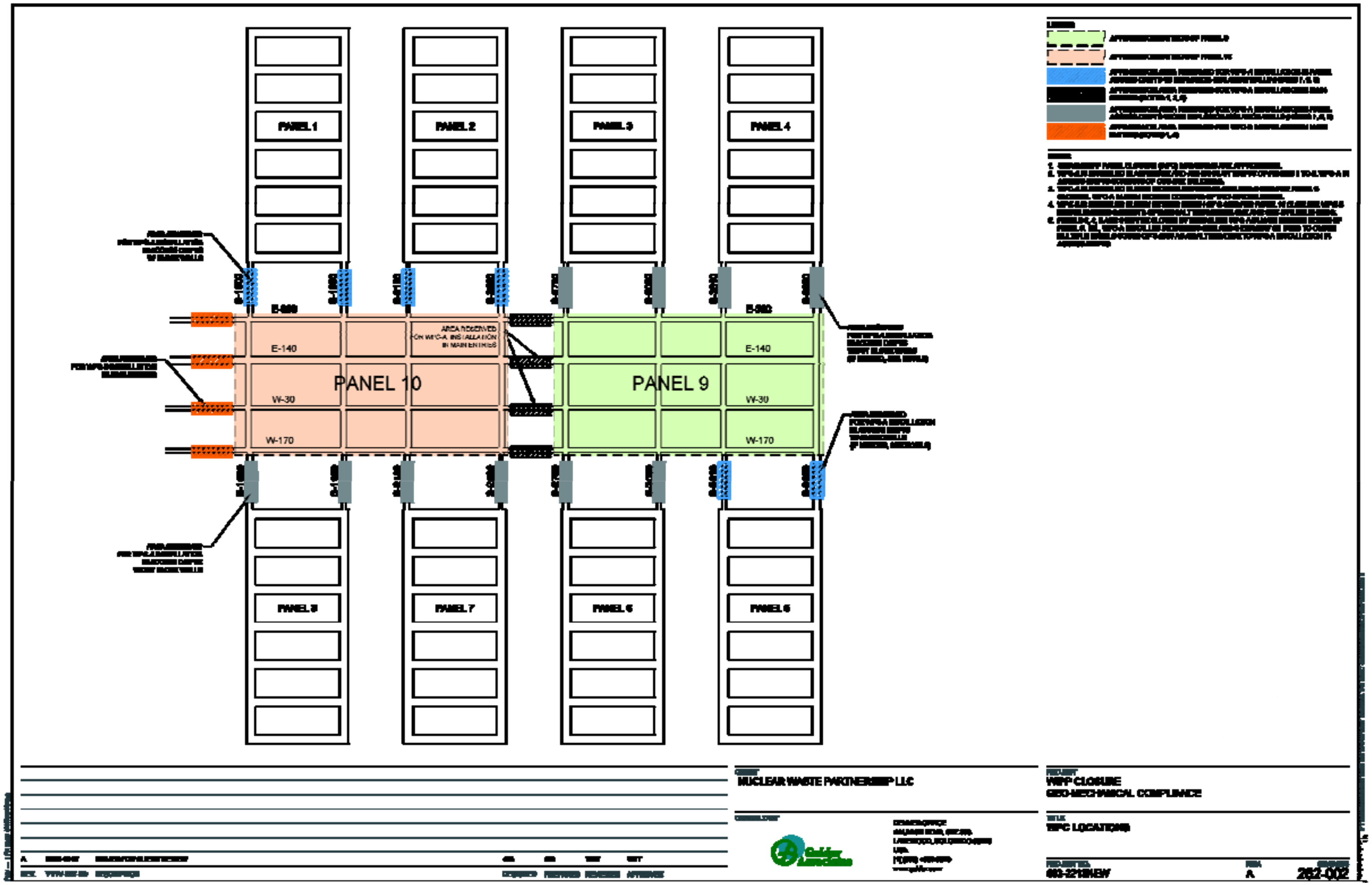
PROJECT
WIPP CLOSURE
GEO-MECHANICAL COMPLIANCE

CONSULTANT

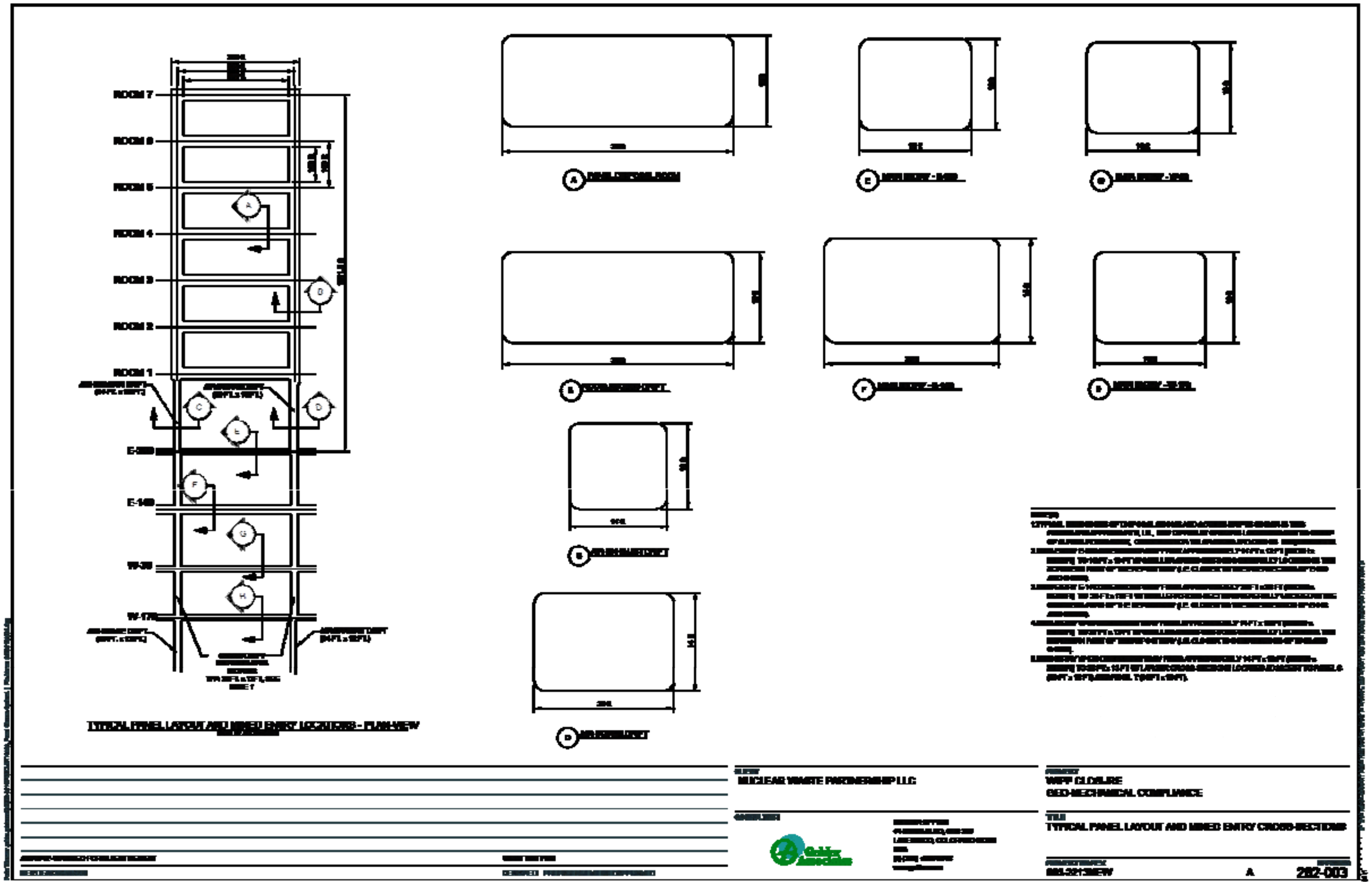
Golder Associates

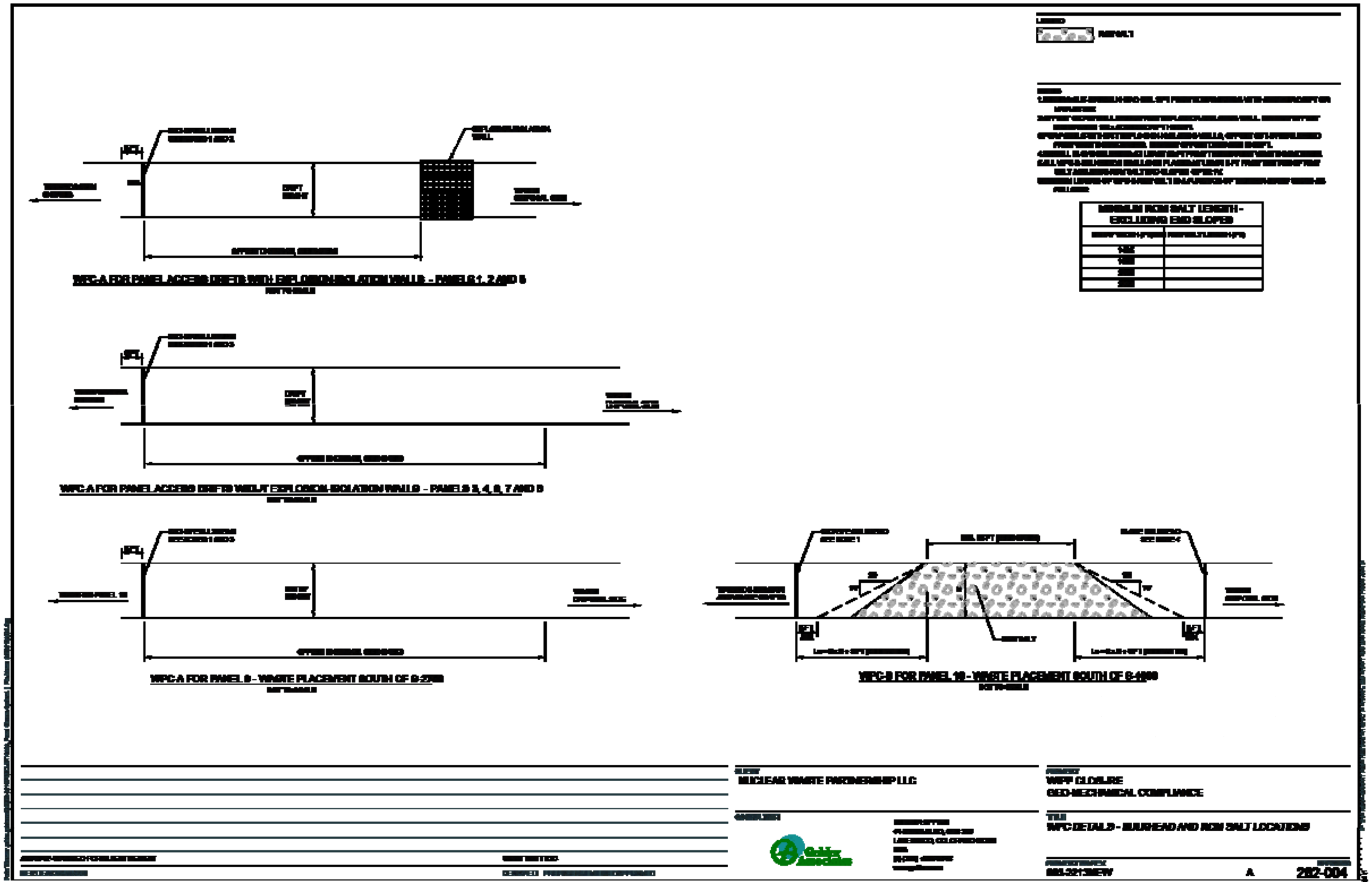
TITLE
WIPP PANEL CLOSURE (WPC) TITLE SHEET

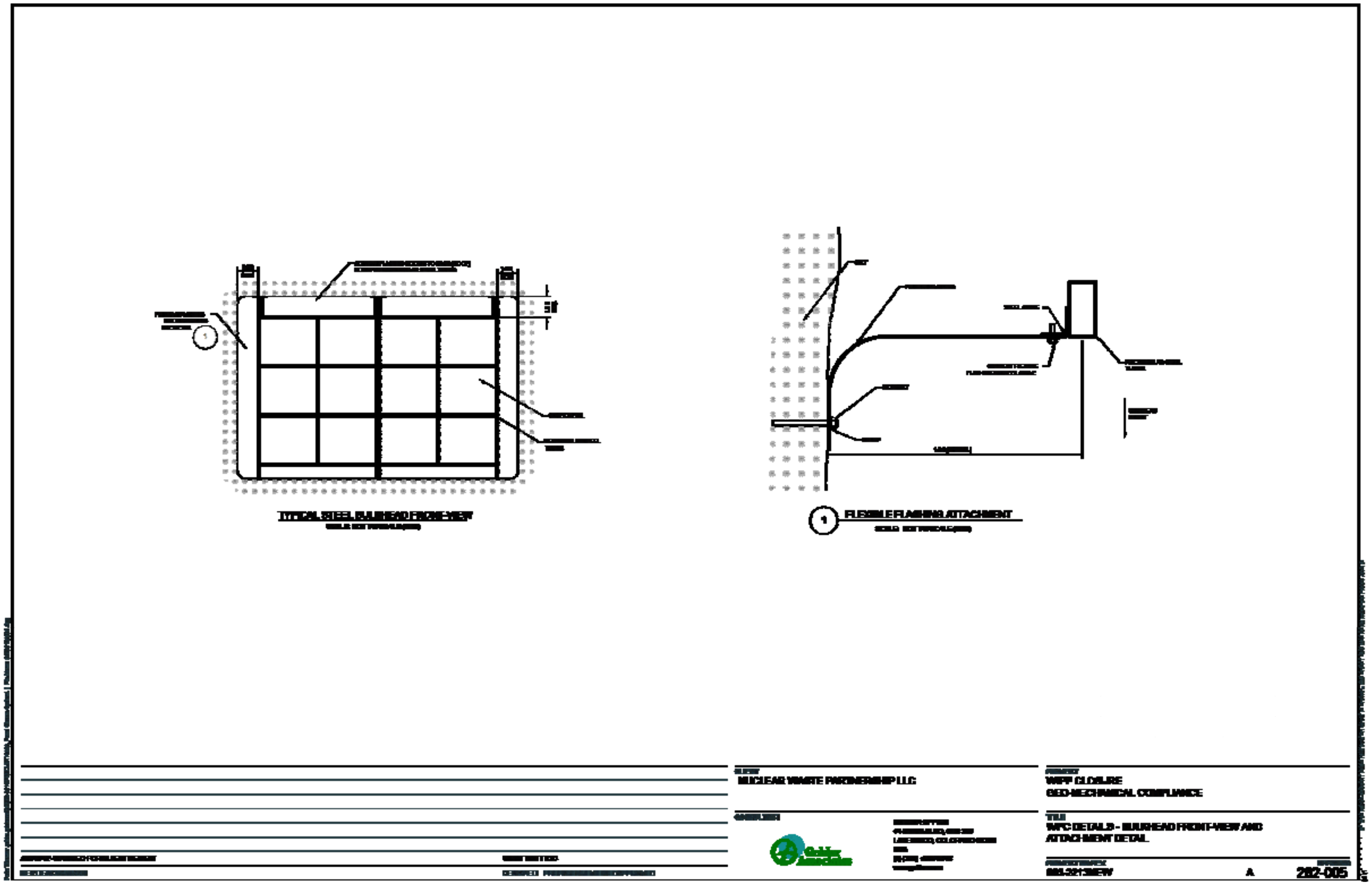
PROJECT NO. 063-2213NEW | REV. A | DRAWING 262-001


PANEL 10
PANEL 9
E-140
W-30
W-170
AREA RESERVED FOR WPC-A INSTALLATION IN MAIN ENTRIES

1


ROOM 7
ROOM 4
ROOM 1
E-140
NUCLEAR WASTE PARTNERSHIP LLC
WIPP CLOSURE
GEO-MECHANICAL COMPLIANCE
TYPICAL PANEL LAYOUT AND MINED ENTRY CROSS-SECTIONS
202-003


MINIMUM ROM SALT LENGTH - EXCLUDING END SLOPES
NUCLEAR WASTE PARTNERSHIP LLC
WIPP CLOSURE
GEO-MECHANICAL COMPLIANCE
282-004


TYPICAL STEEL BULKHEAD FRONT-VIEW
FLEXIBLE FLASHING ATTACHMENT
NUCLEAR WASTE PARTNERSHIP LLC
WIPP CLOSURE
GEO-MECHANICAL COMPLIANCE
WPC DETAILS - BULKHEAD FRONT-VIEW AND
ATTACHMENT DETAIL
A
282-005

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~~ATTACHMENT G1~~
~~APPENDIX G~~

~~TECHNICAL SPECIFICATIONS~~

~~PANEL CLOSURE SYSTEM~~
~~WASTE ISOLATION PILOT PLANT~~
~~CARLSBAD, NEW MEXICO~~

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~~ATTACHMENT G1~~
~~APPENDIX G~~

~~TECHNICAL SPECIFICATIONS~~

~~PANEL CLOSURE SYSTEM~~
~~WASTE ISOLATION PILOT PLANT~~
~~CARLSBAD, NEW MEXICO~~

~~TABLE OF CONTENTS~~

~~LIST OF FIGURES~~

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~~DIVISION 1 - GENERAL REQUIREMENTS~~

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~~Section 01010 - Summary of Work~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Scope of Work~~
- ~~Definitions and Abbreviations~~
- ~~Drawings~~
- ~~Work by Others~~
- ~~Contractors Use of Site~~
- ~~Contractors Use of Facilities~~
- ~~Work Sequence~~
- ~~Work Plan~~
- ~~Submittals~~

~~1.2 Scope of Work~~

~~The Contractor shall furnish all labor, materials, equipment and tools to perform operations in connection with the construction of two (2) panel closure systems for each panel, one of each to be installed in the air intake drift and the air exhaust drift of a waste-emplacement panel, as shown on the drawings and called for in these specifications.~~

~~Four (4) possible arrangements of the concrete barrier and isolation walls are shown on the attached Figure G1-1 "Plan Variations."~~

- ~~Concrete barrier without disturbed rock zone (**DRZ**) removal in combination with construction isolation wall (Sketch A).~~

- ~~Concrete barrier without DRZ removal in combination with an explosion isolation wall (Sketch B).~~

- ~~Concrete barrier with DRZ removal up through clay seam G and down through marker bed 139 (**MB 139**) in combination with a construction isolation wall (Sketch C).~~

- ~~Concrete barrier with DRZ removal in combination with an explosion isolation wall (Sketch D) (This is the only approved configuration in this Permit).~~

~~The scope of work shall include but not be limited to the following units of work:~~

- ~~Develop work plan, health and safety plan (**HASP**) and contractors quality control plan (**CQCP**)~~

- ~~Prepare and submit all plans requiring approval~~

- ~~Mobilize to site~~

- ~~Coordinate construction with operations~~
- ~~Perform the following for the air intake entry and the air exhaust entry.~~
  - ~~Excavate the surface preparation for the explosion isolation wall~~
  - ~~Construct the explosion isolation wall~~
  - ~~Excavate the DRZ~~
  - ~~Install the form work for the concrete barrier~~
  - ~~Place concrete for the concrete barrier~~
  - ~~Grout the interface of concrete barrier/back wall~~
  - ~~Provide contact grouting along the contact surface (if required by the engineer)~~
- ~~Clean up construction areas in underground and above ground~~
- ~~Submit all required record documents~~
- ~~Demobilize from site~~

~~1.3 Definitions and Abbreviations~~

~~Definitions~~

~~Contact-handled waste—Contact-handled defense transuranic (**TRU**) waste with a surface dose rate not to exceed 200 millirem per hour.~~

~~Concrete barrier—A barrier placed in the access drifts of a panel to restrict the mass flow rate of volatile organic compounds (**VOC**).~~

~~Concrete block—Concrete used for construction of either an explosion-isolation wall or a construction-isolation wall.~~

~~Construction-isolation wall—A wall immediately adjacent to the panel waste-emplacement area that is made of concrete block, with mortar or steel frame to isolate construction personnel from coming into contact with the waste.~~

~~Creep—Plastic deformation of salt under deviatoric stress.~~

~~Design migration limit—A mass flow rate that is at least 1 order of magnitude below the health-based levels for VOCs during the Waste Isolation Pilot Plant (**WIPP**) operational period.~~

~~Disturbed rock zone (**DRZ**)—A zone surrounding underground excavations where stress redistribution occurs with attendant dilation and fracturing.~~

~~Explosion-isolation wall—A concrete-block wall adjacent to the panel waste-emplacement area with mortar that can sustain the pressure and temperature transients of a methane explosion.~~

~~Health-based concentration level—The concentration level for a VOC in air that must not be exceeded at the point of compliance during the WIPP operational period.~~

~~Health-based migration limit—The mass flow rate of a VOC from all closed panels that results in the health-based concentration level at the point of compliance.~~

~~Hydration temperature—The temperature developed by a cementitious material due to the hydration of the cement.~~

~~Interface grouting—Grouting performed through grout boxes and pipe lines to fill the void at the concrete barrier/back-wall interface.~~

~~Methane explosion—A postulated deflagration caused by the buildup of methane gas to explosive levels.~~

~~Partial closure—The process of rendering a part of the underground repository inactive and closed according to approved facility closure plans. The partial-closure process is considered complete after partial-closure activities are performed in accordance with approved Resource Conservation and Recovery Act (**RCRA**) partial closure plans.~~

~~Point of compliance—The operating point of compliance for VOC levels at the WIPP, which is the 16-section land withdrawal boundary.~~

~~Remote-handled waste—Any of the various forms of high beta-gamma defense TRU waste requiring remote-handling and with a surface dose rate exceeding 200 millirem per hour.~~

~~Standard barrier—A concrete barrier emplaced into the panel-access drifts without major excavation of the surrounding rock.~~

~~Volatile Organic Compound (**VOC**)—Any VOC comprising the land-disposal-restricted indicator VOC constituents in the WIPP waste inventory.~~

~~Abbreviations/Acronyms~~

~~ACI~~	~~American Concrete Institute~~
~~AISC~~	~~American Institute for Steel Construction~~
~~ANSI~~	~~American National Standards Institute~~
~~ASTM~~	~~American Society for Testing and Materials~~
~~AWS~~	~~American Welding Society~~
~~CFR~~	~~Code of Federal Regulations~~
~~DOE~~	~~U.S. Department of Energy~~
~~DRZ~~	~~Disturbed rock zone~~
~~EPA~~	~~U.S. Environmental Protection Agency~~
~~MB 139~~	~~Marker Bed 139~~
~~MSHA~~	~~U.S. Mine Safety and Health Administration~~
~~NMAC~~	~~New Mexico Administrative Code~~
~~NMED~~	~~New Mexico Environment Department~~
~~MOC~~	~~Management and Operating Contractor (Permit Section 1.5.3)~~
~~RCRA~~	~~Resource Conservation and Recovery Act~~
~~SMC~~	~~Salado Mass Concrete~~
~~USACE~~	~~U.S. Army Corps of Engineers~~
~~WIPP~~	~~Waste Isolation Pilot Plant~~

~~1.4 List of Drawings~~

~~The following drawings are made apart of this specification:~~

~~762447-E1~~	~~Panel closure system, air intake and exhaust drifts, title sheet~~
~~762447-E2~~	~~Panel closure system, underground waste-emplacement panel plan~~
~~762447-E3~~	~~Panel closure system, air intake drift, construction details~~
~~762447-E4~~	~~Panel closure system, air exhaust drift, construction details~~
~~762447-E5~~	~~Panel closure system, construction and explosion walls, construction details~~
~~762447-E6~~	~~Panel closure system, air intake and exhaust drifts, grouting and miscellaneous details~~

~~1.5 Work by Others~~

~~Survey~~

~~All survey work to locate the barriers and walls, control and confirm excavation, and complete the work will be supplied by the Permittees. All survey measurements for record purposes will also be performed/supplied by the Permittees. The Contractor shall be responsible for verifying the excavation dimensions to develop the form work to fit the excavation.~~

~~Excavation~~

~~The Permittees may elect to perform certain portions of the work, notably the excavation. The work performed by the Permittees will be defined prior to the contract.~~

~~1.6 Contractor's Use of Site~~

~~Site Conditions~~

~~The site is located near Carlsbad, New Mexico, as shown on the site location maps and the title sheet drawing. The underground arrangements and location of the WIPP waste-emplacement panels are shown on the plan view drawing. The work described above is to construct the concrete barriers in the air intake and exhaust drifts of one of the panels upon completion of the disposal phase of that panel. The waste-emplacement panels are located approximately 2,150 feet below the ground surface. The Contractor shall visit the site and become familiar with the site and site conditions prior to preparing his bid proposal.~~

~~Contractor's Use of Site~~

~~Areas at the ground surface will be designated for the Contractor's use in assembling and storing his equipment and materials. The Contractor shall utilize only those areas designated.~~

~~Limited space within the underground area will be designated for the Contractor's use for storage of material and setup of equipment.~~

~~Coordination of Contractor's Work~~

~~The Contractor is advised that on-going waste emplacement and excavation operations are being conducted throughout the period of construction of the panel barrier system. The~~

~~Contractor shall coordinate his construction operations with that of the waste emplacement and mining operations. All coordination shall be through the Engineer.~~

~~1.7 Contractor's Use of Facilities~~

~~Existing facilities at the site which are available for use by the Contractor are:~~

- ~~WIPP roadheader~~
- ~~Waste shaft conveyance~~
- ~~Salt skip hoist~~
- ~~(1) 20 ton forklift~~
- ~~(1) 40 ton forklift~~
- ~~460 volt AC, 3 phase power~~
- ~~Water (underground, at waste shaft only) (above ground, at location designated by Engineer)~~

~~Additional information on these facilities is presented in Section 02010.~~

~~1.8 Work Sequence~~

~~Work Sequence shall be as shown on the drawings and directed by the Engineer.~~

~~1.9 Work Plan~~

~~The Contractor shall prepare and submit for approval by the Engineer a Work Plan fully describing his proposed construction operation. The work plan shall define all proposed equipment. The work plan shall also include the method of excavation, grouting, and pumping concrete. The work plan shall also contain such items as control of surface dust emissions. No work shall be performed prior to approval of the Work Plan.~~

~~1.10 Submittals~~

~~Submittals to the Permittees shall be in accordance with the Permittees' Submittal Procedures and as required by the individual specifications. Approval by the Permittees shall not constitute approval by NMED. Any submittals that propose a change to the panel closure requirements of this Permit (e.g., changes in grout composition, detailed design, etc.) shall be submitted to NMED as required by 20.4.1.900 NMAC (incorporating 40 CFR §270.42).~~

~~Part 2 - Products~~

~~Not used.~~

~~**Part 3 - Execution**~~

~~Not Used.~~

~~End of Section~~

~~Section 01090 - Reference Standards~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Provision of Reference Standards at Site.~~
- ~~Acronyms used in Contract Documents for Reference Standards. Source of Reference Standards.~~

~~1.2 Quality Assurance~~

~~For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.~~

~~Conform to reference by date of issue current on the date of the agreement between the Permittees and the contractor.~~

~~The Contractor shall obtain copy of the standards referenced in the individual specification sections. Maintain a copy at jobsite during submittals, planning, and progress of the specific work, until completion of work.~~

~~Should specified reference standards conflict with the contract documents, request clarification from the Engineer before proceeding.~~

~~1.3 Schedule of References~~

~~Various publications are referenced in other sections of the specifications to establish requirements for the work. These referenced are identified by documents number and title. The addresses of the organizations whose publications are referenced are listed below.~~

~~ACI~~	~~ACI International~~ ~~P.O. Box 19150~~ ~~Detroit, MI 48219-0150~~ ~~Ph: 313-532-2600~~ ~~Fax: 313-533-4747~~
~~AITC~~	~~American Institute of Timber Construction~~ ~~7012 So. Revere Parkway, Suite 140~~ ~~Englewood, CO 80112~~ ~~Ph: 303-792-9559~~ ~~Fax: 303-792-0669~~
~~AISC~~	~~American Institute of Steel Construction~~ ~~One E. Wacker Dr., Suite 3100~~ ~~Chicago, IL 60601-2001~~

	~~Ph: 312-670-2400~~ ~~Fax: 312-670-5403~~
~~ANSI~~	~~American National Standards Institute~~ ~~11 West 42nd St.~~ ~~New York NY 10036~~ ~~Ph: 212-642-4900~~ ~~Fax: 212-302-1286~~
~~API~~	~~American Petroleum Institute~~ ~~1220 L. St., NW~~ ~~Washington, DC 20005~~ ~~Ph: 202-682-8375~~ ~~Fax: 202-962-4776~~
~~ASTM~~	~~American Society for Testing and Materials~~ ~~1916 Race St.~~ ~~Philadelphia, PA 19103~~ ~~Ph: 215-299-5585~~ ~~Fax: 215-977-9679~~
~~AWS~~	~~American Welding Society~~ ~~550 LeJeune Road~~ ~~Miami, FL 33135~~ ~~Ph: 800-443-9353~~ ~~Fax: 305-443-7559~~
~~CFR~~	~~Code of Federal Regulations~~ ~~Government Printing Office~~ ~~Washington, DC 20402~~ ~~Ph: 202-783-3238~~ ~~Fax: 202-223-7703~~
~~EPA~~	~~Environmental Protection Agency~~ ~~Public Information Center~~ ~~Ariel Rios Building~~ ~~1200 Pennsylvania Avenue, NW~~ ~~Washington, DC 20460~~ ~~Ph: 202-272-0167~~
~~FTM-STO~~	~~Federal Test Method Standards~~ ~~Standardization Documents Order Desk~~ ~~Bldg. 4D~~ ~~700 Robbins Ave.~~ ~~Philadelphia, PA 19111-5094~~ ~~Ph: 215-697-2179~~ ~~Fax: 215-697-2978~~
~~NRMCA~~	~~National Ready-Mixed Concrete Association~~ ~~900 Spring St.~~

	~~Silver Spring, MD 20910~~ ~~Ph: 301-587-1400~~ ~~Fax: 301-585-4219~~
~~NTIS~~	~~National Technical Information Service~~ ~~U.S. Department of Commerce~~ ~~Springfield, VA 22161~~ ~~(703) 487-4650~~
~~PCA~~	~~Portland Cement Association~~ ~~5420 Old Orchard Road~~ ~~Skokie, IL 60077~~
~~USACE~~	~~U.S. Army Corps of Engineers~~ ~~U.S. Army Engineer Waterway Experiment Station~~ ~~ATTN: Technical Report Distribution Section, Services Branch, TIC~~ ~~3909 Halls Ferry Rd.~~ ~~Vicksburg, MS 39180-6199~~ ~~Ph: 601-634-2355~~ ~~Fax: 601-634-2506~~
~~MOC~~	~~Nuclear Waste Partnership LLC~~ ~~PO Box 2078~~ ~~Carlsbad, New Mexico 88221~~

~~End of Section~~

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Section 01400 - Contractor Quality Control

Part 1 - General

1.1 Scope

This section includes:

- Contractor Quality Control Plan (**CQCP**)
- Reference Standards
- Quality Assurance
- Tolerances
- Testing Services
- Inspection Services
- Submittals

1.2 Related Sections

- 01090 - Reference Standards
- 01600 - Material and Equipment
- 02222 - Excavation
- 02722 - Grouting
- 03100 - Concrete Formwork
- 03300 - Cast-in-Place Concrete
- 04100 - Mortar
- 04300 - Unit Masonry System

1.3 Contractor Quality Control Plan

The Contractor shall prepare and submit for approval by the Engineer, a Quality Control Plan, as described in Section 3.2. No work shall be performed prior to approval of the Contractor's Quality Control Plan.

1.4 References and Standards

Refer to individual specification sections for standards referenced therein, and to Section 01090 - Reference Standards for general listing.

Standards referenced in this section are as follows:

ASTM C1077	Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C1093	Practice for Accreditation of Testing Agencies for Unit Masonry
ASTM E329	Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction

~~ASTM E543~~	~~Practice for Determining the Qualification of Nondestructive Testing Agencies~~
~~ASTM E548~~	~~Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies~~

~~1.5 Quality Assurance~~

- ~~Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality~~
- ~~Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship~~
- ~~Perform work by persons qualified to produce required and specified quality~~
- ~~Verify that field measurements are as indicated on shop drawings~~
- ~~Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.~~

~~1.6 Tolerances~~

~~Monitor excavation fabrication and installation tolerance control of work and products to produce acceptable work. Do not permit tolerances to accumulate.~~

~~Adjust products to appropriate dimensions; position before securing products in place.~~

~~1.7 Testing Services~~

~~Unless otherwise indicated by the Engineer, the Contractor shall employ an independent firm to perform the testing services and other services specified in the individual specification sections, and as required by the Engineer. Testing and source quality control may occur on or off the project site.~~

~~The testing laboratory shall comply with applicable sections of the reference standards and shall be authorized to operate in the state in which the project is located.~~

~~Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.~~

~~1.8 Inspection Services~~

~~The Contractor shall employ an independent firm to perform inspection services as a supplement to the Contractor's quality control as specified in the individual specification sections, and as required by the Engineer. Inspection may occur on or off the project site.~~

~~The inspection firm shall comply with applicable sections of the reference standards.~~

~~1.9 Submittals~~

~~The Contractor shall submit a Contractors' Quality Control Plan as described herein.~~

~~Prior to start of work, the Contractor shall submit for approval, the testing laboratory name, address, telephone number and name of responsible officer of the firm. He shall also submit a copy of the testing laboratory compliance with the reference ASTM standards, and a copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards with memorandum of remedies of any deficiencies reported by the inspection.~~

~~Prior to start of work, the Contractor shall submit for approval the inspection firm name, address, telephone number and name of responsible officer of the firm. He shall also submit the personnel proposed to perform the required inspection, along with their individual qualifications and certifications (Example: Certified AWS Welding Inspector.)~~

~~Part 2 - Products~~

~~Not used.~~

~~Part 3 - Execution~~

~~3.1 General~~

~~The Contractor is responsible for quality control and shall establish and maintain an effective quality control system. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both on site and off site, and shall be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work on the job. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.~~

~~3.2 Quality Control Plan~~

~~3.2.1 General~~

~~The Contractor shall furnish for review and approval by the Engineer, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (**CQC**) Plan proposed to implement the requirements of the Contract. The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. Construction will be permitted to begin only after acceptance of the CQC Plan.~~

~~3.2.2 Content of the CQC Plan~~

~~The CQC Plan shall include, as a minimum, the following to cover all construction operations, both on site and off site, including work by subcontractors, fabricators, suppliers, and purchasing agents:~~

- ~~A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.~~

- ~~The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.~~

- ~~Description of the CQC System Manager's responsibilities and delegation of authority to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities.~~

- ~~Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off site fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with the Permittees' Submittal Procedures.~~

- ~~Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be subject to approval by the Engineer.)~~

- ~~Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.~~

- ~~Reporting procedures, including proposed reporting formats.~~

- ~~A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon by the Engineer.~~

~~3.2.3 Acceptance of Plan~~

~~Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Permittees reserve the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.~~

~~3.2.4 Notification of Changes~~

~~After acceptance of the CQC Plan, the Contractor shall notify the Engineer in writing of any proposed change. Proposed changes are subject to acceptance by the Engineer.~~

~~3.3 Quality Control Organization~~

~~3.3.1 General~~

~~The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel supplemented by independent testing and inspection firms as required by the specifications, to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Engineer.~~

~~3.3.2 CQC System Manager~~

~~The Contractor shall identify as CQC System Manager an individual within his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, with a minimum of five years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC System Manager.~~

~~3.3.3 CQC Personnel~~

~~In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel or third party inspectors to assist the CQC System Manager. These individuals shall be employed by the prime Contractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience. These individuals shall have no other duties other than quality control.~~

~~3.3.4 Organizational Changes~~

~~The Contractor shall maintain his CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Engineer for acceptance at the Contractors' expense.~~

~~3.4 Tests~~

~~3.4.1 Testing Procedure~~

~~The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Engineer duplicate samples of test specimens for possible testing~~

~~by the Engineer. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of an approved testing laboratory. The Contractor shall perform the following activities and record and provide the following data:~~

- ~~Verify that testing procedures comply with contract requirements.~~
- ~~Verify that facilities and testing equipment are available and comply with testing standards.~~
- ~~Check test instrument calibration data against certified standards.~~
- ~~Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.~~
- ~~Results of all tests taken, both passing and failing tests, will be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by the Engineer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an off site or commercial test facility will be provided directly to the Engineer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.~~

~~3.5 Testing Laboratory~~

~~The testing laboratory shall provide qualified personnel to perform specified sampling and testing of products in accordance with specified standards, and ascertain compliance of materials and mixes with requirements of Contract Documents. The testing laboratory shall promptly notify the Engineer and Contractor of any observed irregularities or non-conformance of Work or Products.~~

~~Reports indicating results of tests, and compliance (or noncompliance) with the contract documents will be submitted in accordance with the Permittees' submittal procedures.~~

~~The Contractor shall cooperate with the independent testing firm, furnish samples, storage, safe access, and assistance by incidental labor as required. Testing by the independent firm does not relieve the contractor of the responsibility to perform the work to the contract requirements.~~

~~The laboratory may not:~~

- ~~Release, revoke, alter, or enlarge on requirements of the contract~~
- ~~Approve or accept any portion of the work~~
- ~~Assume any duties of the Contractor.~~

~~The laboratory has no authority to stop the work.~~

~~3.6 Inspection Services~~

~~The inspection firm shall provide qualified personnel at site to supplement the Contractor's Quality Control Program to perform specified inspection of Products in accordance with~~

~~specified standards. He shall ascertain compliance of materials and mixes with requirements of Contract Documents, and promptly notify the CQC System Manager, the Engineer and the Contractor of observed irregularities or non-conformance of Work or Products. The inspector does not have the authority to stop the work. The inspector shall refer such cases to the CQC System Manager who has the authority to stop work (see Section 3.2.2).~~

~~Reports indicating results of the inspection and compliance (or noncompliance) with the contract documents will be submitted in accordance with the Permittees' submittal procedures.~~

~~The Contractor shall cooperate with the independent inspection firm, furnish samples, storage, safe access and assistance by incidental labor, as requested.~~

~~Inspection by the independent firm does not relieve the Contractor of the responsibility to perform the work to the contract requirements.~~

~~3.7 Completion Inspection~~

~~3.7.1 Pre-Final Inspection~~

~~At the completion of all work the CQC System Manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Once this is accomplished the Contractor shall notify the Engineer that the facility is complete and is ready for the "Prefinal" inspection. The Engineer will perform this inspection to verify that the facility is complete. A "Final Punch List" will be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected and notify the Engineer so that a "Final" inspection can be scheduled. Any items noted on the "Final" inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work.~~

~~3.7.2 Final Acceptance Inspection~~

~~The final acceptance inspection will be formally scheduled by the Engineer based upon notice from the Contractor. This notice will be given to the Engineer at least 14 days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.~~

~~3.8 Documentation~~

~~The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:~~

- ~~Contractor/subcontractor and their area of responsibility.~~
- ~~Operating plant/equipment with hours worked, idle, or down for repair.~~

- ~~Work performed each day, giving location, description, and by whom.~~
- ~~Test and/or quality control activities performed with results and references to specifications/drawings requirements. List deficiencies noted along with corrective action.~~
- ~~Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.~~
- ~~Submittals reviewed, with contract reference, by whom, and action taken.~~
- ~~Off-site surveillance activities, including actions taken.~~
- ~~Instructions given/received and conflicts in plans and/or specifications.~~
- ~~Contractor's verification statement.~~

~~These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Engineer daily. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.~~

~~3.9 Notification of Noncompliance~~

~~The Engineer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.~~

~~End of section.~~

~~Section 01600 - Material and Equipment~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Equipment~~
- ~~Products~~
- ~~Transportation and handling~~
- ~~Storage and protection~~
- ~~Substitutions~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01400 - Contractor Quality Control~~
- ~~02010 - Mobilization and Demobilization~~
- ~~02222 - Excavation~~
- ~~02722 - Grouting~~
- ~~03100 - Concrete Formwork~~
- ~~03300 - Cast-in-Place Concrete~~
- ~~04100 - Mortar~~
- ~~04300 - Unit Masonry System~~

~~1.3 Equipment~~

~~The Contractor shall specify his proposed equipment in the Work Plan. Power equipment for use underground shall be either electrical or diesel engine driven. All diesel engine equipment shall be certified for use underground.~~

~~1.4 Products~~

~~The Contractor shall specify in the Work Plan, or in subsequently required submittals the proposed products including, but not limited to the grout mix and its components, concrete mix and its components, mortar mix and its components, formwork, and masonry. The proposed products shall be supported by laboratory test results as required by the specifications. All products shall be subject to approval by the Engineer.~~

~~1.5 Transportation and Handling~~

- ~~Transport and handle products in accordance with manufacturer's instructions.~~

- ~~Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.~~

- ~~Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.~~

~~1.6 Storage and Protection~~

- ~~Store and protect products in accordance with manufacturers' instructions.~~
- ~~Store with seals and labels intact and legible.~~
- ~~Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.~~
- ~~For exterior storage of fabricated products, place on sloped supports above ground.~~
- ~~Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.~~
- ~~Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.~~
- ~~Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.~~
- ~~Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.~~

~~1.7 Substitutions~~

~~1.7.1 Equipment Substitutions~~

~~The Contractor may substitute equipment for that proposed in the Work Plan subject to the Engineer's approval. The Contractor shall demonstrate the need for the substitution, and the applicability of the proposed substitute equipment.~~

~~1.7.2 Product Substitutions~~

~~The Contractor may not substitute products after the proposed products have been approved by the Engineer unless he can demonstrate that the supplier/source of that product no longer exists in which case he shall submit alternate products with lab test results to the Engineer for approval. In the case that product is a component in a mix, the Contractor shall perform mix testing using that component and submit laboratory test results.~~

~~Part 2 - Products~~

~~Not used.~~

~~Part 3 - Execution~~

~~Not used.~~

~~End of section.~~

~~DIVISION 2 - SITE WORK~~

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~~Section 02010 - Mobilization and Demobilization~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Mobilization of equipment and facilities to site~~
- ~~Contractor use of site~~
- ~~Use of existing facilities~~
- ~~Demobilization of equipment and facilities~~
- ~~Site cleanup~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01600 - Material and Equipment~~

~~Part 2 - Products~~

~~Not used.~~

~~Part 3 - Execution~~

~~3.1 Mobilization of Equipment and Facilities to Site~~

~~Upon authorization to proceed, the Contractor shall mobilize his equipment and facilities to the jobsite. Equipment and facilities shall be as specified, and as defined in the Contractor's Work Plan. The Contractor shall erect the batch plant and assemble his equipment and materials in the areas designated by the Engineer. Facilities shall be located as near as practical to the existing utilities.~~

~~The Permittees will provide utilities (460 volt AC, 3 phase, and water) at designated locations. The Contractor shall be responsible for all hookups and tie-ins required for his operations.~~

~~The Contractor shall be responsible for providing his own office, storage, and sanitary facilities.~~

~~Areas will be designated for the Contractor's use in the underground area in the vicinity of the panel closure system installation. These areas are limited.~~

~~3.2 Use of Site~~

~~The Contractor shall use only those areas specifically designated for his use by the Engineer. The Contractor shall limit his on-site travel to the specific routes required for performance of his work, and designated by the Engineer.~~

~~3.3 Use of Existing Facilities~~

~~Existing facilities at the site which are available for use by the Contractor are:~~

- ~~WIPP roadheader~~
- ~~Waste shaft conveyance~~
- ~~Salt skip hoist~~
- ~~(1) 20 ton forklift~~
- ~~(1) 40-ton forklift~~
- ~~460 Volt AC, 3 phase power~~
- ~~Water (in mine, at waste shaft only-above ground at location designated by the Engineer).~~

~~The Contractor shall arrange for use of the facilities with the Engineer and coordinate his actions/requirements with that of the ongoing operations.~~

~~Use of water in the underground will be restricted. No washout or cleanup will be permitted in the underground. Above ground washout/cleanup or equipment will be allowed in the areas designated by the Engineer.~~

~~The Contractor is cautioned to be aware of the physical dimensions of the waste conveyance and the air lock (see Figures G1-2 and G1-3, attached).~~

~~The Contractor shall be responsible for any damage incurred by the existing site facilities as a result of his operations. Any damage shall be reported immediately to the Engineer and repaired at the Contractor's cost.~~

~~3.4 Demobilization of Equipment and Facilities~~

~~At completion of this work, the Contractor shall demobilize his equipment and facilities from the job site. The batch plant shall be disassembled and removed along with any unused material. All Contractor's equipment and materials shall be removed from the mine and all disturbed areas restored. Utilities shall be removed to their connection points unless otherwise directed by the Engineer.~~

~~3.5 Site Cleanup~~

~~At conclusion of the work, the Contractor shall remove all trash, waste, debris, excess construction materials, and restore the affected areas to its prior condition, to the satisfaction of the Engineer. A final inspection of the areas will be conducted by the Engineer and the Contractor before final payment is approved.~~

~~End of section.~~

~~Section 02222 - Excavation~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Excavation for main concrete barrier~~
- ~~Excavation for surface preparation and leveling of base areas for isolation walls~~
- ~~Disposition of excavated materials.~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01600 - Material and Equipment~~
- ~~03100 - Concrete Form Work~~
- ~~04300 - Unit Masonry System.~~

~~1.3 Reference Documents~~

~~"Reference Stratigraphy and Rock Properties for the Waste Isolation Pilot Plant (WIPP) Project" by R.D. Krieg-Sandia National Laboratory Document Sand 83-1908. [Available through National Technical Information Service (**NTIS**).]~~

~~1.4 Field Measurements and Survey~~

~~All surveys required for performance of the work will be provided by the Permittees. To develop the concrete formwork to fit the excavation, the Contractor shall be responsible for verifying the excavation dimensions.~~

~~Part 2 - Products~~

~~Not used.~~

~~Part 3 - Execution~~

~~3.1 Excavating for Concrete Barrier~~

~~Excavation for the main concrete barrier shall be performed to the lines and grades shown on the drawings. Excavate the back a minimum of 1 inch to 3 inches beyond clay seam G, and the floor a minimum of 1 inch to 3 inches below the anhydride marker bed 139 (**MB-139**) to assure removal of the disturbed rock zone (**DRZ**). Excavation shall be performed utilizing mechanical means such as a cutting head on a suitable boom, by drilling boreholes and using an expansive agent to fragment the rock or other competent equipment or methods submitted to the Engineer for review and approval. The use of explosives is prohibited. The existing WIPP roadheader mining machine may also be available for use. The Contractor is to determine availability and coordinate proposed use of the roadheader with the Engineer. The existing roadheader is capable of excavating the back and the portions of the ribs above the floor level. However, it is not capable of excavating the portion below floor level.~~

~~The tolerances for the concrete barrier excavation shall be +6 inches, to 0 inch. In addition, the Contractor is to remove all loose or spalling rock from the excavation surface to provide a sound surface abutting the concrete barrier. The Contractor shall provide and install roof bolts for support as required for personnel protection and approved ground control plans.~~

~~3.2 Excavating for Surface Preparation and leveling of Base Areas for Isolation Walls~~

~~The Contractor shall excavate a 6-inch surface preparation around the entire perimeter of the isolation walls. The surface preparation in the floor shall be made level to produce a surface for placing the first course of block in the isolation walls. Tolerances for the leveled portion of the surface preparation are ±1 inch. Excavation may be performed by either mechanical or manual means. Use of explosives is prohibited.~~

~~3.3 Disposition of Excavated Materials~~

~~The Contractor shall remove all excavated materials from the panel-access drift where they are excavated. Excavated materials shall be removed from the mine via the salt skip to the surface, where they will be disposed on site at a location as directed by the Engineer.~~

~~3.4 Field Measurements and Survey~~

~~All survey required for performance of the work will be provided by the Permittees. The Contractor shall protect all survey control points, bench marks, etc., from damage by his operations. MOC will verify by survey that the Contractor has excavated to the required lines and grades. The Contractor shall be responsible for verifying the excavation dimensions to develop concrete formwork to fit the excavation. No form work or block work is to be erected until this survey is completed. The Contractor is to coordinate the survey work with his operations to assure against lost time. The Contractor shall notify the Engineer at least 24 hours prior to the time surveying is required~~

~~End of section.~~

~~Section 02722 - Grouting~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Grouting of concrete barrier.~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01400 - Contractor Quality Control~~
- ~~01600 - Material and Equipment~~
- ~~03100 - Concrete Form Work~~
- ~~03300 - Cast-in-Place Concrete~~

~~1.3 References~~

~~ASTM C1107 Standard Specification for Nonshrink Grout~~

~~ASTM C109 Test Method for Compressive Strength of Hydraulic Cement Mortars~~

~~1.4 Submittals for Review and Approval~~

~~Thirty days prior to the initiation of grouting, the Contractor shall submit to the Engineer for review and approval, the following:~~

- ~~Type of grout proposed~~
- ~~Product data:~~
  - ~~Manufacturer's specification and certified laboratory tests for the manufactured grout, if proposed~~
  - ~~Certified laboratory tests for the salt-saturated grout, if proposed, using project-specific materials~~
- ~~Proposed grouting method, including equipment and materials and construction sequence in Work Plan.~~

~~1.5 Submittals for Construction~~

~~Daily grouting report indicating the day, date, time of mixing and delivery, quantity of grout placed, water used, pressure required, problems encountered, action taken, quality control data, testing results, etc., no later than 24 hours following construction.~~

~~Part 2 - Products~~

~~2.1 Grout Materials~~

~~Grout used for grouting in connection with fresh water/plain cement concrete shall be nonshrink, cement-based grout, Five Star 110 as manufactured by Five Star Products Inc., 425 Stillson Road, Fairfield, Connecticut 06430 or approved equal. Mixing and installation shall be in accordance with the manufacturer's recommendations.~~

~~As an alternate to the above grout, in connection with the Salado Mass concrete mix, the Contractor shall use, subject to the approval of the Engineer, a salt saturated grout. The following formulation is suggested to the Contractor as an initiation point for selection of the grout mix. Salt saturated grout strength shall be 4500 psi at 28 days.~~

~~Salt-Saturated Grout (BCT-1F)~~

~~Component~~	~~Percent of total Mass (wt.)~~
~~Class H Cement~~	~~48.3~~
~~Class C Fly Ash~~	~~16.2~~
~~Cal Seal (Plaster - from Halliburton)~~	~~5.7~~
~~Sodium chloride~~	~~7.9~~
~~Dispersant~~	~~0.78~~
~~Defoamer~~	~~0.02~~
~~Water~~	~~21.1~~

~~Water for mixing shall be of potable quality, free from injurious amounts of oil, acid, alkali, salt, or organic matter, sediments, or other deleterious substances, as specified for concrete, Section 03300-2.3.~~

~~2.2 Product Data~~

~~If the Contractor proposes to utilize a manufactured nonshrink cement-based grout, he shall submit complete manufacturer's specifications for the product, along with certified laboratory test results of the material.~~

~~If the Contractor proposes to utilize the salt-saturated grout in connection with the Salado Mass concrete mix, he shall submit manufacturer's/supplier's specifications for the component materials, and certified laboratory test results for the resultant mix.~~

~~Part 3 - Execution~~

~~3.1 General~~

~~The Contractor shall furnish all labor material, equipment, and tools to perform all operations in connection with the grouting.~~

~~Grout delivery and return lines for interface grouting shall be installed in the form work or in the area to be grouted to provide uniform distribution of the grout as shown on the drawings. The~~

~~exact location of the boxes and lines shall be determined in the field. Additional grout delivery and return lines and boxes may be required by the Engineer.~~

~~Pumps shall be positive displacement piston type pump designed for grouting service capable of operating at a discharge pressure of 100 psi. The Contractor shall supply a standby pump to be utilized in the event of a breakdown of the primary unit.~~

~~Mixers shall be high velocity "colloidal" type with a rotary speed of 1,200 to 1,500 rpm. Grout shall be mixed to a pumpable mix as per the manufacturer's recommendations.~~

~~Mixing water shall be accurately metered to control the consistency of the grout.~~

~~The Contractor shall provide all necessary valves, gages, and pressure hoses.~~

~~Water for mixing is available at the waste shaft. The Contractor is cautioned that no free water discharges or spills are permitted in the mine. All cleanup and washout operations shall be performed at the ground surface.~~

~~Potential spill areas in the underground shall be identified by the Contractor in the work plan. The Contractor shall provide adequate containment for potential spills. Isolation measures shall include, but are not limited to, lining with a membrane material (PVC, hypalon, HDPE), draped curtains (polyethylene, PVC, etc.), corrugated sheet metal protective walls or a combination of these and other measures.~~

~~If salt-saturated grout is selected for use, the Contractor shall make provisions to accurately proportion the components. Proportioning shall be by weighing. Sufficient quantities of dry components shall be developed prior to initiation of the grouting to perform the work so as not to incur delays during the mixing/placing sequence.~~

~~3.2 Interface Grouting of Concrete Barrier~~

~~After each cell of the concrete barrier has been allowed to cure for a period of seven days, or as directed by the Engineer, the Contractor shall interface grout the remaining space between the back wall and the top surface of the concrete barrier.~~

~~Each cell of the concrete barrier shall be grouted before the next adjacent cell is formed and concrete placed. Grout delivery and return lines shall be installed with the form work as shown and called for on the drawings, or as directed by the Engineer.~~

~~The placing of grout, unless otherwise directed by the Engineer shall be continuous until completed. Grouting shall progress from lower to higher grout pipes. Grouting shall proceed through a single delivery line until grout escapes from the adjacent return line. The Contractor shall then secure these lines and move to the next adjacent set of delivery and return lines. Pressure shall be adjusted to adequately deliver the grout to the forms, as witnessed by grout in the return line.~~

~~The grouting operation shall be conducted in a manner such that it does not affect the stability of the concrete barrier structure.~~

~~3.3 Contact Grouting~~

~~After completion of interface grouting if directed by the Engineer, the Contractor shall contact grout to fill any remaining voids at the concrete barrier/back wall interface. Contact grouting includes all operations to drill, clean, and grout holes installed in the concrete barrier.~~

~~The Contractor shall drill and grout the interface zone to the main concrete barrier as directed by the Engineer.~~

~~The location, direction, and depth of each grout hole shall be as directed by the Engineer. The order in which the holes are drilled and the manner in which each hole is drilled and grouted, the proportions of the water used in the grout, the time of grouting, the pressures used in grouting, and all other details of the grouting operations shall be as directed by the Engineer.~~

~~Wherever required, contact grouting will entail drilling the hole to a limited depth, installing a packer, and performing grouting.~~

~~3.3.1 Drilling~~

~~The holes shall be drilled with rotary-type drills. Drilling grout holes with percussion-type drills will not be permitted except as approved by the Engineer.~~

~~The requirements as to location, depth, spacing, and direction of the holes shall be as directed by the Engineer.~~

~~The minimum diameter shall be approximately 11/2 inches.~~

~~When the drilling of each hole or stage of has been completed, compressed air will be used to flush out drill cuttings. The hole shall then be temporarily capped or otherwise suitably protected to prevent the hole from becoming clogged or obstructed until it is grouted.~~

~~3.3.2 Materials for Contact Grouting~~

~~Standard weight black steel pipe conforming to ASTM A-53 shall be set in the concrete in the locations as directed by the Engineer. All pipe and fittings shall be furnished by the Contractor.~~

~~The size of the grout pipe for each hole and the depth of the holes for setting pipe for grouting shall be as directed by the Engineer. Care shall be taken to avoid clogging or obstructing the pipes before being grouted, and any pipe that becomes clogged or obstructed from any cause shall be cleaned satisfactorily or replaced.~~

~~The packers shall be furnished by the Contractor and shall consist of expansible tubes or rings of rubber, leather, or other suitable material attached to the end of the grout supply pipe. The packers shall be designed so that they can be expanded to seal the drill hole at the specified locations and when expanded shall be capable of withstanding without leakage, for a period of 5 minutes, air pressure equal to the maximum grout pressures to be used.~~

~~3.3.3 Grouting Procedures~~

~~Different grouting pressures will be required for grouting different sections of the grout holes. Pressures as high as necessary to deliver the grout but which, as determined by trial, are safe against concrete displacement shall be used in the grouting.~~

~~If, during the grouting of any hole, grout is found to flow from adjacent grout holes or connections in sufficient quantity to interfere seriously with the grouting operation or to cause appreciable loss of grout, such grout holes and connections shall be capped temporarily. Where such capping is not essential, inaugurated holes shall be left open to facilitate the escape of air as the grout is forced into other holes. Before the grout has set, the grout pump shall be connected to adjacent capped holes and to other holes from which grout flow was observed, and grouting of all holes shall be completed. If during the grouting of any hole, grout is found to flow from points in the barrier, any parts of the concrete structure, or other locations, such flows or leaks shall be plugged or caulked by the Contractor as directed by the Engineer.~~

~~As a safeguard against concrete displacement, excessive grout travel, or while grout leaks are being caulked, the Engineer may require the reduction of the pumping pressure, intermittent pumping, or the discontinuance of pumping.~~

~~The consistency of the grout mix shall be varied, as directed by the Engineer, depending on the conditions encountered. Where the grout hole or connection continues to take a large amount of grout after the mix has been thickened, the Engineer may require that pumping be done intermittently, waiting up to 8 hours between pumping periods to allow grout in the barrier to set. After the grouting is complete, the pressure shall be maintained by means of stopcocks, or other suitable valve that it will be retained in the holes or connections being grouted.~~

~~3.4 Cleanup~~

~~No clean-up or washing of equipment with water is allowed in the underground. No free water spills are permitted. All clean out or wash out requiring water will be performed above ground at the location approved by the Engineer. See note above regarding potential spill areas in Section 3.1 - General.~~

~~3.5 Quality Control~~

~~The Contractor shall provide a third-party quality control inspector at the site throughout the grout placement operations. The inspector shall determine that the grout mix is properly proportioned and properly mixed to the approved consistency. The inspector shall sample and make one set of grout cubes for compression testing for every 50 cubic feet of grout placed, or fraction thereof, for each day of grout placement.~~

~~End of section.~~

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~~DIVISION 3 - CONCRETE~~

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~~Section 03100 - Concrete Formwork~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Formwork for cast-in-place concrete with shoring, bracing, and anchorage~~
- ~~Accessory items, grout pipes, concrete delivery pipes.~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01400 - Contractor Quality Control~~
- ~~01600 - Material and Equipment~~
- ~~02722 - Grouting~~
- ~~03300 - Cast-in-Place Concrete~~
- ~~04300 - Unit Masonry System~~

~~1.3 References~~

~~ACI 301~~	~~Specifications for Structural Concrete for Buildings~~
~~ACI 318~~	~~Building Code Requirements for Reinforced Concrete~~
~~ACI 347~~	~~Recommended Practice for Concrete Formwork~~
~~ASTM A-36~~	~~Standard Specification for Structural Steel~~
~~ASTM A-53~~	~~Standard Specification for Pipe, Steel, Black, and Hot-Dipped Zinc Coated~~
~~ASTM A-325~~	~~High Strength, Structural Bolts~~
~~ASTM A-615~~	~~Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcements~~
~~AWS A3.0~~	~~Welding Terms and Definitions~~
~~AWS A5.1~~	~~Specification for Mild Steel Covered Arc Welding Electrodes~~
~~AWS D1.1~~	~~Structural Welding Code-Steel~~
~~AISC~~	~~Manual of Steel Construction Latest Edition~~

~~1.4 Submittals~~

~~The Contractor shall submit the following 30 days prior to initiation of work at site.~~

~~Shop detail drawings with appropriate calculations to support the adequacy or the formwork.~~

~~Mill test certification of materials utilized in construction of the forms.~~

~~Details of installation contained in the Contractor's Work Plan.~~

~~1.5 Quality Assurance~~

~~Design and detail the formwork under direct supervision of a professional structural Engineer experienced in design of this work and licensed in the state of New Mexico.~~

~~Perform work in accordance with ACI 301, 318, and 347, AISC and AWS standards. Maintain one copy of all standards at site.~~

~~Perform all fabrication in accordance with AISC manual of steel construction.~~

~~Perform all welding in accordance with AWS D1.1 structural welding code.~~

~~Perform all bolting in accordance with AISC specification for structural joints using ASTM A325 or A490 bolts.~~

~~Part 2 - Products~~

~~2.1 Form Materials~~

~~Forms for the concrete barrier shall be constructed of ASTM A-36 steel.~~

~~Pipe inserts shall be ASTM A-53 black standard weight pipe.~~

~~Form spacers shall be ASTM A-36 round stock.~~

~~Bolts shall be ASTM A325 high strength structural bolts.~~

~~Grout pipes shall be ASTM A-53 standard weight pipe or flex conduit as shown on the drawings.~~

~~Rock anchors shall develop strength equal to or greater than ASTM A-36 round stock.~~

~~Welding electrodes shall conform to AWS A5.1.~~

~~Part 3 - Execution~~

~~3.1 General~~

~~The Contractor shall furnish all labor material equipment and tools to perform all operations in connection with the design, detail, fabrication and erection of the formwork and the fabrication and installation of grout pipes for the main concrete barrier.~~

~~The Contractor may, at his option submit an alternate design or modify the design shown on the drawings, subject to the approval of the Engineer. All designs must be supported by design calculations stamped and sealed by a registered professional engineer.~~

~~The Contractor shall furnish, fabricate and install all grout pipes and grout boxes for both the concrete barrier and the isolation walls.~~

~~3.2 Shop Drawings~~

~~The Contractor shall design and detail all formwork for the concrete barrier, complete with any required bracing and shoring for the concrete barrier as shown on the drawings, in accordance with ACI 318 and 347 and the AISC manual of steel construction.~~

~~The details shall incorporate provision for adjusting and modifying the formwork to suit the excavation. Excavation tolerances are given in Section 02222 Excavation.~~

~~The Contractor shall be responsible for verifying the excavation dimensions to develop the concrete formwork to fit the excavation.~~

~~Prior to fabrication, the Contractor shall submit shop drawings complete with supporting calculations for review/approval by the Engineer 30 days prior to initiating work. The contractor shall incorporate all Engineer's comments, revisions, resolve all questions and resubmit drawings for final approval prior to proceeding with fabrication.~~

~~3.3 Fabrication~~

~~The Contractor shall fabricate all formwork and ancillary items in accordance with the latest edition of the AISC Manual of Steel Construction and the approved detail drawings.~~

~~Formwork shall contain all inserts for grouting and pumping concrete. Sufficient valving shall be provided on inserts to allow shut off of concrete and grout to prevent back flow through the form work.~~

~~All welding shall be in accordance with AWS D1.1 structural welding code including operator and procedure certifications. Elements shall be welded using E-7018 low hydrogen electrodes. Panels shall be piece marked to correspond to the erection drawing(s) and sequence at fabrication.~~

~~3.4 Installation~~

~~3.4.1 Grout Pipes~~

~~The Contractor shall furnish, fabricate, and install all grout pipes and boxes as approved by the Engineer. Grout pipes and boxes shall be attached to the back surface using masonry anchors as shown on the drawings or other approved methods. Grout pipes shall be connected to the inserts installed in the permanent forms and securely fastened to the formwork. All grout pipes will be blown out with compressed air after installation and prior to closure of the formwork to assure they are clean and free from debris or obstructions. Grout pipes shall then be temporarily capped to prevent entry of foreign matter until ready for grouting. The Contractor shall apply masking tape to the grout box openings to prevent concrete infiltration during concrete placement.~~

~~3.4.2 Formwork~~

~~The steel formwork for the concrete barrier is to remain in place at completion of each segment of the barrier, therefore all formwork shall be free from oil, grease, rust, dirt, mud or other material that would prevent bonding by the concrete. Forms will not be oiled or receive application of release agent.~~

~~The Contractor shall install formwork at the locations shown on the drawings to the lines and grades shown. Forms are to be mortar tight. The Contractor shall adjust the formwork to suit the contour of the excavation. Rock may be trimmed or chipped to suit where interferences are encountered. Where overexcavation has occurred in excess of the designed-in adjustability of the formwork, modifications shall be proposed to the Engineer for his approval prior to installation. Installation of the formwork shall be reviewed and approved by the Engineer prior to proceeding with concrete installation.~~

~~The Contractor shall provide a sealant or gasket material on mating surfaces to provide mortar-tite joints.~~

~~3.5 Quality Control~~

~~The Contractor shall arrange for and contract with an approved third party inspector to provide inspection/testing services for the fabrication and installation of the formwork and ancillary items, as required by the QA/QC plan.~~

~~The Contractor shall furnish certified mill test reports for all materials utilized in the fabrication.~~

~~All welding shall be in accordance with AWS D1.1 structural welding code. The Contractor shall furnish welding operator and procedure certifications for all operators and procedures utilized.~~

~~Fabricated components shall be inspected for dimension and overall quality. Welds shall be inspected by an AWS certified welding inspector.~~

~~The inspector shall visually inspect the installation for fit-up and dimensionally for location.~~

~~3.6 Handling, Shipping, Storage~~

~~The Contractor shall handle, ship, and store fabricated components with care to avoid damage. Stored components shall be placed on timbers or pallets off the ground to keep the units clean. Components shall be tarped while in outdoor storage. Components that become spattered or contaminated with mud will be thoroughly cleaned before delivering to the mine for installation. Damaged components will be rejected by the inspector and replaced by the contractor at his cost.~~

~~End of section.~~

~~Section 03300 - Cast-in-Place Concrete~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Cast-in-place concrete for concrete barrier~~
- ~~Concrete mix design.~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01400 - Contractor Quality Control~~
- ~~01600 - Material and Equipment~~
- ~~02222 - Excavation~~
- ~~02722 - Grouting~~
- ~~03100 - Concrete Formwork~~

~~1.3 References~~

~~ACI 211.1~~	~~Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete~~
~~ACI 318.1~~	~~Building Code Requirements for Structural Plain Concrete~~
~~ACI 304R~~	~~Guide for Measuring, Mixing, Transporting, and Placing Concrete~~
~~ASTM C 33~~	~~Standard Specification for Concrete Aggregates~~
~~ASTM C 39~~	~~Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens~~
~~ASTM C 94~~	~~Standard Specification for Ready-Mixed Concrete~~
~~ASTM C 136~~	~~Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates~~
~~ASTM C 143~~	~~Standard Specification for Slump of Portland Cement Concrete~~
~~ASTM C 150~~	~~Standard Specification for Portland Cement~~
~~ASTM C 186~~	~~Standard Test Method for Heath of Hydration of Hydraulic Cement~~
~~ASTM C 403~~	~~Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance~~
~~ASTM C 618~~	~~Fly ash and Raw or Calcined Natural Pozzolan for Use as an Admixture in Portland Cement Concrete~~

~~ASTM D 2216~~	~~Standard Test Method for Laboratory Determination of Water (moisture) Content of Soil and Rock~~
~~USACE CRD-C 36~~	~~Method of Test for Thermal Diffusivity of Concrete~~
~~USACE CRD-C 48~~	~~Standard Test Method for Water Permeability of Concrete~~
~~API 10~~	~~Cements~~
~~NRMCA~~	~~Check List for Certification of Ready Mixed Concrete Production Facilities~~
~~NRMCA~~	~~Concrete Plant Standards~~

~~MOC Standards~~

~~WIPP-DOE-71~~	~~Design Criteria Waste Isolation Pilot Plant, Revised Mission Concept -- IIA (DOE, 1984)~~
~~WP 03-1~~	~~WIPP Startup and Acceptance Test Program (Westinghouse, 1993b)~~
~~WP 09-010~~	~~Design Development Testing (Westinghouse, 1991)~~
~~WP 09-CN3021~~	~~Component Numbering (Westinghouse, 1994a)~~
~~WP 09-024~~	~~Configuration Management Board/Engineering Change Proposal (**ECP**) (Westinghouse, 1994b)~~

~~1.4 Submittals for Review/Approval~~

~~The Contractor shall submit the following for approval 30 days prior to initiating any work at the site.~~

~~Specific sources of supply and detailed product information for each component of the concrete mix is specified in Section 2.6 below.~~

~~Product Data - Laboratory test data and trial mix data for the proposed concrete to be utilized for the concrete barrier.~~

~~Proposed method of installation, including equipment and materials in work plan.~~

~~1.5 Submittals at Completion~~

~~Laboratory test data developed during the installation of the concrete barrier.~~

~~1.6 Quality Assurance~~

~~Perform work in accordance with the Contractor’s Quality Control Plan and referenced ACI and ASTM standards.~~

~~Acquire cement, aggregate and component materials from the same source throughout the work.~~

~~Part 2 - Products~~

~~2.1 Cement~~

~~Portland cement shall conform to API 10 Class H oil well cements. The source of the cement to be used shall be indicated and manufacturer's certification that the cement complies to the applicable standard shall be provided with each shipment.~~

~~2.2 Aggregates~~

~~Aggregates shall be quartz aggregates conforming to the requirements of ASTM C33.~~

~~Fine aggregate shall meet the requirements of ASTM C33 having a fineness modules in the range of 2.80 to 3.00.~~

~~Coarse aggregate maximum size shall be 1 ½ inches and shall be clean, cubical, angular, 100 percent crushed aggregate without flat or elongated particles.~~

~~The source of the aggregate is to be indicated and test reports certifying that the aggregate complies with the applicable standard are to be submitted for approval with the trial mix data.~~

~~2.3 Water~~

~~Water used in mixing concrete shall be of potable quality, free of injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.~~

~~Water shall conform to the provisions in ASTM C94, and in addition, shall conform to the following:~~

- ~~pH not less 6.0 or greater than 8.0~~
- ~~Carbonates and/or bicarbonates of sodium and potassium: 1000 ppm maximum~~
- ~~Chloride ions (C1): 250 ppm maximum~~
- ~~Sulfate ions (SO_4): 1000 ppm maximum~~
- ~~Iron content: 0.3 ppm maximum~~
- ~~Total solids: 2000 ppm maximum~~

~~When ice is used in concrete mix, the water used for making ice shall meet all of the above requirements.~~

~~The source of water is to be indicated and certified copies of test data from an approved laboratory confirming that the water to be used meets the above requirements shall be submitted for approval with the trial mix data.~~

~~2.4 Admixtures~~

~~Pozzolan shall conform to ASTM C618. Sampling and testing of pozzolans shall conform to ASTM C311. Approximately 5 percent by weight of pozzolan may be used to replace cement in the mixes when approved.~~

~~The source of any admixtures proposed are to be indicated and certified copies of test data from an approved laboratory shall be submitted for approval with the trial mix.~~

~~2.5 Concrete Mix Properties~~

~~The Contractor shall develop and proportion a Salado Mass Concrete mix for use in constructing the concrete barrier. Cement utilized in the mix shall be Class H. The Contractor shall demonstrate by trial mix that the proposed concrete meets the following properties:~~

~~Target properties for Barrier Concrete~~

~~Property~~	~~Comment~~
~~4-hr working time~~	~~Indicated by 8-inch slump (ASTM C 142) after 3-hr intermittent mixing. Max 10-inch slump at mixing.~~
~~Nonsegregating~~	~~Aggregates do not readily separated from cement paste during handling~~
~~Less than 25°F heat rise prior to placement~~	~~Difference between initial condition and temperature after 4 hr.~~
~~4,500 psi compressive strength~~ (f'_c)	~~At 28 days after casting (ASTM C39)~~
~~Volume stability~~	~~Length change between +0.05 percent and -0.02 percent (ASTM C 490)~~
~~Minimal entrained air~~	~~2 percent to 3 percent air~~

~~The Contractor shall provide certified copies of test data from an approved laboratory demonstrating compliance with the above target properties.~~

~~In addition to the target properties the Contractor shall provide certified test data for the trial mix for the following properties:~~

- ~~Heat of hydration ASTM C-186~~
- ~~Concrete Set ASTM C-403~~
- ~~Thermal Diffusivity USACE CRD-C36~~
- ~~Water Permeability USACE CRD-C43~~

~~2.6 Salado Mass Concrete~~

~~The Contractor shall utilize the Salado Mass concrete. The Contractor shall demonstrate that the Salado Mass concrete meets the target properties shown above. Recommended initial proportioning of the Salado Mass concrete is as follows:~~

~~Component~~	~~Percent of Total Mass~~
~~Class H Cement~~	~~4.93~~
~~Chem Comp III~~	~~2.85~~
~~Class F fly ash~~	~~6.82~~
~~Fine aggregate~~	~~33.58~~
~~Coarse aggregate~~	~~43.02~~
~~Sodium chloride~~	~~2.18~~
~~Defoaming agent~~	~~0.15~~
~~Sodium citrate~~	~~0.09~~
~~Water~~	~~6.38~~

~~The Contractor shall prepare a trial mix and provide certified test data from an approved testing laboratory for slump, compressive strength, heat rise, heat of hydration, concrete set time, thermal diffusivity, and water permeability as indicated above for the plain concrete mix.~~

~~Part 3 - Execution~~

~~3.1 General~~

~~The Contractor shall provide all labor material, equipment and tools necessary to develop, supply, mix, transport and place mass concrete in the forms as shown on the drawings and called for in these specifications~~

~~The Contractor will be required to provide and erect on the site a batch plant, suitable to store, handle, weight and deliver the proposed concrete mix. The batch plant shall be certified to NRMCA standards. The batch plant shall be erected on site in the location as directed by the Engineer.~~

~~The Contractor shall batch, mix, and deliver to the underground, sufficient quantity of concrete to complete placement of concrete within one form section, as shown on the drawings. Once begun, placement of concrete in a section shall be continuous until completed. The time for concreting one section will not exceed ten hours.~~

~~It is expected that addition of water to the dry materials and mixing of the concrete will occur at the ground surface with transport of wet concrete to a pump at the underground level where it will be pumped into the forms.~~

~~The Contractor is to provide all transport vehicles or means to transfer the wet concrete from the mixer truck to the pump. It is expected that the Contractor will use the waste conveyance hoist to transfer from the ground surface to the mine level. The Contractor is to familiarize himself with the dimensions of the waste conveyance and the airlock in order to provide suitable transport vehicles. The Contractor is also to familiarize himself with the capacity and speed of the conveyance to allow transfer of sufficient concrete to sustain the continuing placement of concrete. (See Figures G1-2 and G1-3, attached).~~

~~The Contractor shall determine the horizontal distance to the entry where placement of the concrete barrier is to occur, and develop a route, with the approval of the Engineer for traffic flow within the underground.~~

~~Details of the logistics for handling the concrete shall be included in the Contractors' Work Plan, and submitted to the Engineer for approval prior to start of work at the site.~~

~~Potential spill areas in the underground shall be identified by the Contractor in the Work Plan. The Contractor shall provide measures to contain and isolate any water from contact with the halite in these areas. Suitable containment isolation measures shall include but are not limited to, lining with a membrane material (PVC, hypalon, HDPE), draped curtains (polyethylene, PVC, etc.), corrugated sheet metal protective walls or a combination of these and other measures.~~

~~3.2 Pumping Concrete~~

~~The Contractor shall provide pumping equipment suitable for placing the concrete into the forms. The Contractor at a minimum, shall provide an operating and a spare pump, to be used in the event of breakdown of the primary unit. After transporting and prior to pumping the concrete shall be remixed to compensate for segregation of aggregate during transport. The Contractor shall indicate the equipment proposed for pumping (manufacturer, model, type, capacity, pressure and remixing at the point of delivery in the Work Plan).~~

~~Each batch of concrete shall be checked at the surface at the time of mixing and again at the point of transfer to the pump for slump and temperature, and shall conform to the following:~~

- ~~Maximum slump at mixing - 10 inches~~
- ~~Maximum slump at delivery to pump - 8 inches~~
- ~~Maximum mix temperature at placement = 70°F~~

~~Note: No water is to be added to the mix after the initial mixing and slump are determined.~~

~~The Contractor shall connect to the pipe ports fabricated into the forms for delivery of the concrete, beginning with the lowest ports first. Pumping shall continue until concrete is seen in the adjacent port at which time the delivery hose will be transferred to that port and the first port capped.~~

~~Pumping shall continue moving laterally then upward until the entire form is filled and the pour is completed.~~

~~3.3 Coordination of Work~~

~~The Contractor is to coordinate his work mixing, transporting, and placing the mass concrete with the on-going operations in the underground. Coordination of use of the facilities and existing equipment shall be through the Engineer.~~

~~3.4 Clean-Up~~

~~No clean up or washing of equipment with water will be allowed in the underground. No free water spills are permitted in the underground. All clean-out or wash-out requiring water will be performed above ground at the location approved by the Engineer.~~

~~3.5 Quality Control~~

~~The Contractor shall provide a third-party quality control inspector at the site throughout the concrete placement. The inspector shall be responsible for determining that the batch plant is proportioning the mix according to the approved proportions. The batch plant shall provide a print out of batch quantities for each truck delivered to the mine. The inspector shall also determine the slump for each batch as it is mixed and allow additional water to be added until the initial slump is achieved. No additional water is to be added after this time. Temperature will also be recorded at this time.~~

~~The inspector shall also determine the slump and temperature following the remixing when concrete is transferred to the pump. Concrete not meeting or exceeding the specification is to be rejected and removed from the underground.~~

~~Concrete test cylinders to determine unconfined compression strength shall be taken by the inspection at the delivery from remixer to the pump in the underground. Four (4) cylinders shall be made for each 50 cubic yards of concrete placed. Cylinders shall be sealed with polyethylene and taped and field cured at ambient temperatures in the mine adjacent to the concrete barrier area. Two (2) samples shall be tested at 7 days and the remaining two (2) at 28 days.~~

~~End of section.~~

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~~DIVISION 4 - MASONRY~~

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~~Section 04100 - Mortar~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Mortar for Isolation Wall Construction.~~

~~1.2 Related Sections~~

- ~~01010 - Summary of Work~~
- ~~01400 - Contractor Quality Control~~
- ~~01600 - Material and Equipment~~
- ~~04300 - Unit Masonry System~~

~~1.3 References~~

~~ASTM C91~~	~~Standard Specification for Masonry Cement~~
~~ASTM C144~~	~~Standard Specification for Aggregate for Masonry Mortar~~
~~ASTM C150~~	~~Standard Specification for Portland Cement~~
~~ASTM C207~~	~~Standard Specification for Hydrated Lime for Masonry Purposes~~
~~ASTM C270~~	~~Standard Specification for Mortar for Unit Masonry~~
~~ASTM C7805~~	~~Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry~~
~~ASTM C1142~~	~~Ready-Mixed Mortar for Unit Masonry~~
~~ASTM E447~~	~~Test Methods for Compressive Strength of Masonry Prisms~~

~~1.4 Submittals for Review and Approval~~

~~The Contractor shall submit for approval the following 30 days prior to the initiation of work at the site:~~

~~Design mix.~~

~~Certified laboratory tests for the proposed design mix, indicating conformance of mortar to property requirements of ASTM C270, and test and evaluation reports to ASTM C780.~~

~~1.5 Submittals at Completion~~

~~Certified laboratory test results for the construction testing of mortar mix.~~

~~1.6 Quality Assurance~~

~~Perform work in accordance with the Contractor's Quality Control Plan and referenced ASTM standards. Acquire cement, aggregate, and component materials from the same source throughout the work.~~

~~1.7 Delivery Storage Handling~~

~~Maintain packaged materials clean, dry and protected against dampness, freezing and foreign matter.~~

~~Part 2 - Products~~

~~2.1 Mortar Mix~~

~~The Contractor shall provide mortar for Isolation Walls, which shall be in conformance with ASTM C270 type M, using the property specification (3,000 psi at 28 days).~~

~~Sand for mortar shall conform to ASTM C144.~~

~~Water used for mixing mortar shall be of potable quality, free of injurious amounts of oil, acid alkali, organic matter, sediments, or other deleterious substances, as specified for Concrete, Section 03300 2.3.~~

~~The supply of materials as defined in the design mix shall remain the same throughout the job.~~

~~Part 3 - Execution~~

~~3.1 General~~

~~The Contractor shall furnish all labor material equipment and tools to perform all operations in connection with supplying and mixing mortar for constructing the isolation walls.~~

~~The Contractor shall fully describe his proposed mortar mixing operation, including proposed equipment and materials in the Work Plan.~~

~~3.2 Mortar Mixing~~

~~Mortar shall be machine-mixed with sufficient water to achieve satisfactory workability. Maintain sand uniformly damp immediately before the mixing process. If water is lost by evaporation, retemper only within one and one half hours of mixing. Use mortar within two hours of mixing at ambient temperature of 85° in the mine.~~

~~3.3 Installation~~

~~The Contractor shall install mortar to the requirements of Section 04300 Unit Masonry System.~~

~~3.4 Field Quality Control~~

~~The Contractor shall provide a third party Quality Control Inspector to perform all sampling and testing to confirm that the mortar mix conforms to the proposed mix properties developed in the design mix.~~

~~Construction testing of mortar mix shall be in accordance with ASTM C780 for compression strength. Four (4) prism specimens shall be taken for each 50 cu. ft. of mortar or fraction thereof placed each day.~~

~~End of Section.~~

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~~Section 04300 - Unit Masonry System~~

~~Part 1 - General~~

~~1.1 Scope~~

~~This section includes:~~

- ~~Concrete Masonry Units~~

~~1.2 Related Sections~~

- ~~01010 Summary of Work~~
- ~~01400 Contractor Quality Control~~
- ~~01600 Material and Equipment~~
- ~~02722 Grouting~~
- ~~03100 Concrete Formwork~~
- ~~04100 Mortar~~

~~1.3 References~~

~~ASTM C55 Standard Specification for Concrete Building Brick~~

~~ASTM C140 Standard Method of Sampling and Testing Concrete Masonry Units~~

~~1.4 Submittals for Revision and Approval~~

~~The Contractor shall submit for approval the following 30 days prior to initiation of the work at the site.~~

~~Certified laboratory test results for the proposed solid masonry units.~~

~~1.5 Quality Assurance~~

~~Perform the work in accordance with the Contractor's Quality Control Plan.~~

~~Part 2 - Products~~

~~2.1 Concrete Masonry Units~~

~~Concrete masonry units shall be solid (no cavities or cores), load bearing high-strength units having a minimum compressive strength of 3500 psi. Concrete masonry units shall be tested in accordance with ASTM C140. All other aspects of the concrete masonry units shall comply with ASTM C55, Type I Moisture Controlled.~~

~~Nominal modular size shall be 8 x 8 x 16 inches, or as otherwise approved by the Engineer.~~

~~Concrete brick shall comply with ASTM C55, Grade N, Type I (moisture controlled) having a minimum compressive strength of 3500 psi (Avg. 3 units) or 3000 psi for individual unit.~~

~~2.2 Mortar~~

~~Mortar shall be as specified in Section 04100 Mortar.~~

~~Part 3 - Execution~~

~~3.1 General~~

~~The Contractor shall furnish all labor, material, equipment and tools to perform all operations of installing Unit Masonry Isolation Walls to the lines and grades shown on the drawings.~~

~~The Contractor shall examine the excavation of the entry to affirm that the keys have been properly leveled and cut to the appropriate depths, at the proper locations prior to any to any work.~~

~~3.2 Installation~~

~~The Contractor shall install the isolation walls using concrete masonry units as specified above. Masonry units shall be installed with 3/8-inch mortar joints with full mortar bedding and full head joints. Masonry units shall be installed in running bond with headers every third course. Masonry units shall be mortared tight to the ribs and the back wall to provide a seal all around the isolation wall.~~

~~Concrete brick may be used as required for fit-up around grout pipes, or minimizing the dimensional fit-up at the top or sides of the isolation walls as approved by the Engineer. The interface between the top of the isolation wall and the back wall shall be completely mortared to provide full contact between the back and the block wall.~~

~~3.3 Field Quality Control~~

~~The Contractor shall provide a third-party Quality Control Inspector to inspect the installation of the Concrete Masonry Unit Isolation Walls. Inspection and testing of the mortar shall be in accordance with Section 04100 Mortar.~~

~~End of Section~~

~~FIGURES~~

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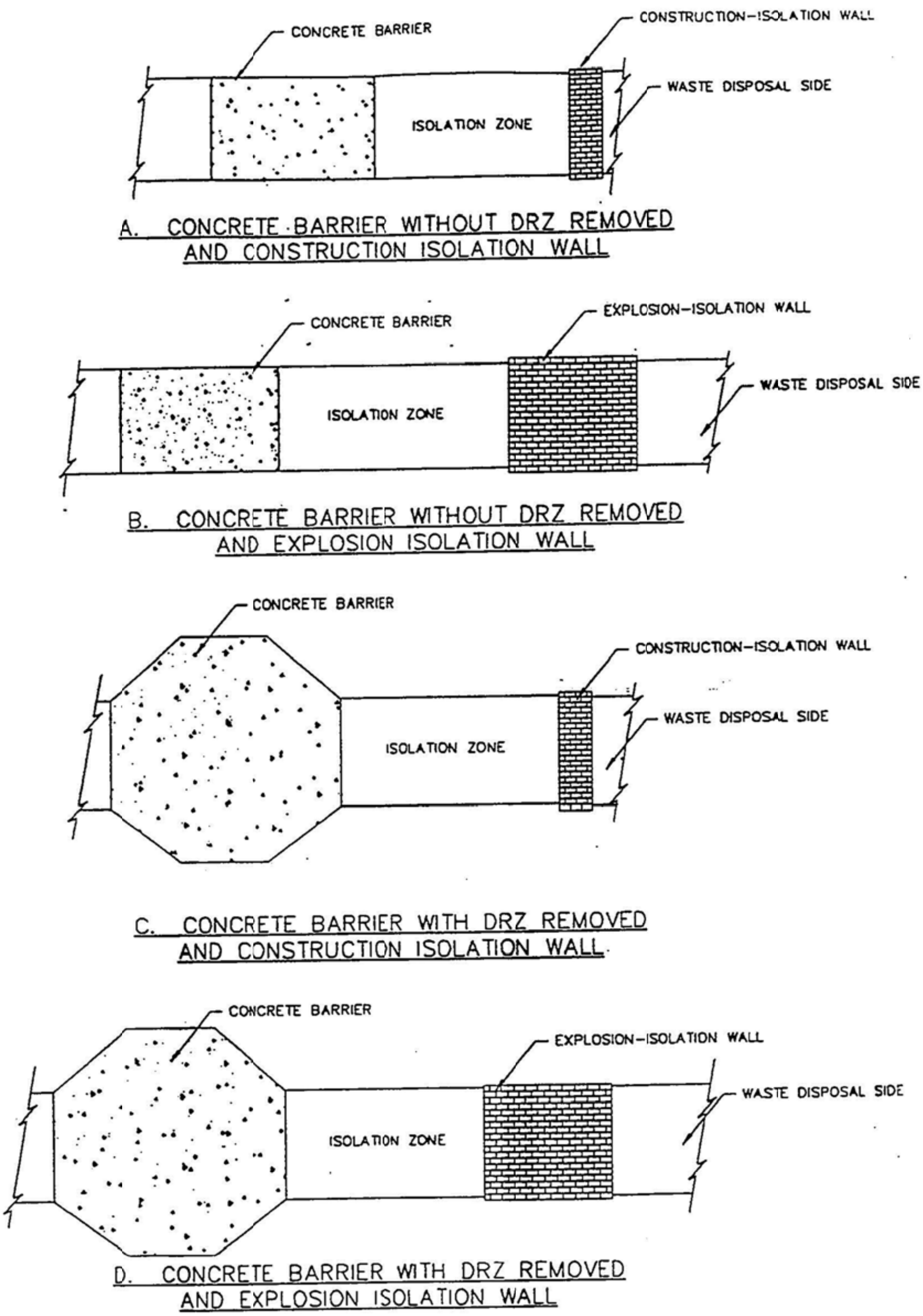
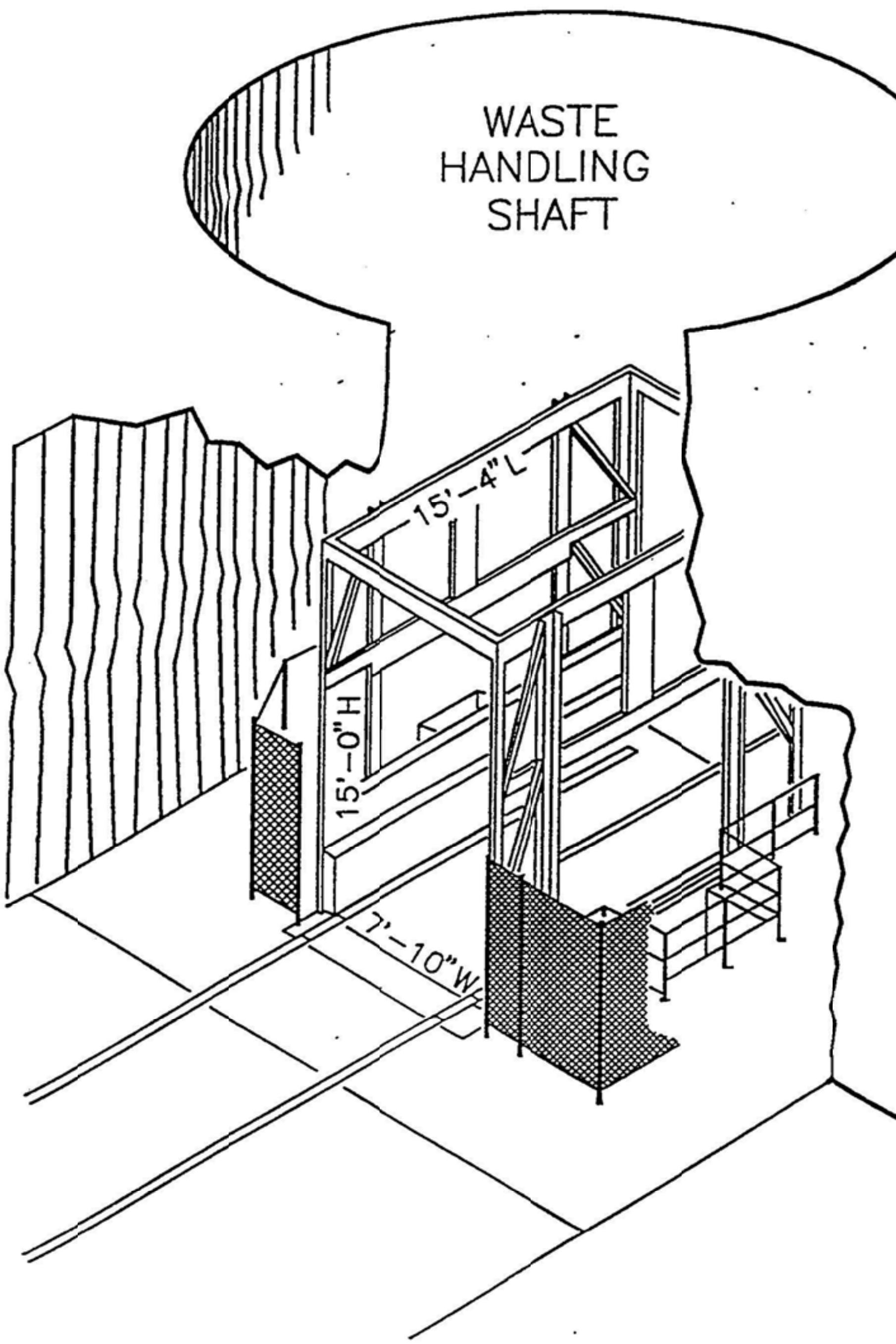
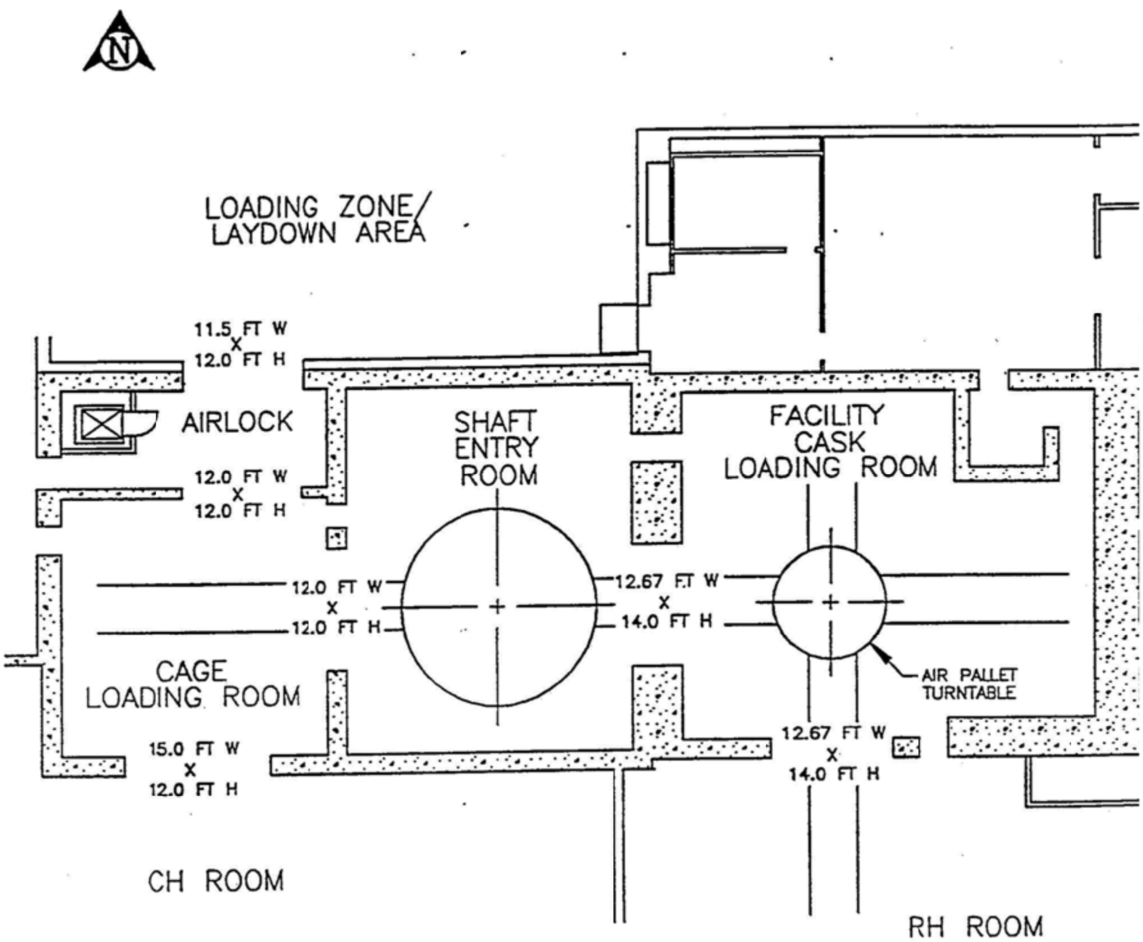


~~Figure G1G-1~~
~~Plan Variations~~



~~Figure G1G-2~~
~~Waste Handling Shaft Cage Dimensions~~



~~Figure G1G-3~~
~~Waste Shaft Collar and Airlock Arrangement~~

1

~~ATTACHMENT G1~~
~~APPENDIX H~~

~~DESIGN DRAWINGS~~

~~PANEL CLOSURE SYSTEM~~
~~WASTE ISOLATION PILOT PLANT~~
~~CARLSBAD, NEW MEXICO~~

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~~ATTACHMENT G1~~
~~APPENDIX H~~

~~DESIGN DRAWINGS~~

~~PANEL CLOSURE SYSTEM~~
~~WASTE ISOLATION PILOT PLANT~~
~~CARLSBAD, NEW MEXICO~~

~~**Drawing**~~	~~**Title**~~
~~762447-E1~~	~~Panel closure system, air intake and exhaust drifts, title sheet~~
~~762447-E2~~	~~Panel closure system, underground waste-emplacement panel plan~~
~~762447-E3~~	~~Panel closure system, air intake drift, construction details~~
~~762447-E4~~	~~Panel closure system, air exhaust drift, construction details~~
~~762447-E5~~	~~Panel closure system, construction and explosion walls, construction details~~
~~762447-E6~~	~~Panel closure system, air intake and exhaust drifts, grouting and miscellaneous details~~

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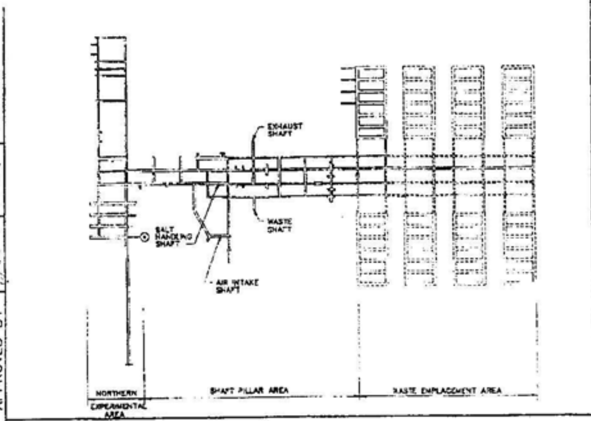
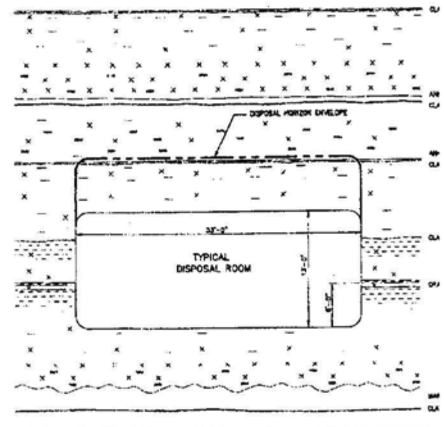


UNDERGROUND REPOSITORY LAYOUT PLAN
NTS

762447–E1	TITLE SHEET
762447–E2	UNDERGROUND WASTE DISPOSAL PANEL–PLAN
762447–E3	PANEL CLOSURE SYSTEM–AIR INTAKE DRIFT–CONSTRUCTION DETAILS
762447–E4	PANEL CLOSURE SYSTEM–AIR EXHAUST DRIFT–CONSTRUCTION DETAILS
762447–E5	PANEL CLOSURE SYSTEM–CONSTRUCTION AND EXPLOSION WALLS–CONSTRUCTION DETAILS
762447–E6	PANEL CLOSURE SYSTEM–AIR ENTRANCE AND EXHAUST DRIFT GROUTING AND MISCELLANEOUS DETAILS

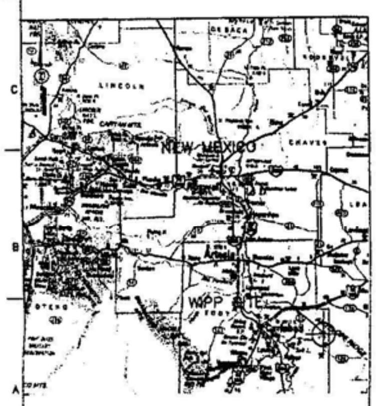


DETAILED STRATIGRAPHY AT THE REPOSITORY HORIZO
NTS

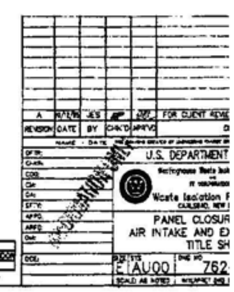
WASTE ISOLATION PILOT PLANT
PANEL CLOSURE SYSTEM
CARLSBAD, NEW MEXICO

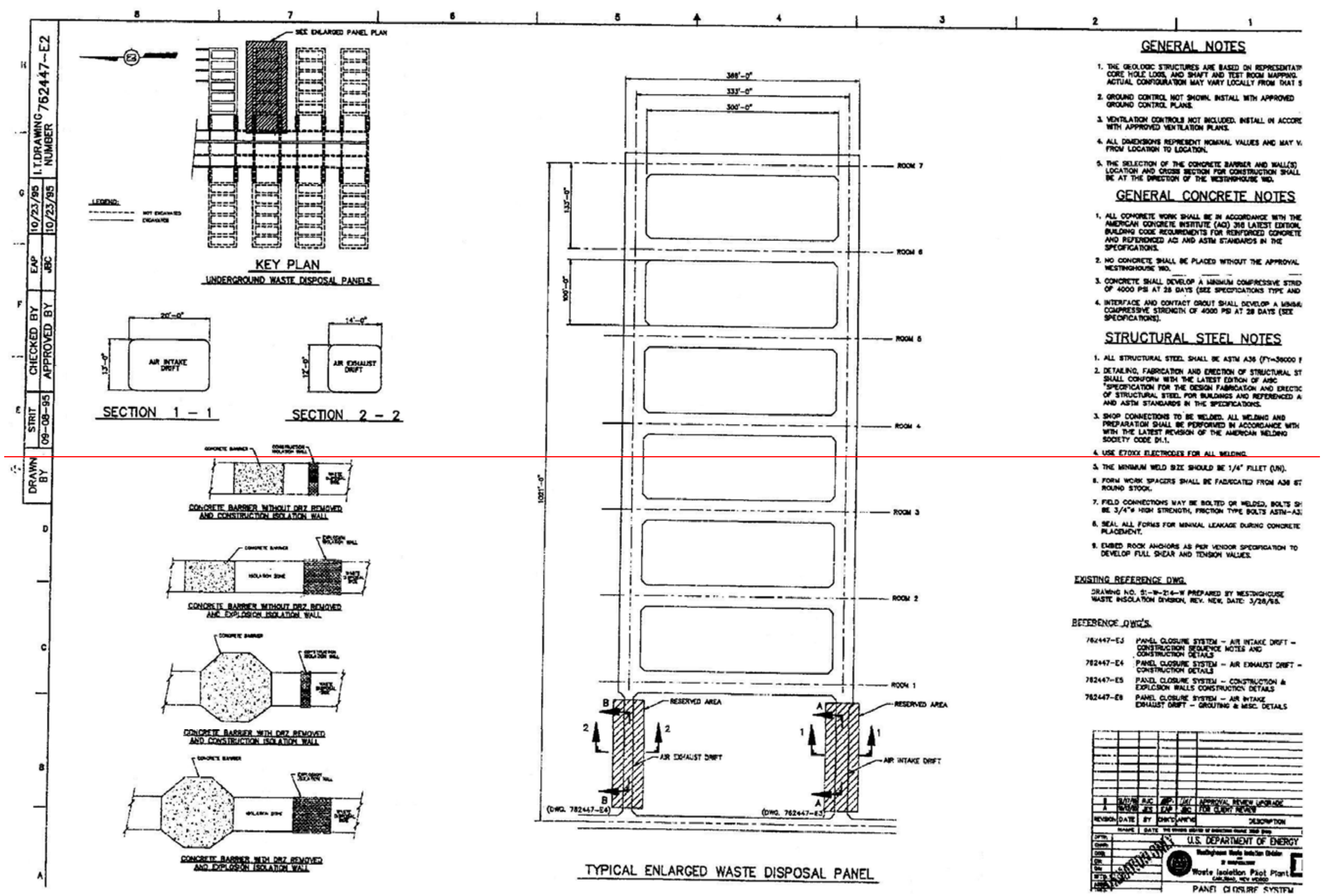
prepared by

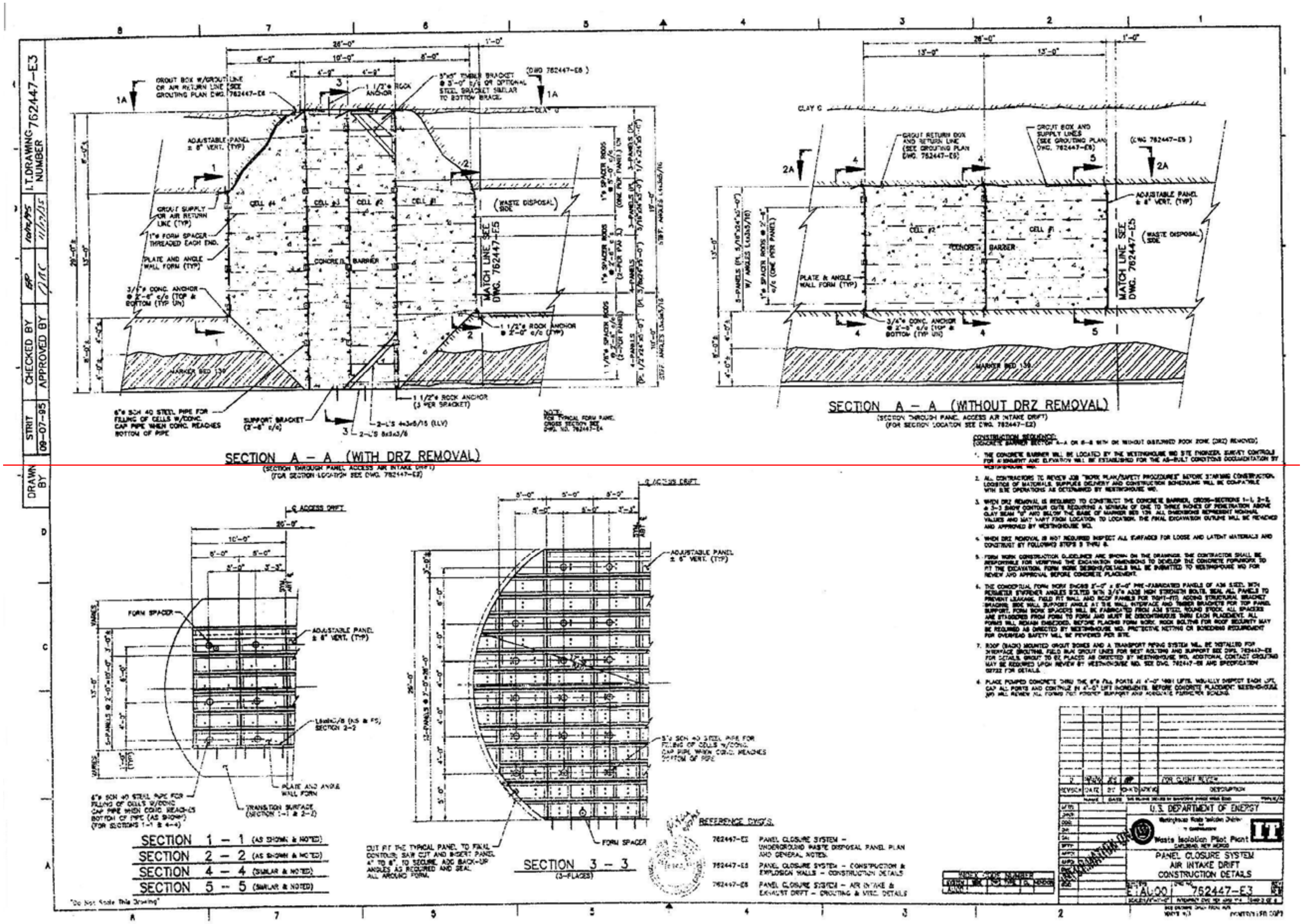
IT CORPORATION
ALBUQUERQUE, NEW MEXICO

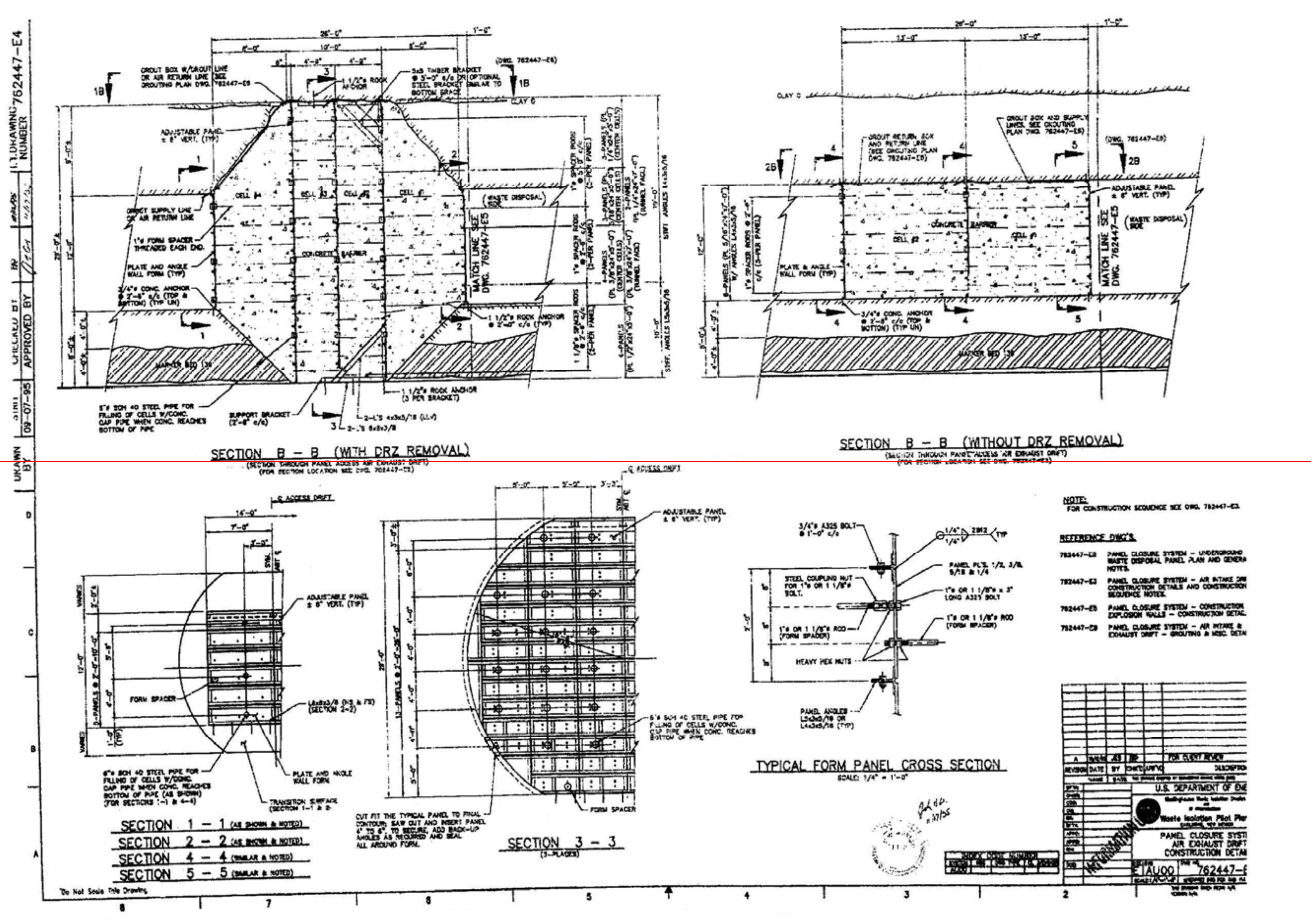


GENERAL LOCATION MAP
NTS

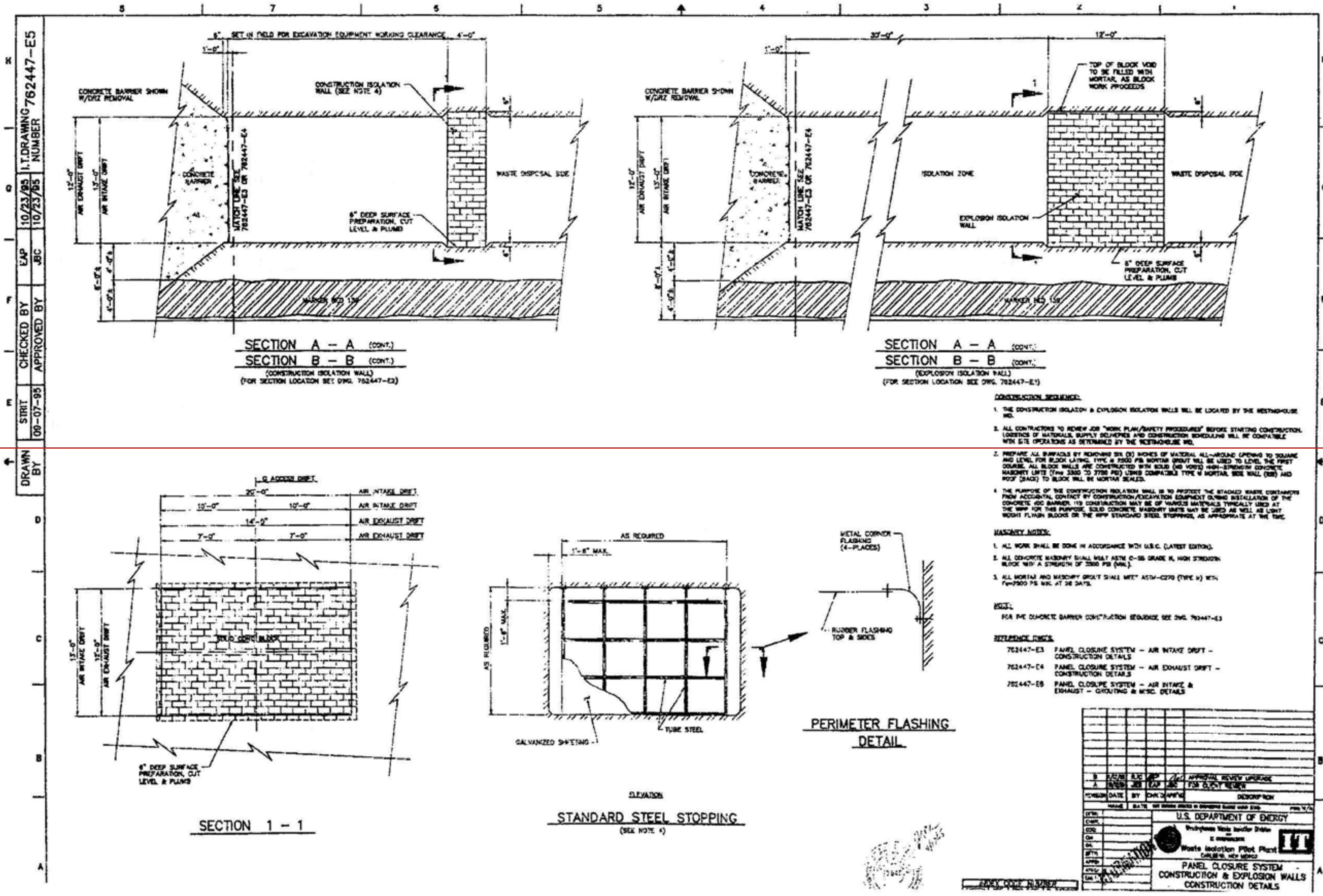



I.T. DRAWING NUMBER 762447-E2
KEY PLAN
UNDERGROUND WASTE DISPOSAL PANELS
SEE ENLARGED PANEL PLAN
LEGEND:
AIR INTAKE DRIFT
AIR EXHAUST DRIFT
SECTION 1 – 1
SECTION 2 – 2
CONCRETE BARRIER WITHOUT DRZ REMOVED AND CONSTRUCTION ISOLATION WALL
CONCRETE BARRIER WITHOUT DRZ REMOVED AND EXPLOSION ISOLATION WALL
CONCRETE BARRIER WITH DRZ REMOVED AND CONSTRUCTION ISOLATION WALL
CONCRETE BARRIER WITH DRZ REMOVED AND EXPLOSION ISOLATION WALL
ROOM 7
ROOM 6
ROOM 5
ROOM 4
ROOM 3
ROOM 2
ROOM 1
RESERVED AREA
AIR EXHAUST DRIFT
AIR INTAKE DRIFT
TYPICAL ENLARGED WASTE DISPOSAL PANEL
GENERAL NOTES
GENERAL CONCRETE NOTES
STRUCTURAL STEEL NOTES
EXISTING REFERENCE DWG.
REFERENCE DWG'S.
U.S. DEPARTMENT OF ENERGY
Waste Isolation Pilot Plant
PANEL CLOSURE SYSTEM

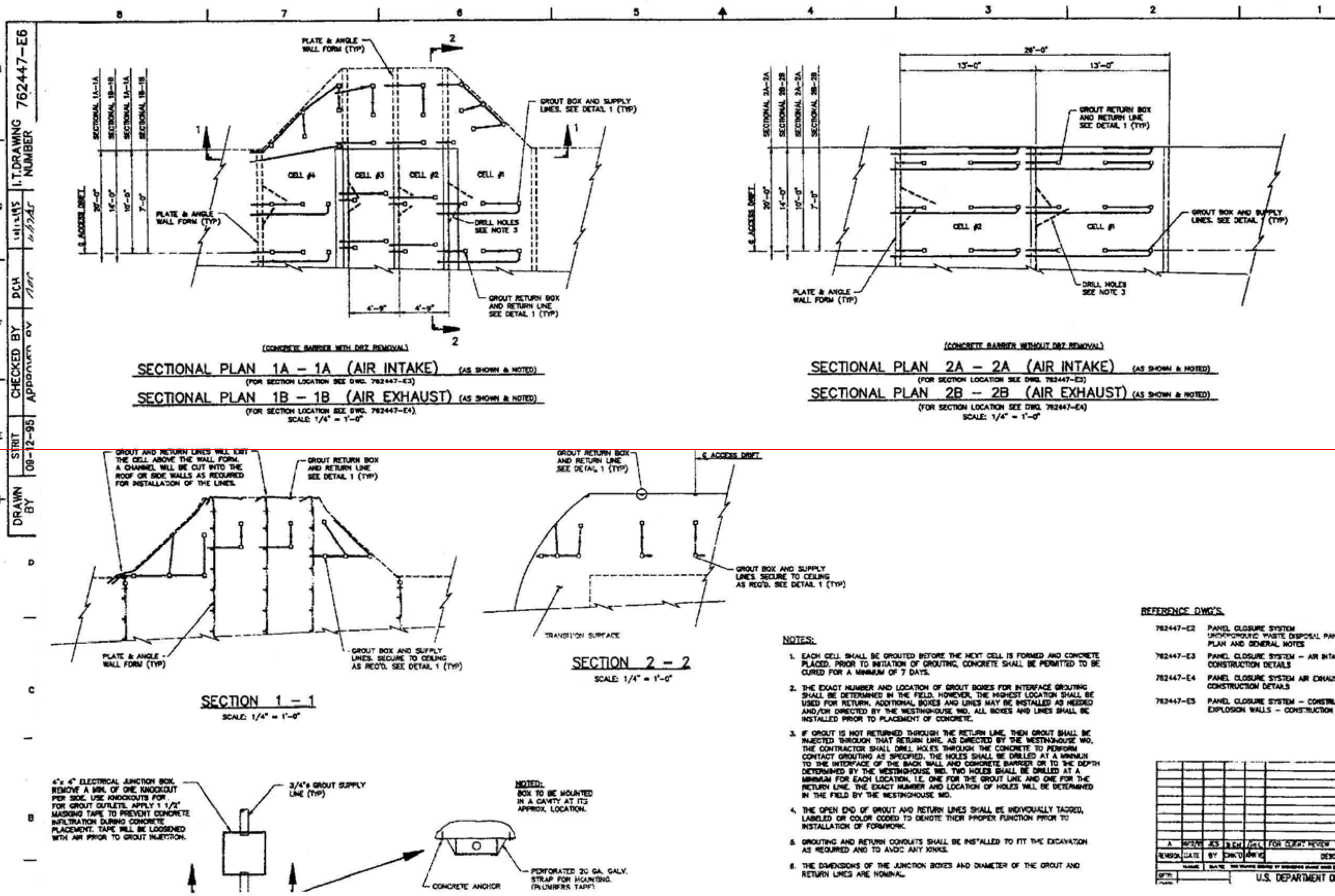

SECTION A – A (WITH DRZ REMOVAL)
SECTION A – A (WITHOUT DRZ REMOVAL)
SECTION 1 – 1
SECTION 2 – 2
SECTION 4 – 4
SECTION 5 – 5
SECTION 3 – 3
REFERENCE DWG'S
U.S. DEPARTMENT OF ENERGY
Waste Isolation Pilot Plant
PANEL CLOSURE SYSTEM
AIR INTAKE DRIFT
CONSTRUCTION DETAILS
762447-E3
MARKER BED 139
CONCRETE BARRIER
WASTE DISPOSAL SIDE
"Do Not Scale This Drawing"


SECTION B – B (WITH DRZ REMOVAL)
SECTION B – B (WITHOUT DRZ REMOVAL)
SECTION 1 – 1
SECTION 2 – 2
SECTION 4 – 4
SECTION 5 – 5
SECTION 3 – 3
TYPICAL FORM PANEL CROSS SECTION
MARKER BED 139
CONCRETE BARRIER
MATCH LINE SEE DWG. 762447-E5
REFERENCE DWG'S
U.S. DEPARTMENT OF ENERGY
Waste Isolation Pilot Plant
PANEL CLOSURE SYSTEM AIR EXHAUST DRIFT CONSTRUCTION DETAILS
762447-E4
Do Not Scale This Drawing

1


762447-E5
I.T. DRAWING NUMBER
SECTION A – A (CONT.)
SECTION B – B (CONT.)
(CONSTRUCTION ISOLATION WALL)
(FOR SECTION LOCATION SEE DWG. 762447-E3)
CONCRETE BARRIER SHOWN W/DRZ REMOVAL
CONSTRUCTION ISOLATION WALL (SEE NOTE 4)
WASTE DISPOSAL SIDE
6" DEEP SURFACE PREPARATION, CUT LEVEL & PLUMB
CONCRETE BARRIER
MARKER BED 139
SECTION A – A (CONT.)
SECTION B – B (CONT.)
(EXPLOSION ISOLATION WALL)
(FOR SECTION LOCATION SEE DWG. 762447-E3)
TOP OF BLOCK VOID TO BE FILLED WITH MORTAR, AS BLOCK WORK PROCEEDS
ISOLATION ZONE
EXPLOSION ISOLATION WALL
CONSTRUCTION SEQUENCE:
1. THE CONSTRUCTION ISOLATION & EXPLOSION ISOLATION WALLS WILL BE LOCATED BY THE WESTINGHOUSE WID.
2. ALL CONTRACTORS TO REVIEW JOB "WORK PLAN/SAFETY PROCEDURES" BEFORE STARTING CONSTRUCTION. LOGISTICS OF MATERIALS, SUPPLY DELIVERIES AND CONSTRUCTION SCHEDULING WILL BE COMPATIBLE WITH SITE OPERATIONS AS DETERMINED BY THE WESTINGHOUSE WID.
MASONRY NOTES:
1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH U.B.C. (LATEST EDITION).
NOTE:
FOR THE CONCRETE BARRIER CONSTRUCTION SEQUENCE SEE DWG. 762447-E3
REFERENCE DWG'S.
762447-E3 PANEL CLOSURE SYSTEM – AIR INTAKE DRIFT – CONSTRUCTION DETAILS
762447-E4 PANEL CLOSURE SYSTEM – AIR EXHAUST DRIFT – CONSTRUCTION DETAILS
762447-E8 PANEL CLOSURE SYSTEM – AIR INTAKE & EXHAUST – GROUTING & MISC. DETAILS
SECTION 1 – 1
SOLID CONC. BLOCK
AIR INTAKE DRIFT
AIR EXHAUST DRIFT
AS REQUIRED
GALVANIZED SHEETING
TUBE STEEL
ELEVATION
STANDARD STEEL STOPPING
(SEE NOTE 4)
METAL CORNER FLASHING (4-PLACES)
RUBBER FLASHING TOP & SIDES
PERIMETER FLASHING DETAIL
U.S. DEPARTMENT OF ENERGY
Waste Isolation Pilot Plant
PANEL CLOSURE SYSTEM CONSTRUCTION & EXPLOSION WALLS CONSTRUCTION DETAILS

1


762447-E6
I.T. DRAWING NUMBER
DRAWN BY
CHECKED BY
APPROVED BY
(CONCRETE BARRIER WITH DRZ REMOVAL)
SECTIONAL PLAN 1A – 1A (AIR INTAKE) (AS SHOWN & NOTED)
(FOR SECTION LOCATION SEE DWG. 762447-E3)
SECTIONAL PLAN 1B – 1B (AIR EXHAUST) (AS SHOWN & NOTED)
(FOR SECTION LOCATION SEE DWG. 762447-E4)
SCALE: 1/4" = 1'-0"
(CONCRETE BARRIER WITHOUT DRZ REMOVAL)
SECTIONAL PLAN 2A – 2A (AIR INTAKE) (AS SHOWN & NOTED)
(FOR SECTION LOCATION SEE DWG. 762447-E3)
SECTIONAL PLAN 2B – 2B (AIR EXHAUST) (AS SHOWN & NOTED)
(FOR SECTION LOCATION SEE DWG. 762447-E4)
SCALE: 1/4" = 1'-0"
PLATE & ANGLE WALL FORM (TYP)
GROUT BOX AND SUPPLY LINES. SEE DETAIL 1 (TYP)
GROUT RETURN BOX AND RETURN LINE SEE DETAIL 1 (TYP)
DRILL HOLES SEE NOTE 3
CELL #1
CELL #2
CELL #3
CELL #4
26'-0"
13'-0"
13'-0"
4'-9"
SECTION 1 – 1
SCALE: 1/4" = 1'-0"
SECTION 2 – 2
SCALE: 1/4" = 1'-0"
GROUT AND RETURN LINES WILL EXIT THE CELL ABOVE THE WALL FORM. A CHANNEL WILL BE CUT INTO THE ROOF OR SIDE WALLS AS REQUIRED FOR INSTALLATION OF THE LINES.
GROUT BOX AND SUPPLY LINES. SECURE TO CEILING AS REQ'D. SEE DETAIL 1 (TYP)
℄ ACCESS DRIFT
TRANSITION SURFACE
4"x 4" ELECTRICAL JUNCTION BOX. REMOVE A MIN. OF ONE KNOCKOUT PER SIDE. USE KNOCKOUTS FOR FOR GROUT OUTLETS. APPLY 1 1/2" MASKING TAPE TO PREVENT CONCRETE INFILTRATION DURING CONCRETE PLACEMENT. TAPE WILL BE LOOSENED WITH AIR PRIOR TO GROUT INJECTION.
3/4"ø GROUT SUPPLY LINE (TYP)
NOTED: BOX TO BE MOUNTED IN A CAVITY AT ITS APPROX. LOCATION.
CONCRETE ANCHOR
PERFORATED 20 GA. GALV. STRAP FOR MOUNTING (PLUMBERS TAPE)
NOTES:
1. EACH CELL SHALL BE GROUTED BEFORE THE NEXT CELL IS FORMED AND CONCRETE PLACED. PRIOR TO INITIATION OF GROUTING, CONCRETE SHALL BE PERMITTED TO BE CURED FOR A MINIMUM OF 7 DAYS.
2. THE EXACT NUMBER AND LOCATION OF GROUT BOXES FOR INTERFACE GROUTING SHALL BE DETERMINED IN THE FIELD. HOWEVER, THE HIGHEST LOCATION SHALL BE USED FOR RETURN. ADDITIONAL BOXES AND LINES MAY BE INSTALLED AS NEEDED AND/OR DIRECTED BY THE WESTINGHOUSE WID. ALL BOXES AND LINES SHALL BE INSTALLED PRIOR TO PLACEMENT OF CONCRETE.
3. IF GROUT IS NOT RETURNED THROUGH THE RETURN LINE, THEN GROUT SHALL BE INJECTED THROUGH THAT RETURN LINE. AS DIRECTED BY THE WESTINGHOUSE WID, THE CONTRACTOR SHALL DRILL HOLES THROUGH THE CONCRETE TO PERFORM CONTACT GROUTING AS SPECIFIED. THE HOLES SHALL BE DRILLED AT A MINIMUM TO THE INTERFACE OF THE BACK WALL AND CONCRETE BARRIER OR TO THE DEPTH DETERMINED BY THE WESTINGHOUSE WID. TWO HOLES SHALL BE DRILLED AT A MINIMUM FOR EACH LOCATION, I.E. ONE FOR THE GROUT LINE AND ONE FOR THE RETURN LINE. THE EXACT NUMBER AND LOCATION OF HOLES WILL BE DETERMINED IN THE FIELD BY THE WESTINGHOUSE WID.
4. THE OPEN END OF GROUT AND RETURN LINES SHALL BE INDIVIDUALLY TAGGED, LABELED OR COLOR CODED TO DENOTE THEIR PROPER FUNCTION PRIOR TO INSTALLATION OF FORMWORK.
5. GROUTING AND RETURN CONDUITS SHALL BE INSTALLED TO FIT THE EXCAVATION AS REQUIRED AND TO AVOID ANY KINKS.
6. THE DIMENSIONS OF THE JUNCTION BOXES AND DIAMETER OF THE GROUT AND RETURN LINES ARE NOMINAL.
REFERENCE DWG'S.
762447-E2 PANEL CLOSURE SYSTEM UNDERGROUND WASTE DISPOSAL PLAN AND GENERAL NOTES
762447-E3 PANEL CLOSURE SYSTEM – AIR INTAKE CONSTRUCTION DETAILS
762447-E4 PANEL CLOSURE SYSTEM AIR EXHAUST CONSTRUCTION DETAILS
762447-E5 PANEL CLOSURE SYSTEM – CONSTRUCTION EXPLOSION WALLS – CONSTRUCTION
U.S. DEPARTMENT OF

ATTACHMENT H

POST-CLOSURE PLAN

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ATTACHMENT H

POST-CLOSURE PLAN

TABLE OF CONTENTS

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ATTACHMENT H

POST-CLOSURE PLAN

Introduction

This Permit Attachment contains the Post-Closure Plan, which describes activities required to maintain the Waste Isolation Pilot Plant (**WIPP**) after completion of facility closure. 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)).

This plan was submitted to the New Mexico Environment Department (**NMED**) in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(13)) and the U.S. Environmental Protection Agency (**EPA**). The Post-Closure Plan includes the implementation of institutional controls to limit access and groundwater monitoring to assess disposal system performance. Until final closure is complete and has been certified in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.115), a copy of the approved Post-Closure Plan and all approved revisions will be on file at the WIPP facility and will be available to the Secretary of the NMED or the EPA Region VI Administrator upon request.

H-1 Post-Closure Plan

The post-closure care period begins after completion of closure of the first underground hazardous waste disposal unit (**HWDU**) and continues for 30 years after final closure of the facility. The post-closure care period may be shortened or lengthened by the Secretary of the NMED, based on evidence that human health and the environment are being protected or are at risk. During the post-closure period, the WIPP shall be maintained in a manner that complies with the environmental performance standards applicable to the facility. During this period, the Permittees will employ active institutional controls as necessary.

This post-closure plan focuses on activities following final facility closure. However, some discussion of post-closure following panel closure is warranted since some panel closures will occur long before final facility closure. As discussed in Attachment G (Closure Plan), Section G-1e(1), panel closures have been designed to require minimum~~no~~ post-closure maintenance. The Permittees have defined a post-closure care program for closed panels that has three aspects. These are routine inspection of the openings in the vicinity of the closures, the sampling of ventilation air for harmful constituents, and a Repository Volatile Organic Compound Monitoring Program. The rules of the Mine Safety and Health Administration as well as Permit Attachment E (Inspection Schedule, Process and Forms) drive the implementation of the first two programs. These rules require that underground mines monitor air quality to assure good breathing air whenever personnel are underground and that mine operators provide safe ground conditions for personnel in areas that require access. Routine monitoring of the openings in the access ways to panels will be continued and these openings will be maintained for as long as access into them is needed. This includes continued reading of installed geomechanical instrumentation, sounding the areas, visual inspection and maintenance activities ~~such as scaling, mining, or bolting~~ as required and as described in Permit Attachment A2. In addition, all areas in the underground that are occupied by personnel are checked prior to each day's work activities for accumulations of harmful gases~~, including methane~~. Action levels for increasing ventilation to areas that show high levels of harmful gases are specified as described in standard operating procedures on file at the WIPP facility~~Permit Attachment D~~.

These monitoring programs will be carried out during the period between the closure of the first panel and the initiation of final facility closure for the underground facility. The Permittees have prepared a Volatile Organic Compound Monitoring Plan (**VOCMP**) which will be implemented to confirm that the annual average concentration of volatile organic compounds (**VOCs**) in the air emissions from the underground HWDUs do not exceed the VOC action levels (10^{-5} for carcinogens and HI>1 for non-carcinogens) listed in Permit Part 4, Section 4.6.2.3. The VOCMP is provided in Attachment N. The VOCMP includes monitoring design, sampling and analysis procedures and quality assurance objectives. This plan is required to demonstrate compliance with 20.4.1.500 and .900 NMAC (incorporating 40 CFR §264.602 and §270.23(a)(2)).

The Permittees will operate in accordance with the VOCMP until after certification of the closure of the last underground HWDU.

The VOCMP uses EPA Compendium Method TO-15. The Permittees have had success with TO-15 at the WIPP if care is taken in placing the sampler to avoid high dust and if stringent cleaning requirements are imposed for the clean canisters. This is necessary because of the extremely low concentrations that are being monitored.

The VOCMP will be implemented under a Quality Assurance Plan that conforms to the document entitled "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations". Quality Assurance criteria required for the target analytes are presented in Table N-2 in Permit Attachment N. Definitions of these criteria are given in Permit Attachment N along with a discussion of other requirements of the Quality Assurance Program, including sample handling, calibration, analytical procedures, data reduction, validation and reporting, performance and system audits, preventive maintenance, and corrective actions.

H-1a Post-Closure Plan after Final Facility Closure

A number of regulations deal with the period of time that begins once the WIPP has undergone final facility closure and decommissioning. Under 40 CFR Part 191, the period consists of an active control period and a passive control period; only 100 years of the active control period can be used in performance assessment. The Land Withdrawal Act (LWA) of 1992 requires that the U.S. Department of Energy (DOE) prepare and submit a post-decommissioning land management plan. 20.4.1.500 NMAC (incorporating 40 CFR §264.117) requires post-closure care, including monitoring, security, and control of property use. Because of the numerous regulations, the Permittees have prepared a single strategy for post-closure management of the WIPP. This strategy consists of three elements: 1) active controls, 2) monitoring, and 3) passive controls. Only the first and second elements occur within the post-closure period covered by this permit.

H-1a(1) Active Institutional Controls

Once a facility is decommissioned, positive actions (referred to as "active institutional controls") will be taken to assure proper maintenance and monitoring. The EPA, in 40 CFR §191.14(a) has specified that active controls will be maintained for as long as practicable and that no more than 100 years of active institutional control can be assumed in predictions of long-term performance. This assumption assures that future protection and control does not rely on positive actions by future generations.

The Permittees' active institutional control program has a primary objective of addressing all applicable requirements, including restoring the WIPP site as nearly as possible to its original condition, and thereby equalizing any preference over other areas for development by humans in the future. Restoration of the WIPP site includes any necessary remedial actions or cleanup of releases resulting from decommissioning. In addition, as part of the active institutional control program implemented under 40 CFR §194.14(a), the Permittees will implement monitoring systems suitable for assessing disposal system performance if such monitoring is feasible.

The Permittees will implement the active institutional control program as described in more detail below:

Identification of Active Institutional Control Measures

A detailed explanation of the active institutional controls selected by the Permittees as part of this first step is provided in Permit Attachment H1 (WIPP Active Institutional Controls). This is the Permittees' reference design for active institutional controls. The reference design will be reviewed periodically and updated by the Permittees as appropriate during WIPP disposal operations. The ongoing review and evaluation ensure that the active institutional controls implemented are appropriate for the conditions that may exist at that time. The Permittees will review the reference design prior to implementation and all affected regulatory agencies will be consulted as part of this review. If updating the reference design proposes any changes in the Post-Closure Plan as described in this permit, the Permittees shall apply for a permit modification to include those changes, or submit the reference design and revised Post-Closure Plan as part of a routine permit renewal application, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.118(d)).

As part of the active institutional controls program, the Permittees have developed a set of active institutional controls which will be implemented. These are as follows:

- A fence line shall be established to control access to the repository's footprint area (the waste disposal area projected to the surface). A standard wire fence shall be erected along the perimeter of the repository surface footprint. The fence shall have gates placed approximately midway along each of the four sides.

- An unpaved roadway along the perimeter of the barbed wire fence shall be constructed to provide ready vehicle access to any point around the fenced perimeter, to facilitate inspection and maintenance of the fence line, and to permit visual observation of the repository footprint to the extent permitted by the lay of the land. This roadway shall connect to the paved south access road.

- To ensure visual notification, the fence line shall be posted with signs having as a minimum, a legend reading "Danger—Unauthorized Personnel Keep Out" and a warning against entering the area without specific permission of the Permittees.

- Contractual arrangements shall be developed to ensure that periodic inspection and necessary corrective maintenance is conducted on the fence line, its associated warning signs, and the roadway. The Permittees will maintain control over all contractual work and will maintain, in the operating record, the results of all inspections and maintenance activities.

- Through direct Permittee staffing support and/or contractual arrangements, procedures shall be established to provide routine periodic patrols and surveillances of the protected area by personnel trained in security surveillance and investigation.

- Mitigating actions will be taken to address any abnormal conditions[1] identified during periodic surveillance and inspections.

- Reports of activities associated with the post-disposal active access controls shall be prepared in accordance with regulatory requirements for submittal to the appropriate regulatory and legislative authority.

Details on meeting these criteria are found in Permit Attachment H1.

<u>Preparation of a Post-Decommissioning Land Management Plan</u>

Section 13(b) of the LWA requires the DOE to prepare and submit a plan for managing the land withdrawal area after decommissioning the WIPP facility. This plan will include a description of both the active and passive institutional controls that will be imposed after decommissioning is complete. This plan will be prepared in consultation with the Department of Interior and the state of New Mexico. If the land management plan proposes any changes in the Post-Closure Plan as described in this permit, the Permittees shall apply for a permit modification to include those changes, or submit the land management plan and revised Post-Closure Plan as part of a routine permit renewal application, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.118(d)).

<u>Preparation of the Active Institutional Control Plan</u>

An active institutional control plan will be initiated prior to actual plant closure, and will contain all the information needed to implement the active and passive institutional controls for the WIPP facility. Active institutional control planning will be based on the reference design and will take into account the most current information regarding the facility and its vicinity and will make use of state-of-the-art materials and techniques. This plan will include acceptable decontamination levels, sampling and analysis plans, and QA/QC specifications. If such future plan contains provisions different from those in this Post-Closure Plan or Permit Attachment H1 (Active Institutional Controls), the Permittees shall submit a request for modification of the Post-Closure Plan and the WIPP Permit. The changes must be approved and made part of the revised Permit before the changes are implemented, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264.118(d)).

<u>Implementation of Active Institutional Control Measures</u>

Most of the active institutional control measures, such as long-term site monitoring and site remedial actions, will be implemented simultaneously with facility closure. However, it may be

[1] "Abnormal conditions" include any natural or human-caused conditions which could affect the integrity of Active Institutional controls required by the Permit or which could affect compliance of the WIPP with applicable RCRA standards.

possible to implement some measures earlier. For example, salt disposal may begin prior to final plant closure. Reclamation and restoration of unused disturbed surface areas has already begun. Guarding and maintenance activities, which are already in place, could evolve into an appropriate type of post-closure activity, subject to appropriate modifications of the Permit.

H-1a(2) Monitoring

Post-closure groundwater monitoring will involve a continuation of the monitoring plan in Permit Attachment L as described in Permit Part 5. The sampling frequency may be changed to a frequency of every two years after final facility closure is complete by modification of the Permit as approved by the Secretary of the NMED in accordance with 20.4.1.901.B NMAC (incorporating 40 CFR §270.42). In addition, the final target analyte list specified in Permit Attachment L may be changed by permit modification based on final volume of waste.

H-2 Notices Required for Disposal Facilities

H-2a Post-Closure Certification

Within 60 days of completion of the post-closure care period after final facility closure, the Permittees will submit to the Secretary of the NMED, via registered mail, a certification that post-closure care was performed in accordance with the specifications of the approved post-closure plan. The certification will be signed by the Permittees and by an independent New Mexico registered professional engineer. Documentation supporting the independent registered engineer’s certification and a copy of the certification will be furnished to the Secretary of the NMED.

H-2b Post-Closure Notices

Within 60 days after certification of closure of each underground HWDU or final facility closure, the Permittees will submit to the Secretary of the NMED, and to the Eddy County government or other applicable local government agencies, a record of the type, location, and quantity of hazardous wastes disposed of in each underground HWDU as required in 20.4.1.500 NMAC (incorporating 40 CFR §264.119).

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ATTACHMENT N

VOLATILE ORGANIC COMPOUND MONITORING PLAN

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ATTACHMENT N

VOLATILE ORGANIC COMPOUND MONITORING PLAN

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ACRONYMS, ABBREVIATIONS, AND UNITS

ARA	additional requested analyte
BS/BSD	blank spike/blank spike duplicate
CFR	Code of Federal Regulations
CH	Contact-handled
CRQL	contract-required quantitation limit
DOE	U.S. Department of Energy
DRVMP	Disposal Room VOC Monitoring Program
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
ft	feet
GC/MS	gas chromatography/mass spectrometry
HI	hazard index
HWDU	Hazardous Waste Disposal Unit
IUR	inhalation unit risk
L	liter
LCS	laboratory control sample
LPEP	Laboratory Performance Evaluation Plan
m	meter
MDL	method detection limit
mm	millimeter
MOC	Management and Operating Contractor
MRL	method reporting limit
mtorr	millitorr
NIST	National Institute of Standards and Technology
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
PASK	passive air sampling kit
ppbv	parts per billion by volume
ppmv	parts per million by volume
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RfC	reference concentration
RH	remote-handled
RPD	relative percent difference

RVMP	Repository VOC Monitoring Program
SOP	standard operating procedure
TIC	tentatively identified compound
TRU	transuranic
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant

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ATTACHMENT N

VOLATILE ORGANIC COMPOUND MONITORING PLAN

N-1 Introduction

This Permit Attachment describes the monitoring plan for volatile organic compound (**VOC**) emissions from mixed waste that may be entrained in the exhaust air from the U.S. Department of Energy (**DOE**) Waste Isolation Pilot Plant (**WIPP**) Underground Hazardous Waste Disposal Units (**HWDUs**) during the disposal phase at the facility. The purpose of VOC monitoring is to ensure compliance with the VOC action levels and limits specified in Permit Part 4. This VOC monitoring plan consists of two programs: (1) the Repository VOC Monitoring Program (**RVMP**), which assesses compliance with the action levels in Permit Part 4, Section 4.6.2.3; and (2) the Disposal Room VOC Monitoring Program (**DRVMP**) (includes ongoing disposal room VOC monitoring), which assesses compliance with the disposal room action levels and limits in Permit Part 4, Tables 4.6.3.2 and 4.4.1. This plan includes the monitoring design, a description of sampling and analysis procedures, quality assurance (**QA**) objectives, and reporting activities.

N-1a Background

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

This plan addresses the following elements:

1. Rationale for the design of the VOC monitoring programs, based on:
    - Possible pathways from WIPP during the active life of the facility
    - Demonstrating compliance with the disposal room limits by monitoring VOCs in underground disposal rooms
    - Demonstrating compliance with the ambient air monitoring action levels by monitoring VOC emissions on the surface
    - VOC sampling operations at WIPP
    - Optimum locations for sampling
2. Descriptions of the specific elements of the VOC monitoring programs, including:
    - The type of monitoring conducted
    - Sampling locations
    - The monitoring interval

- The specific hazardous constituents monitored
- VOC monitoring schedule
- Sampling equipment
- Sampling and analytical techniques
- Data recording/reporting procedures
- Notification and action levels for remedial action

The technical basis for Disposal Room VOC Monitoring is discussed in detail in the Technical Evaluation Report for Room-Based VOC Monitoring (WRES, 2003).

N-1b Objectives of the Volatile Organic Compound Monitoring Plan

The CH and RH TRU mixed waste disposed in the WIPP Underground HWDUs contain VOCs which could be released from WIPP during the disposal phase of the project. This Plan describes how:

- VOCs released from waste panels will be monitored to confirm that the running annual average risk to the non-waste surface worker due to VOCs in the air emissions from the Underground HWDUs do not exceed the action levels identified in Permit Part 4, Section 4.6.2.3. and calculated from measured VOC concentrations using risk factors identified in Table 4.6.2.3. Appropriate remedial action, as specified in Permit Section 4.6.2.4, will be taken if the action levels in Permit Part 4, Section 4.6.2.3 are reached.

- VOCs released from waste containers in disposal rooms will be monitored to confirm that the concentration of VOCs in the air of closed and active rooms in active panels do not exceed the VOC disposal room limits identified in Permit Part 4, Table 4.4.1. Appropriate remedial action, as specified in Permit Part 4, Section 4.6.3.3, will be taken if the original sample results are greater than or equal to the action levels in Permit Part 4, Table 4.6.3.2.

N-2 Target Volatile Organic Compounds

The target VOCs for repository monitoring (Station VOC-C and VOC-D) and disposal room monitoring are presented in Table N-1.

These target VOCs were selected because together they represent approximately 99 percent of the carcinogenic risk due to air emissions of VOCs.

N-3 Monitoring Design

Detailed design features of this plan are presented in this section. This plan uses available sampling and analysis techniques to measure VOC concentrations in air. Subatmospheric sample collection units are used in the Repository and Disposal Room VOC Monitoring Programs. These sample collection units are described in greater detail in Section N-4a(2).

N-3a Sampling Locations

Air samples will be collected at the WIPP facility to quantify airborne VOC concentrations as described in the following sections.

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

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

N-3a(2) Sampling Locations for Disposal Room VOC Monitoring

For purposes of compliance with Section 310 of Public Law 108-447, the VOC monitoring of airborne VOCs in underground disposal rooms in which waste has been emplaced will be performed as follows:

1. A sample head will be installed inside the disposal room behind the exhaust drift bulkhead and at the inlet side of the disposal room.
2. TRU mixed waste will be emplaced in the active disposal room.
3. When the active disposal room is filled, another sample head will be installed to the inlet of the filled active disposal room. (Figure N-3 and N-4)
4. The exhaust drift bulkhead will be removed and re-installed in the next disposal room so disposal activities may proceed.
5. A ventilation barrier will be installed where the bulkhead was located in the active disposal room's exhaust drift. Another ventilation barrier will be installed in the active disposal room's air inlet drift, thereby closing that active disposal room.
6. Monitoring of VOCs will continue in the now closed disposal room. Monitoring of VOCs will occur in the active disposal room and all closed disposal rooms in which waste has been emplaced until commencement of panel closure activities (i.e., completion of ventilation barriers in Room 1).

This sequence for installing sample locations will proceed in the remaining disposal rooms until the inlet air ventilation barrier is installed in Room 1. An inlet sampler will not be installed in Room 1 because disposal room sampling proceeds to the next panel.

~~N-3a(3) Ongoing Disposal Room VOC Monitoring in Panels 3 through 8~~

~~The Permittees shall continue VOC monitoring in Room 1 of Panels 3 through 8 after completion of waste emplacement until final panel closure unless an explosion-isolation wall is installed in the panel.~~

N-3b Analytes to Be Monitored

The VOCs that have been identified for repository and disposal room VOC monitoring are listed in Table N-1. The analysis will focus on routine detection and quantification of these target analytes in collected samples. As part of the analytical evaluations, the presence of other compounds (i.e., non-target VOCs) will also be monitored. Some non-target VOCs may be included on the laboratory's target analyte list as additional requested analytes (**ARAs**) to gain a better understanding of potential concentrations and associated risk. The analytical laboratory will be directed to calibrate for ARAs, when necessary. The analytical laboratory will also be directed to classify and report other non-target VOCs as tentatively identified compounds (**TICs**) when tentative identification can be made. The evaluation of TICs in original samples will include those concentrations that are ≥10 percent of the relative internal standard. The evaluation of ARAs only includes concentrations that are greater than or equal to the MRLs listed in Table N-2.

Non-target VOCs classified as ARAs or TICs meet the following criteria: (1) are listed in Appendix VIII of 40 Code of Federal Regulations (**CFR**) Part 261 (incorporated by reference in 20.4.1.200 New Mexico Administrative Code (**NMAC**)), and (2) are detected in 10 percent or more of any original VOC monitoring samples collected over a 12-month timeframe. Non-target VOCs will be added, as applicable, to the analytical laboratory target analyte list for both the repository and disposal room VOC monitoring programs, unless the Permittees can justify their exclusion. Non-target VOCs reported as "unknown" by the analytical laboratory are not evaluated due to indeterminate identifications.

Additional requested analytes and TICs detected in the repository and disposal room VOC monitoring programs will be placed in the WIPP Operating Record and reported to the New Mexico Environment Department (**NMED**) in the Semi-Annual VOC Monitoring Report as specified in Permit Part 4, Section 4.6.2.2. As applicable, the Permittees will also report the justification for exclusion of the ARA or TIC from the target analyte list (e.g., the compound does not contribute to more than one percent of the risk; the compound persists in the background samples at similar concentrations). If new targets are required, the Permittees will submit the appropriate permit modification annually (in October) to update Table 4.6.2.3 to include the new analyte and associated recommended U.S. Environmental Protection Agency (**EPA**) risk values for the inhalation unit risk (**IUR**) and reference concentration (**RfC**). Added compounds will be included in the risk assessment described in Section N-3e(1).

N-3c Sampling and Analysis Methods

The VOC monitoring programs include a comprehensive VOC monitoring program established at the facility; equipment, training, and documentation are already in place.

The sampling methods used for VOC monitoring are based on the concepts contained in the EPA Compendium Method TO-15 (EPA, 1999). The TO-15 sampling concept uses 6-liter passivated stainless-steel canisters to collect integrated air samples at each sample location. This conceptual method will be used as a reference for collecting the samples at WIPP. The samples will be analyzed using gas chromatography/mass spectrometry (**GC/MS**) under an established QA/quality control (**QC**) program. Laboratory analytical procedures have been developed based on the concepts contained in both TO-15 and 8260B. Section N-5 contains additional QA/QC information for this project.

The TO-15 method is an EPA-recognized sampling concept for VOC sampling and speciation. It can be used to provide subatmospheric samples, integrated samples, or grab samples, as well as compound quantitation for a broad range of concentrations. This sampling technique is also viable for use while analyzing the sample using other EPA methods such as 8260B.

For subatmospheric sampling, air is collected in an initially evacuated passivated canister. When the canister is opened to the atmosphere, the differential pressure causes the sample to flow into the canister. Flow rate and duration are regulated with a flow-restrictive inlet and flow controller. The air will pass through a particulate filter to prevent sample and equipment contamination. Passivated sampling equipment components are used to inhibit adsorption of compounds on the surfaces of the equipment. The required Method Reporting Limit (**MRL**) for the RVMP is 0.2 parts per billion by volume (ppbv) in SCAN mode and 0.1 ppbv in SIM mode. Consequently, low concentrations can be measured. The required MRL for DRVMP is 500 ppbv (0.5 parts per million by volume (**ppmv**)) to allow for reliable quantitation. The MRL is a function of instrument performance, sample preparation, sample dilution, and all steps involved in the sample analysis process. The DRVMP will employ sample collection units that will provide a subatmospheric sample within a short duration (less than 1 hour). Passivated sampling lines will be installed in the disposal room as described in Section N-3a(2) and maintained (to the degree possible) after the room is closed, until the panel associated with the room is closed. The independent lines will run from the sample inlet point to a sampling manifold located in an area accessible to sampling personnel.

N-3d Sampling Schedule

The Permittees will perform sampling on the following schedule in accordance with standard operating procedures.

N-3d(1) Sampling Schedule for Repository VOC Monitoring

Routine collection of a 24-hour time-integrated sample will be conducted two times per week. The RVMP sampling will continue until the certified closure of the last Underground HWDU.

N-3d(2) Sampling Schedule for Disposal Room VOC Monitoring

The disposal room sampling in open panels will occur once every two weeks, unless the need to increase the frequency to weekly occurs in accordance with Permit Section 4.6.3.3.

Beginning with Panel 3, disposal room sampling in filled panels will occur monthly until final panel closure unless an explosion-isolation wall is installed. The Permittees will sample VOCs in Room 1 of each filled panel.

N-3e Data Evaluation and Reporting

N-3e(1) Data Evaluation and Reporting for Repository VOC Monitoring

When the Permittees receive laboratory analytical data from an air sampling event, the data will be validated as specified in Section N-5d. After obtaining validated data from an original surface VOC monitoring sample obtained during an air sampling event, the data will be evaluated to determine whether the VOC emissions from the Underground HWDUs exceed the action levels in Permit Part 4, Section 4.6.2.3. The values are calculated in terms of excess cancer risk for compounds believed to be carcinogenic and hazard index (**HI**) for non-carcinogens as follows:

Calculate the carcinogenic risk for the non-waste surface worker (for each target VOC) using the following equation:

$$R_{VOCj} = \frac{Conc_{VOCj} \times EF \times ED \times IUR_{VOCj} \times 1000}{AT} \qquad \text{(N-1)}$$

Where:

R_{VOCj} = Risk due to exposure to target VOC_j

$Conc_{VOC_j}$ = Concentration target VOC_j at the receptor (mg/m^3), calculated as the concentration at VOC-C (mg/m^3) – the concentration at VOC-D (mg/m^3)
EF = Exposure frequency (hours/year) = 1,920 hours per year
ED = Exposure duration, years = 10 years

IUR_{VOCj} = Inhalation unit risk factor from Table 4.6.2.3 (µg/m^3)$^{-1}$

AT = Averaging time for carcinogens, = 613,200 hours based on 70 years
1,000 = µg/mg

The total carcinogenic risk is then the sum of the risk due to each carcinogenic target VOC:

$$\text{Total Carcinogenic Risk} = \sum_{j=1}^{m} R_{VOC_j} \qquad \text{(N-2)}$$

Where:

Total Risk must be less than 10^{-5}
m = the number of carcinogenic target VOCs

The formula for calculating the non-carcinogenic hazard index is similar:

$$HI_{VOC_j} = \frac{Conc_{VOC_j} \times EF \times ED}{AT \times RfC_{VOC_j}} \qquad \text{(N-3)}$$

Where:

HI_{VOC_j} = Hazard Index for exposure to target VOC_j

$Conc_{VOC_j}$ = Concentration target VOC_j at the receptor (mg/m^3), calculated as the concentration at VOC-C (mg/m^3) – the concentration at VOC-D (mg/m^3)
EF = Exposure frequency (hours/year) = 1,920 hours per year
ED = Exposure duration, years = 10 years

RfC_{VOC_j} = Reference concentration from Table 4.6.2.3 (mg/m^3)

AT = Averaging time for non-carcinogens, = 87,600 hours, based on exposure duration

The total hazard is the sum of the hazard index due to each non-carcinogenic target VOC:

$$\text{Total Hazard Index} = \sum_{j=1}^{m} HI_{VOC_j} \qquad \text{(N-4)}$$

Where:

Hazard Index must be less than or equal to 1.0

m = the number of non-carcinogenic target VOCs

The total carcinogenic risk (Equation N-2) and the total HI (Equation N-4) calculated from the surface VOC concentrations for each sampling event will be compared directly to the action levels in Permit Part 4, Section 4.6.2.3. This will establish whether any of the concentrations of VOCs in the emissions from the Underground HWDUs exceeded the risk and HI action levels at the time of the sampling.

As specified in Permit Part 4, the Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the risk or HI exceeds the action levels specified in Permit Part 4, Section 4.6.2.3.

The surface VOC concentrations for each target VOC that is calculated for each sampling event will then be averaged with the surface VOC concentrations calculated for the air sampling events conducted during the previous 12 months. This will be considered the running annual average concentration for each target VOC. The running annual average risk and HI will be compared to action levels specified in Permit Part 4, Section 4.6.2.3. When a VOC is added to the target analyte list, the running annual average concentration will be calculated using all available data.

As specified in Permit Part 4, the Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the running annual average risk or HI (calculated after each sampling event) exceeds the action levels specified in Permit Part 4, Section 4.6.2.3.

The Permittees will maintain a database with the VOC air sampling data and the results will be reported to the Secretary as specified in Permit Part 4.

N-3e(2) Data Evaluation and Reporting for Disposal Room VOC Monitoring

When the Permittees receive laboratory analytical data from an air sampling event, the data will be validated as specified in Section N-5d. The validated data will be evaluated to determine whether the VOC concentrations in the air of any closed room, the active open room, or the immediately adjacent closed room exceeded the Action Levels for DRVMP specified in Permit Part 4, Table 4.6.3.2.

The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the concentration of any VOC specified in Permit Part 4, Table 4.4.1 exceeds the action levels specified in Permit Part 4, Table 4.6.3.2.

The Permittees shall submit to the Secretary the Semi-Annual VOC Monitoring Report specified in Permit Section 4.6.2.2 that also includes results from disposal room VOC monitoring.

N-4 Sampling and Analysis Procedures

This section describes the equipment and procedures that will be implemented during sample collection and analysis activities for VOCs at WIPP.

N-4a Sampling Equipment

The sampling equipment that will be used includes: 6-liter (L) stainless-steel passivated canisters, passive air sampling kits (**PASKs**), subatmospheric sampling assemblies, passivated stainless-steel tubing, and one or more in-line filters. A discussion of each of these items is presented below.

N-4a(1) Sample Canisters

Six-liter, stainless-steel canisters with passivated interior surfaces will be used to collect and store all ambient air and disposal room samples for VOC analyses collected as part of the monitoring processes. These canisters will be cleaned and certified (batch certification acceptable for disposal room monitoring) prior to their use, in a manner similar to that described by Compendium Method TO-15. The canisters will be certified clean to below the required reporting limits for the VOC analytical method for the target VOCs. The vacuum of certified clean canisters will be verified as adequate upon initiation of a sample cycle as described in standard operating procedures (**SOPs**). The sample canisters are initially evacuated at the analytical laboratory to <0.05 mm Hg (50 mtorr).

N-4a(2) Sample Collection Units

The sample collection unit for surface VOC samples is a commercially available PASK comprised of components that regulate the rate and duration of air flow into a sample canister. It can be operated either manually, using canister valves, or unattended, using a programmable timer.

The sample collection unit for disposal room VOC monitoring is a subatmospheric sampling assembly that regulates the rate and duration of air flow into a sample canister. The subatmospheric sampling assembly also allows for purging of sample lines to ensure that a representative sample is collected.

Sample collection units will use passivated components for the sample flow path. When sample canisters installed on sample collection units are opened to the atmosphere, the differential pressure causes the sample to flow into the canister at a regulated rate. By the end of each sampling period, the canisters will be near atmospheric pressure. Detailed instructions on sample collection will be given in SOPs. A conceptual diagram of the VOC sample collection units are provided in Figure N-2.

N-4a(3) Sample Tubing

The tubing used as a sample path is comprised of passivated stainless-steel to prevent the inner walls from absorbing sample constituents and/or contaminants when they are pulled from the sample point to the sample collection unit.

N-4b Sample Collection

Sample collection for VOCs at the WIPP facility will be conducted in accordance with written SOPs that are kept on file at the facility. These SOPs will specify the steps necessary to ensure the collection of samples that are of acceptable quality to meet the applicable data quality objectives in Section N-5.

Repository VOC samples will be 24 -hour time-integrated samples for each sampling event. Alternative sampling durations may be defined for assessment purposes and to meet the data quality objectives. The selection of sampling days will be specified in SOPs and will be alternated from week-to-week in order to avoid potential bias created by plant operations.

Sample flow for the PASK will be set using an in-line mass flow controller. The flow controllers are initially factory-calibrated and specify a typical accuracy of better than 10 percent full scale. Additionally, each air flow controller is calibrated at a manufacturer-specified frequency using a National Institute of Standards and Technology (**NIST**) primary flow standard.

To verify the matrix similarity and assess field sampling precision, field duplicate samples will be collected (two canisters filled simultaneously) for each VOC monitoring program at an overall frequency of at least 5 percent (see Section N-5a).

Prior to collecting the active open disposal room and closed room samples, the sample lines are purged to ensure that the air collected is not air that has been stagnant in the tubing. This is important in regard to the disposal room sample because of the long lengths of tubing associated with these samples.

N-4c Sample Management

Field sampling data sheets will be used to document the sampler conditions under which each sample is collected. These data sheets have been developed specifically for VOC monitoring at the WIPP facility. The individuals assigned to collect the specific samples will be required to fill in all of the appropriate sample data and to maintain this record in sample logbooks. The program team leader will review these forms for each sampling event.

All sample containers will be marked with identification at the time of collection of the sample. A Request-for-Analysis Form will be completed to identify the sample canister number(s), sample type and type of analysis requested.

All samples will be maintained, and shipped if necessary, at ambient temperatures. Collected samples will be transported in appropriate containers. Prior to leaving the underground for analysis, sample containers may undergo radiological screening, which will ensure that contaminated samples or equipment will not be transported to the surface. Samples will not be accepted by the receiving laboratory personnel unless they are properly labeled and sealed to ensure a tamper-free shipment.

An important component of the sampling program is a demonstration that collected samples were obtained from the locations stated and that they reached the laboratory without alteration. To satisfy this requirement, evidence of collection, shipment, laboratory receipt, and custody will be documented with a completed Chain-of-Custody Form. Chain-of-custody procedures will be followed closely, and additional requirements imposed by the laboratory for sample analysis will be included as necessary.

Individuals collecting samples will be responsible for the initiation of custody procedures. The chain of custody will include documentation as to the canister certification, location of sampling event, time, date, and the name of the individual handling the samples. Deviations from procedure will be considered variances. Variances must be preapproved by the program manager and recorded in the project files. Unintentional deviations, sampler malfunctions, and other problems are nonconformances. Nonconformances must be documented and recorded in the project files. All field logbooks/data sheets must be incorporated into WIPP's records management program.

N-4d Maintenance of Sample Collection Units

Periodic maintenance for sample collection units and associated equipment will be performed as needed. This maintenance may include cleaning, replacement of damaged or malfunctioning parts, and leak testing. Additionally, complete spare sample collection units will be maintained on-site to minimize downtime because of equipment malfunction.

N-4e Analytical Procedures

Analytical procedures used in the analysis of VOC samples from canisters are based on concepts contained in Compendium Method TO-15 (EPA, 1999) and in SW-846 Method 8260B (EPA, 1996).

Analysis of samples will be performed by a certified laboratory. Methods will be specified in procurement documents and will be selected to be consistent with Compendium Method TO-15 (EPA, 1999) or EPA recommended procedures in SW-846 (EPA, 1996). Additional detail on analytical techniques and methods will be given in laboratory SOPs.

The Permittees will establish the criteria for laboratory selection, including the stipulation that the laboratory follow the procedures specified in the appropriate Air Compendium or SW-846 method and that the laboratory follow EPA protocols. The selected laboratory shall demonstrate, through laboratory SOPs, that it will follow appropriate EPA SW-846 requirements and the requirements specified by the EPA Air Compendium protocols. The laboratory shall also provide documentation to the Permittees describing the sensitivity of laboratory instrumentation. This documentation will be retained in the facility operating record and will be available for review upon request by NMED.

The SOPs for the laboratory currently under contract will be maintained in the operating record by the Permittees. The Permittees will provide NMED with an initial set of applicable laboratory SOPs for information purposes, and provide NMED with any updated SOPs on an annual basis by January 31.

Data validation will be performed by the Permittees. Copies of the data validation report will be kept on file in the operating record for review upon request by NMED.

N-5 Quality Assurance

The QA activities for the VOC monitoring programs will be conducted in accordance with the documents: *EPA Guidance for Quality Assurance Project Plans QA/G-5* (EPA, 2002) and the *EPA Requirements for Preparing Quality Assurance Project Plans, QA/R-5* (EPA, 2001). The QA criteria for the VOC monitoring programs are listed in Table N-2. This section addresses the methods to be used to evaluate the components of the measurement system and how this evaluation will be used to assess data quality. The QA limits for the sampling procedures and laboratory analysis shall be in accordance with the limits set forth in the specific EPA Method referenced in standard operating procedures employed by either the Permittees or the laboratory. The Permittees standard operating procedures will be in the facility Operating Record and available for review by NMED at anytime. The laboratory standard operating procedures will also be in the facility Operating Record and will be supplied to the NMED as indicated in Section N-4e.

N-5a Quality Assurance Objectives for the Measurement of Precision, Accuracy, Sensitivity, and Completeness

QA objectives for this plan will be defined in terms of the following data quality parameters.

Precision. For the duration of this program, precision will be defined and evaluated by the RPD values calculated between field duplicate samples and between laboratory duplicate samples.

$$RPD = \left(\frac{(A - B)}{(A + B)/2} \right) * 100 \qquad \text{(N-5)}$$

where: A = Original sample result
B = Duplicate sample result

Accuracy. Analytical accuracy will be defined and evaluated through the use of analytical standards. Because recovery standards cannot reliably be added to the sampling stream, overall system accuracy will be based on analytical instrument performance evaluation criteria. These criteria will include performance verification for instrument calibrations, laboratory control samples, sample surrogate recoveries (when required by method or laboratory SOPs), and sample internal standard areas. Use of the appropriate criteria as determined by the analytical method performed, will constitute the verification of accuracy for target analyte quantitation (i.e., quantitative accuracy). Evaluation of standard ion abundance criteria for BFB will be used to evaluate the accuracy of the analytical system in the identification of targeted analytes, as well as the evaluation of unknown contaminants (i.e., qualitative accuracy).

Sensitivity. Sensitivity will be defined by the required MRLs for the program. Attainment of required MRLs will be verified by the performance of statistical method detection limit (**MDL**) studies in accordance with 40 *Code of Federal Regulations* §136. The MDL represents the minimum concentration that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. An MDL study will be performed by the program analytical laboratory prior to sampling and analysis, and annually thereafter.

Completeness. Completeness will be defined as the percentage of the ratio of the number of valid sample results received (i.e., those which meet data quality objectives) versus the total number of samples collected. Completeness may be affected, for example, by sample loss or destruction during shipping, by laboratory sample handling errors, or by rejection of analytical data during data validation.

N-5a(1) Evaluation of Laboratory Precision

Laboratory sample duplicates and blank spike/blank spike duplicates (**BS/BSD**) will be used to evaluate laboratory precision. QA objectives for laboratory precision are listed in Table N-2, and are based on precision criteria proposed by the EPA for canister sampling programs (EPA, 1991). These values will be appropriate for the evaluation of samples with little or no matrix effects. Because of the potentially high level of salt-type aerosols in the WIPP underground environment, the analytical precision achieved for WIPP samples may vary with respect to the EPA criteria. RPDs for BS/BSD analyses will be tracked through the use of control charts. RPDs obtained for laboratory sample duplicates will be compared to those obtained for BS/BSDs to ascertain any sample matrix effects on analytical precision. BS/BSDs and laboratory sample duplicates will be analyzed at a frequency of 10 percent, or one per analytical lot, whichever is more frequent.

N-5a(2) Evaluation of Field Precision

Field duplicate samples will be collected at a frequency of at least 5 percent for the RVMP and at least 5 percent for the DRVMP. The data quality objective for field precision is 35 percent for each set of field duplicate samples.

N-5a(3) Evaluation of Laboratory Accuracy

Quantitative analytical accuracy will be evaluated through performance criteria on the basis of (1) relative response factors generated during instrument calibration, (2) analysis of laboratory control samples (**LCS**), and (3) recovery of internal standard compounds. The criteria for the initial calibration (5-point calibration) is $\leq$ 30 percent relative standard deviation for target analytes. After the successful completion of the 5-point calibration, it is sufficient to analyze only a midpoint standard for every 24 hours of operation. The midpoint standard will pass a 30 percent difference acceptance criterion for each target compound before sample analysis may begin.

A blank spike or LCS is an internal QC sample generated by the analytical laboratory by spiking a standard air matrix (humid zero air) with a known amount of a certified reference gas. The reference gas will contain the target VOCs at known concentrations. Percent recoveries for the target VOCs will be calculated for each LCS relative to the reference concentrations. Objectives for percent recovery are listed in Table N-2, and are based on accuracy criteria proposed by the EPA for canister sampling programs (EPA, 1991). LCSs will be analyzed at a frequency of 10 percent, or one per analytical lot, whichever is more frequent.

Internal standards will be introduced into each sample analyzed, and will be monitored as a verification of stable instrument performance. In the absence of any unusual interferences, areas should not change by more than 40 percent over a 24-hour period. Deviations larger than 40 percent are an indication of a potential instrument malfunction. If an internal standard area in a given sample changes by more than 40 percent, the sample will be reanalyzed. If the 40 percent criterion is not achieved during the reanalysis, the instrument will undergo a performance check and the midpoint standard will be reanalyzed to verify proper operation. Response and recovery of internal standards will also be compared between samples, LCSs, and calibration standards to identify any matrix effects on analytical accuracy.

N-5a(4) Evaluation of Sensitivity

The presence of aerosol salts in underground locations may affect the MDL of the samples collected in those areas. The sample inlet of these sample collection units will be protected sufficiently from the underground environment to minimize salt aerosol interference. Up to two filters, inert to VOCs, will be installed in the sample flow path to minimize particulate interference.

The MDL for each of the target VOCs will be evaluated by the analytical laboratories before sampling begins. The initial and annual MDL evaluation will be performed in accordance with 40 *Code of Federal Regulations* §136, and with EPA/530-SW-90-021, as revised and retitled, "Quality Assurance and Quality Control" (Chapter 1 of SW-846) (1996).

N-5a(5) Completeness

The expected completeness for this program is greater than or equal to 95 percent. Data completeness will be tracked monthly.

N-5b Sample Handling and Custody Procedures

Sample packaging, shipping, and custody procedures are addressed in Section N-4c.

N-5c Calibration Procedures and Frequency

Calibration procedures and frequencies for analytical instrumentation are listed in Section N-4e.

N-5d Data Reduction, Validation, and Reporting

Field sampling data sheets will contain documentation of all pertinent data for the sampling and will at a minimum include the following; sample identification, sample location, sample collection date, initial vacuum, ending vacuum, collection start and collection stop time, flow rate and ambient temperature.

Data validation procedures will include at a minimum, a check of all field data sheets for completeness and correctness. Sample custody and analysis records will be reviewed by the analytical laboratory QA officer and the analytical laboratory supervisor at a frequency of at least 10 percent.

Electronic Data Deliverables (**EDDs**) are provided by the laboratory prior to receipt of hard copy data packages. EDDs will be evaluated within five calendar days of receipt to determine if VOC concentrations are at or above action levels in Permit Part 4, Section 4.6.3.2 for disposal room VOC monitoring data, or the action levels specified in Permit Part 4, Section 4.6.2.3 for repository monitoring data. If the EDD indicates that VOC concentrations are at or above these action levels or concentrations, the hard copy data package will be validated within five calendar days as opposed to the 14 calendar day time frame.

Data will be reported as specified in Section N-3(e) and Permit Part 4.

Acceptable data for this VOC monitoring plan will meet stated precision and accuracy criteria. The QA objectives for precision, accuracy, and completeness as shown in Table N-2 can be achieved when established methods of analyses are used as proposed in this plan and standard sample matrices are being assessed.

N-5e Performance and System Audits

The Permittees will evaluate whether the monitoring systems and analytical methods are functioning properly through performance and system audits. The assessment period will be determined by the Permittees. System audits will initially address start-up functions for each phase of the project. These audits will consist of on-site evaluation of materials and equipment, review of certifications for canisters and measurement and test equipment, review of laboratory qualification and operation and, at the request of the QA officer, an on-site audit of the laboratory facilities. The function of the system audit is to verify that the requirements in this plan have been met prior to initiating the program. System audits will be performed at or shortly after the initiation of the VOC monitoring programs and on an annual basis thereafter.

Performance audits will be accomplished as necessary through the evaluation of analytical QC data by performing periodic site audits throughout the duration of the project, and through the introduction of third-party audit cylinders (laboratory blinds) into the analytical sampling stream. Performance audits will also include a surveillance/review of data associated with canister certifications and measurement and test equipment, a project-specific technical audit of field operations, and a laboratory performance audit. Field logs, logbooks, and data sheets, as applicable will be reviewed during data validation. Blind-audit canisters will be introduced once during the sampling period. Details concerning scheduling, personnel, and data quality evaluation are addressed in the QAPjP.

By May 1, 2016 the Permittees shall develop and implement a RVMP Laboratory Performance Evaluation Plan (**LPEP**) that has been reviewed and approved by the Secretary prior to use, for Repository VOC ambient monitoring. In addition to the timely submittal of validated data packages under this LPEP to the Secretary, the results shall also be reported annually in the October Semi- Annual VOC Monitoring Report. The second contract laboratory performing the performance evaluation to be used for comparison to the primary contract laboratory shall use the required MRLs as required in Table N-2, which are defined to be equivalent to the CRQLs. Any contract laboratory involved in this program shall have a site specific quality assurance project plan and an associated QA/QC program that are acceptable and aligned with EPA guidance. The LPEP shall, at a minimum, include the following sections:

1. Table of Contents
2. Introduction
3. Background
4. Scope/Objectives: this section shall include comparative testing of subatmospheric sampling containers, the field background canisters, and a test of the cleanliness of the canister less than the SIM mode MRL in Table N-2.
5. Laboratory Specific SOPs
6. Sampling Methodologies
7. Analytical Methodologies
8. Quality Assurance Requirements

9. Schedules

10. Reporting: data packages shall contain all applicable sections found in the document "*Statement-of-Work for the Analysis of Air Toxics from Superfund Sites*" (EPA 1990), Exhibit B, Section 2, "*Reporting Requirements and Order of Data Deliverables"* and as approved by the Secretary.

As an alternative to the LPEP, the Permittees will notify the Secretary of their intention to require the contract laboratory to participate in proficiency testing. The Permittees will then, within 90 days, submit to the NMED for approval, a proposal for proficiency testing. If the Permittees are unable to develop a proficiency testing plan that is acceptable to the NMED, then the Permittees will prepare and submit the LPEP. The proposal for proficiency testing will include the following, as applicable:

- Specific analytical method(s)
- Schedule for proficiency testing implementation
- Provision for the periodic reporting of proficiency testing results and corrective actions, if any

Results of proficiency testing will be reported in the Semi-Annual VOC Monitoring Report as specified in Permit Part 4, Section 4.6.2.2.

N-5f Preventive Maintenance

Maintenance of sample collection units is described briefly in Section N-4d Maintenance of analytical equipment will be addressed in the analytical laboratory SOP.

N-5g Corrective Actions

If the required completeness of valid data (95 percent) is not maintained, corrective action may be required. Corrective action for field sampling activities may include recertification and cleaning of sample collection units, reanalysis of samples, additional training of personnel, modification to field and laboratory procedures, and recalibration of measurement and test equipment.

Laboratory corrective actions may be required to maintain data quality. The laboratory continuing calibration criteria indicate the relative response factor for the midpoint standard will be less than 30 percent different from the mean relative response factor for the initial calibration. Differences greater than 30 percent will require recalibration of the instrument before samples can be analyzed. If the internal standard areas in a sample change by more than 40 percent, the sample will be reanalyzed. If the 40 percent criterion is not achieved during the reanalysis, the instrument will undergo a performance check and the midpoint standard will be reanalyzed to verify proper operation. Deviations larger than 40 percent may indicate instrument malfunction.

The laboratory results for samples, duplicate analyses, LCSs, and blanks should routinely be within the QC limits. If results exceed control limits, the reason for the nonconformances and appropriate corrective action must be identified and implemented.

N-5h Records Management

The VOC Monitoring Programs will require administration of record files (both laboratory and field data collection files). The records control systems will provide adequate control and retention for program-related information. Records administration, including QA records, will be conducted in accordance with applicable DOE, MOC, and WIPP requirements.

Unless otherwise specified, VOC monitoring plan records will be retained as lifetime records. Temporary and permanent storage of QA records will occur in facilities that prevent damage from temperature, fire, moisture, pressure, excessive light, and electromagnetic fields. Access to stored VOC Monitoring Program QA Records will be controlled and documented to prevent unauthorized use or alteration of completed records.

Revisions to completed records (i.e., as a result of audits or data validation procedures) may be made only with the approval of the responsible program manager and in accordance with applicable QA procedures. Original and duplicate or backup records of project activities will be maintained at the WIPP site. Documentation will be available for inspection by internal and external auditors.

N-6 Sampling and Analysis Procedures for Disposal Room VOC Monitoring in Filled Panels

Disposal room VOC samples in filled panels will be collected using the subatmospheric pressure grab sampling technique described in Compendium Method TO-15 (EPA, 1999). This method uses an evacuated passivated canister (or equivalent) that is under vacuum (0.05 mm Hg) to draw the air sample from the sample lines into the canister. The sample lines will be purged prior to sampling to ensure that a representative sample is collected. The passivation of tubing and canisters used for VOC sampling effectively seals the inner walls and prevents compounds from being retained on the surfaces of the equipment. By the end of each sampling period, the canisters will be near atmospheric pressure.

The analytical procedures for disposal room VOC monitoring in filled panels are the same as specified in Section N-4e.

N-7 References

40 CFR Part 136, "*Guidelines Establishing Test Procedures for the Analysis of Pollutants*."

Section 310 of Public Law 108-447 of the *Consolidated Appropriations Act of 2005.*

U.S. Environmental Protection Agency, 1991. Contract Laboratory Program, *Volatile Organics Analysis of Ambient Air in Canisters (Draft)*, EPA540/R-94-085, December 1991, Washington, D.C.

U.S. Environmental Protection Agency. 1996. SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Third Edition. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency. 1999 *Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) In Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry(GC/MS)*, EPA 625/R-96/010b. Center for Environmental Research Information, Office of Research and Development, Cincinnati, OH, January 1999.

U.S. Environmental Protection Agency. 2001. *EPA Requirements for Quality Assurance Project Plans, QA/R-5*, EPA 240/B-01/003, March 2001, Washington, D.C.

U.S. Environmental Protection Agency. 2002. *Guidance for Quality Assurance Project Plans*, QA/G-5, EPA 240/R-02/009, December 2002, Washington, D.C.

Washington Regulatory and Environmental Services, 2003. *Technical Evaluation Report for WIPP Room-Based VOC Monitoring*.

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TABLES

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Table N-1
Target Analytes and Methods for Repository VOC (Station VOC-C and VOC-D) Monitoring and Disposal VOC Room Monitoring

Target Analyte	EPA Standard Analytical Method
Carbon tetrachloride	EPA TO-15[a] EPA 8260B[b]
Chlorobenzene	
Chloroform	
1,1-Dichloroethylene	
1,2-Dichloroethane	
Methylene chloride	
1,1,2,2 -Tetrachloroethane	
Toluene	
1,1,1- Trichloroethane	
Trichloroethylene	

[a] U.S. Environmental Protection Agency, 1999, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air- Second Edition, http://www.epa.gov/ttn/amtic/airtox.html

[b] U.S. Environmental Protection Agency, SW-846 Test Methods for Evaluation Solid Wastes, Chemical and Physical Methods, http://www.epa.gov/epaoswer/hazwaste/test/main.html

Table N-2
Quality Assurance Objectives for Accuracy, Precision, Sensitivity, and Completeness

Target Analyte	Accuracy (Percent Recovery)	Precision (RPD)		Required Repository Surface Monitoring MRL for SCAN Mode (ppbv)	Required Repository Surface Monitoring MRL for SIM Mode (ppbv)	Required Disposal Room MRL (ppbv)	Complete-ness (Percent)
		Laboratory	Field				
Carbon tetrachloride	60 to 140	25	35	0.2	0.1	500	95
Chlorobenzene	60 to 140	25	35	0.2	0.1	500	95
Chloroform	60 to 140	25	35	0.2	0.1	500	95
1,1-Dichloroethylene	60 to 140	25	35	0.2	0.1	500	95
1,2-Dichloroethane	60 to 140	25	35	0.2	0.1	500	95
Methylene chloride	60 to 140	25	35	0.2	0.1	500	95
1,1,2,2-Tetrachloroethane	60 to 140	25	35	0.2	0.1	500	95
Toluene	60 to 140	25	35	0.2	0.1	500	95
1,1,1-Trichloroethane	60 to 140	25	35	0.2	0.1	500	95
Trichloroethylene	60 to 140	25	35	0.2	0.1	500	95

MRL maximum method reporting limit for undiluted samples
RPD relative percent difference

FIGURES

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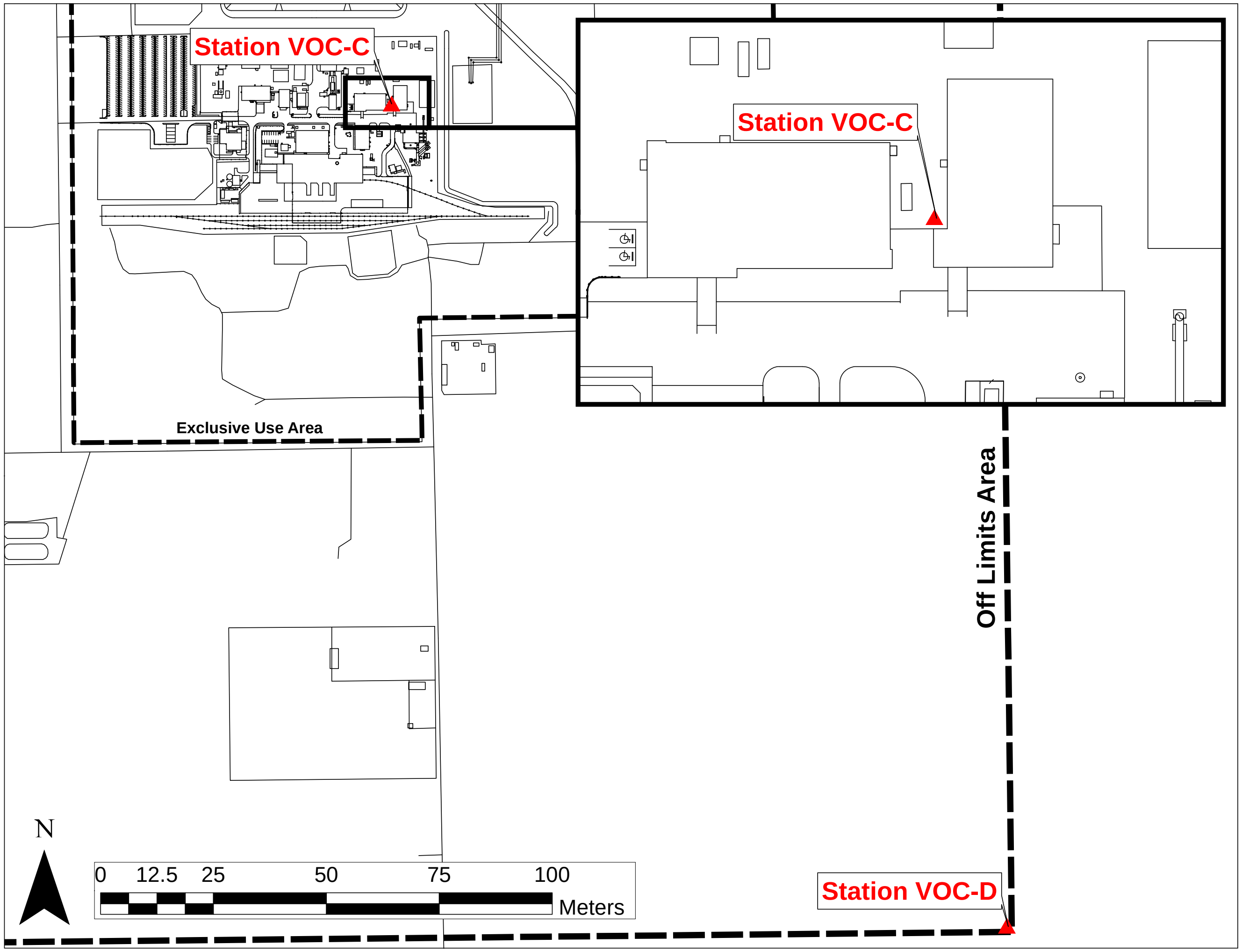
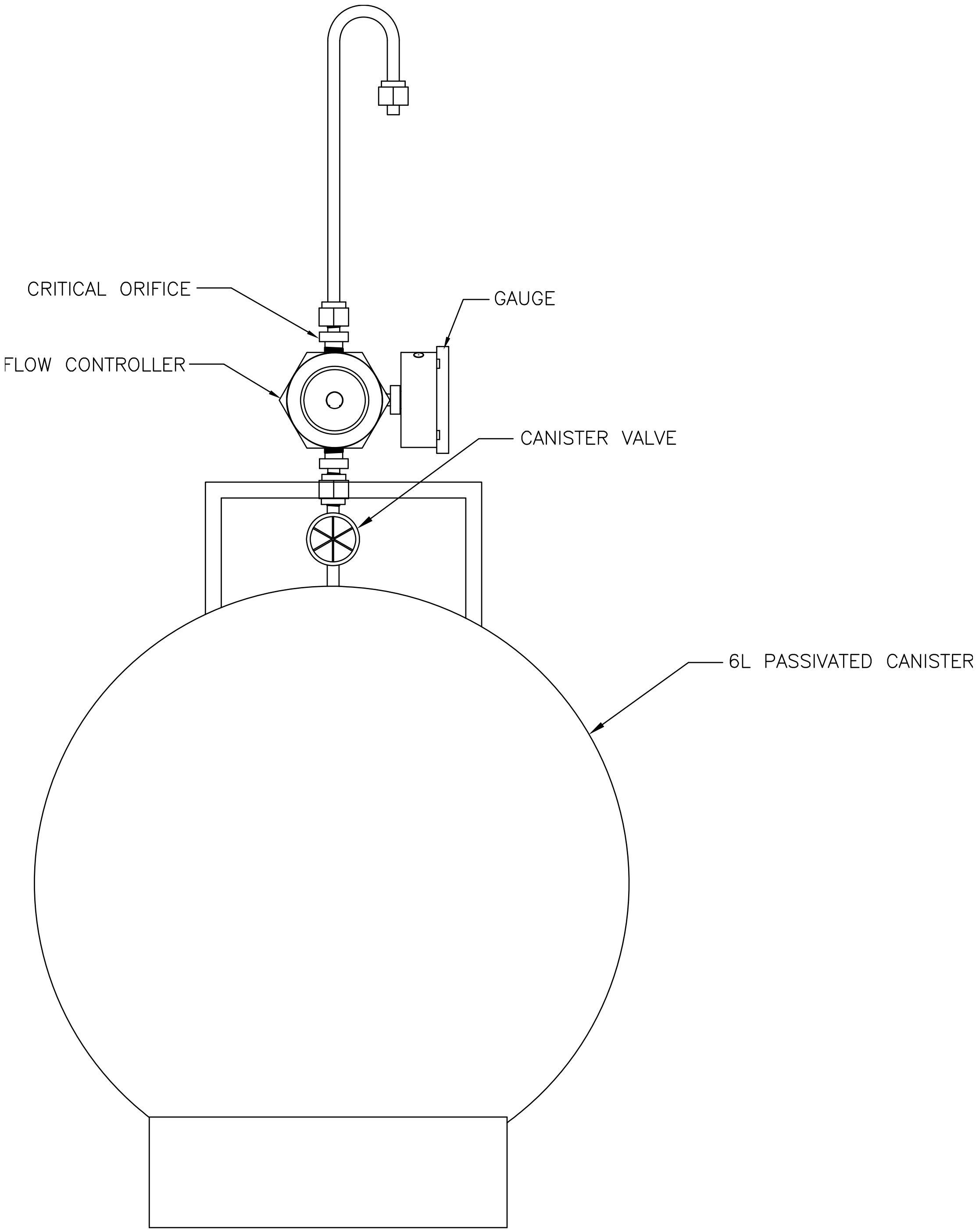


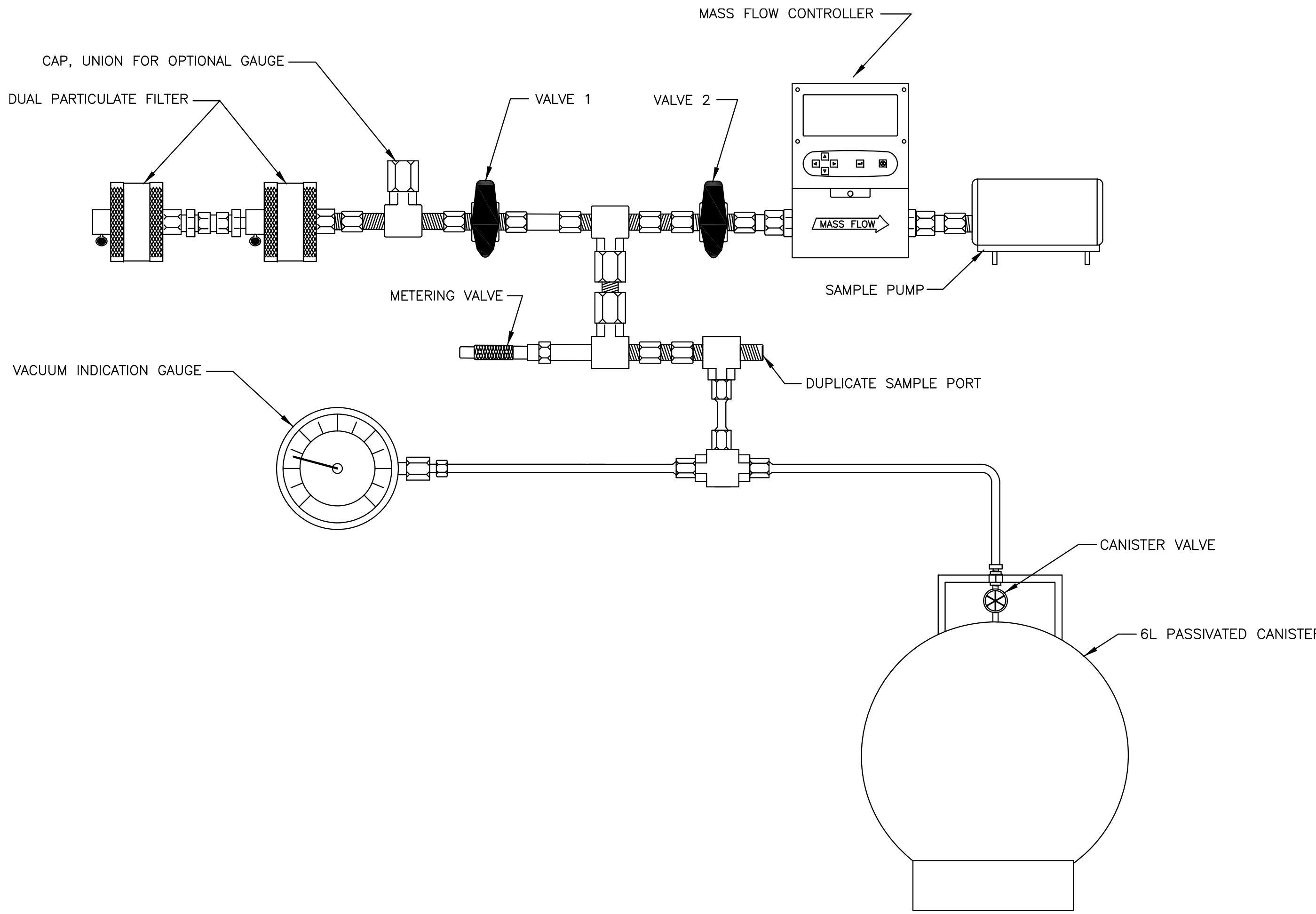
(see Figure D-1 and Figure D-1a for a detailed map and legend of the suface buildings)

Figure N-1
Repository VOC Monitoring Locations



TYPICAL PASSIVE AIR SAMPLING KIT WITH CANISTER

Figure N-2
VOC Monitoring System Design



TYPICAL SUBATMOSPHERIC SAMPLING ASSEMBLY WITH CANISTER

Figure N-2
VOC Monitoring System Design (continued)

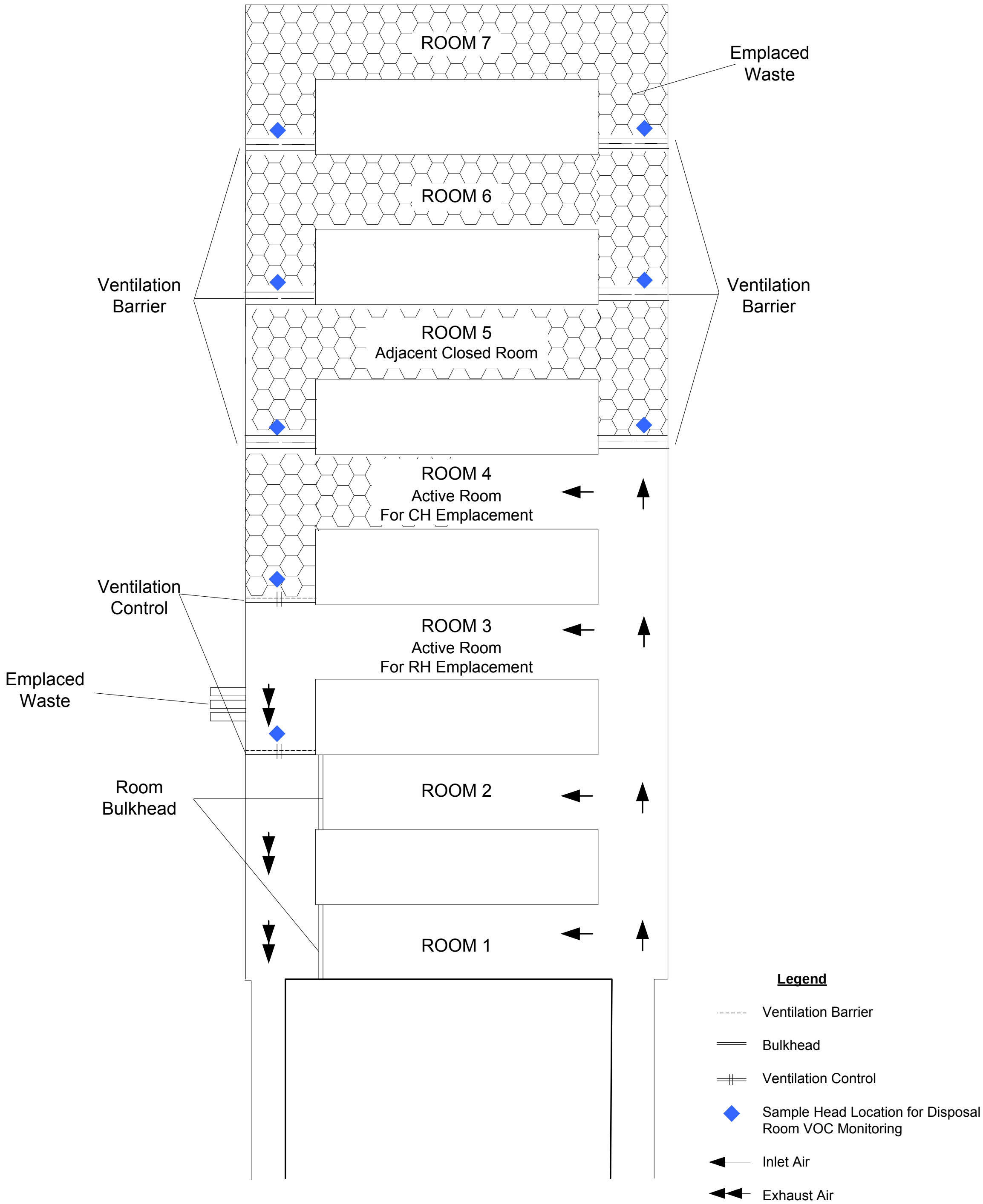
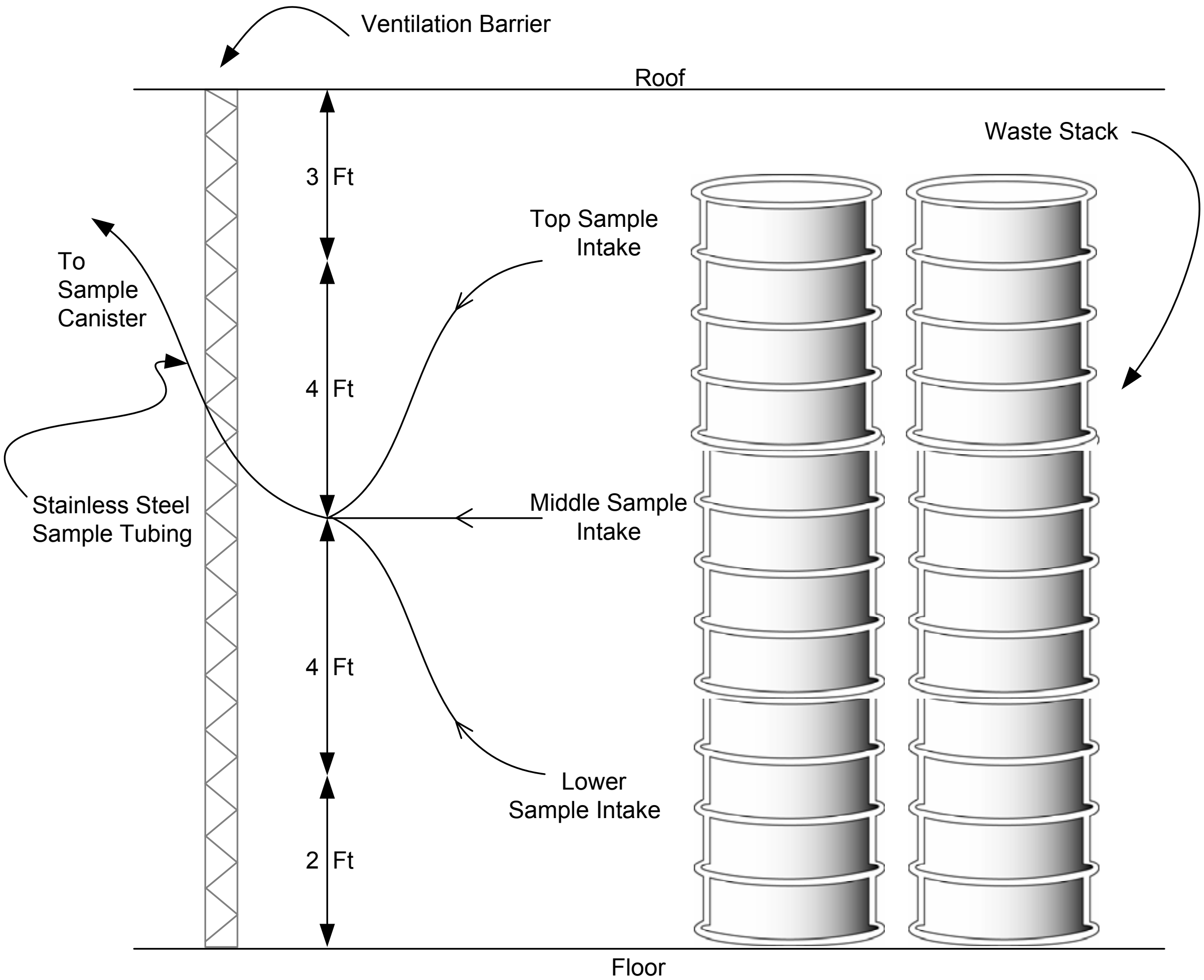


Figure N-3
Typical Disposal Room VOC Monitoring Locations



(not to scale, all measurements approximate)

Figure N-4
Disposal Room Sample Head Arrangement

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~~ATTACHMENT N1~~

~~HYDROGEN AND METHANE MONITORING PLAN~~

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~~ATTACHMENT N1~~

~~HYDROGEN AND METHANE MONITORING PLAN~~

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~~ATTACHMENT N1~~

~~VOLATILE ORGANIC COMPOUND MONITORING PLAN~~

~~N1-1 Introduction~~

~~This Permit Attachment describes the monitoring plan for hydrogen and methane generated in Underground Hazardous Waste Disposal Units (**HWDUs**) 3 through 8, also referred to as Panels 3 through 8.~~

~~Monitoring for hydrogen and methane in Panels 3 through 8 until final panel closure, unless an explosion-isolation wall is installed, may be an effective way to gather data to establish realistic gas generation rates. This plan includes the monitoring design, a description of sampling and analysis procedures, quality assurance (**QA**) objectives, and reporting activities.~~

~~N1-2 Parameters to be Analyzed and Monitoring Design~~

~~The Permittees will monitor for hydrogen and methane in filled Panels 3 through 8 until final panel closure, unless an explosion-isolation wall is installed. A "filled panel" is an Underground HWDU that will no longer receive waste for emplacement.~~

~~Monitoring of a filled panel will commence after installation of the following items in each filled panel:~~

- ~~substantial barriers~~
- ~~bulkheads~~
- ~~five additional monitoring locations.~~

~~The substantial barriers serve to protect the waste from events such as ground movement or vehicle impacts. The substantial barrier will be constructed from available non-flammable materials such as mined salt (Figure N1-1).~~

~~The bulkheads (Figure N1-2) serves to block ventilation at the intake and exhaust of the filled panel and prevent personnel access. The bulkhead is constructed as a typical WIPP bulkhead with no access doors or panels. The bulkhead will consist of a steel member frame covered with galvanized sheet metal, and will not allow personnel access. Flexible flashing will be used as a gasket to attach the steel frame to the salt, thereby providing an effective yet flexible blockage to ventilation air. Over time, it is possible that the bulkhead may be damaged by creep closure around it. If the damage is such as to indicate a possible loss of functionality, then the bulkhead will be repaired or an additional bulkhead will be constructed outside of the original one.~~

~~The existing VOC monitoring lines as specified in Attachment N, Section N-3a(2), "Sampling Locations for Disposal Room VOC Monitoring", will be used for sample collection in each disposal room for Panels 3 and 4. The sample lines and their construction are shown in Figure N1-3. In addition to the existing VOC monitoring lines, five more sampling locations will be used to monitor for hydrogen and methane. These additional locations include:~~

- ~~the intake of room 1~~
- ~~the waste side of the exhaust bulkhead,~~

- ~~the accessible side of the exhaust bulkhead,~~
- ~~the waste side of the intake bulkhead,~~
- ~~the accessible side of the intake bulkhead.~~

~~These additional sampling locations (Figure N1-4) will use a single inlet sampling point placed near the back (roof) of the panel access drifts. This will maximize the sampling efficiency for these lighter compounds.~~

~~N1-3 Sampling Frequency~~

~~Sampling frequency will vary depending upon the levels of hydrogen and methane that are detected.~~

- ~~If monitored concentrations are at or below Action Level 1 as specified in Permit Part 4, Table 4.6.5.3, monitoring will be conducted monthly.~~

- ~~If monitored concentrations exceed Action Level 1 as specified in Permit Part 4, Table 4.6.5.3, monitoring will be conducted weekly in the affected filled panel.~~

~~N1-4 Sampling~~

~~Samples for hydrogen and methane will be collected using subatmospheric pressure grab sampling as described in Environmental Protection Agency (**EPA**) Compendium Method TO-15 (EPA, 1999). The TO-15 sampling method uses passivated stainless-steel sample canisters to collect integrated air samples at each sample location. Flow rates and sampling duration may be modified as necessary to meet data quality objectives.~~

~~Sample lines shall be purged prior to sample collection.~~

~~N1-5 Sampling Equipment~~

~~N1-5a SUMMA® Canisters~~

~~Stainless-steel canisters with passivated or equivalent interior surfaces will be used to collect and store gas samples for hydrogen and methane analyses collected as part of the monitoring processes. These canisters will be cleaned and certified prior to their use in a manner similar to that described by Compendium Method TO-15 (EPA, 1999). The vacuum of certified clean canisters will be verified upon initiation of a sample cycle. Sampling will be conducted using subatmospheric pressure grab sampling techniques as described in TO-15.~~

~~N1-5b Sample Tubing~~

~~Treated stainless steel tubing shall be used as a sample path and treatment shall prevent the inner walls from absorbing contaminants.~~

~~Any loss of the ability to purge a sample line will be evaluated. The criteria used for evaluation are shown in Figure N1-5.~~

~~The Permittees will first suspect that a line is not useable when it is purged prior to sampling. If the line cannot be purged, then it will not be used for sampling unless the line is a bulkhead line~~

~~that can be easily replaced. Replacement of bulkhead lines will occur before the next scheduled sample. Non-bulkhead lines will be evaluated by first determining if adjacent sampling lines are working. If the answer is no, then the previous sample from the failed line will be examined. If the previous sample was between the first and second action levels, then the explosion-isolation wall will be installed since without the ability to monitor it is unknown whether the area is approaching the second action level or decreasing. If the previous sample was below the first action level then continued sampling is acceptable without the lost sample.~~

~~If an adjacent line is working, the prior concentrations measured in that line will be evaluated to determine if it is statistically similar to the prior measurements from the lost line. If the prior sampling results are statistically similar, the lines can be grouped. Statistical similarity will be determined using the Student's "t" test to evaluate differences.~~

~~The magnitude of *t* will be compared to the critical *t* value from SW-846, Table 9-2 (EPA, 1996), for this statistical test.~~

~~If the lost line can be grouped with an adjacent line, no further action is necessary because the unmonitored area is considered to be represented by the adjacent areas. If the lost sample line cannot be grouped with an adjacent line, the previous concentration measurement will be compared to the Action Levels. If the concentration is below Action Level 1, monitoring will continue. If the concentration is between Action Level 1 and Action Level 2, the explosion-isolation wall will be installed in the panel.~~

~~N1-6 Sample Management~~

~~Sample containers shall be sealed and uniquely marked at the time of collection of the sample. A Request-for-Analysis Form shall be completed to identify the sample canister number(s), sample type, and type of analysis requested.~~

~~N1-7 Analytical Procedures~~

~~The samples will be analyzed using gas chromatography equipped with the appropriate detector under an established QA/quality control (**QC**) program. Analysis of samples shall be performed by a laboratory that the Permittees select and approve through established QA processes.~~

~~N1-8 Data Evaluation and Notifications~~

~~Analytical data from sampling events will be evaluated to determine whether the sample concentrations of flammable gases exceed the Action Levels.~~

~~If any Action Level is exceeded, notification will be made to NMED and the notification posted to the WIPP web page and accessed through the email notification system within seven calendar days of obtaining validated analytical data.~~

~~If any sampling line loss occurs, notification will be made to NMED and the notification posted to the WIPP web page and accessed through the email notification system within seven calendar days of learning of a sampling line loss. After the evaluation of the impact of sampling line loss as shown in Figure N1-5, notification will be made to NMED and the notification posted to the WIPP web page and accessed through the email notification system within seven calendar days of completing the sampling line loss evaluation.~~

~~N1-9 References~~

~~U.S. Environmental Protection Agency (EPA), 1996. SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. 3rd Edition. Office of Solid Waste and Emergency Response, Washington, D.C.~~

~~U.S. Environmental Protection Agency (EPA), 1999. *Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) In Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mas Spectrometry*, EPA 625/R-96/010b. Center for Environmental Research Information, Office of Research and Development, Cincinnati, OH, January 1999.~~

~~FIGURES~~

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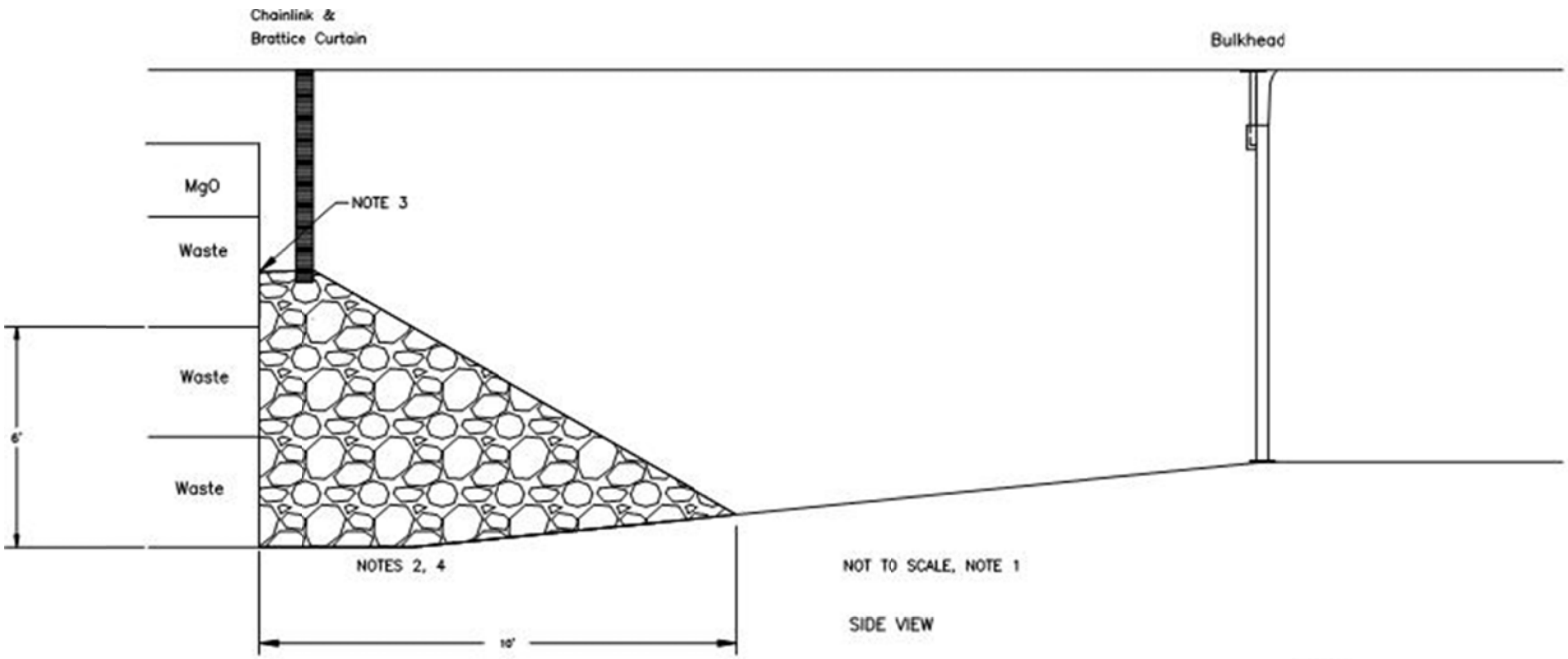


NOTES

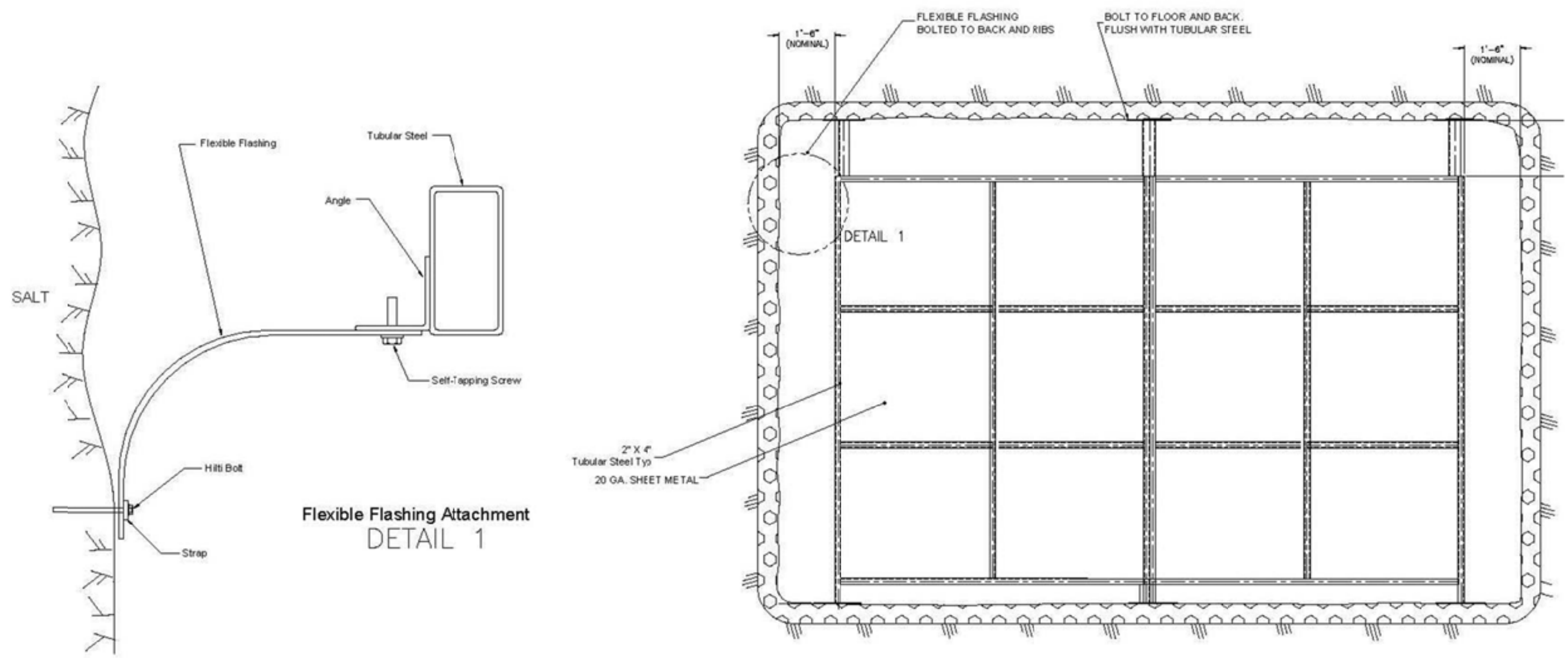
1. CONFIGURATION AND PLACEMENT OF THE SUBSTANTIAL BARRIER AND THE BUL DICTATED BY AS-FOUND (FIELD) CONDITIONS, AS DESIGNATED BY THE COGNIZAN ENGINEER.

2. SUBSTANTIAL BARRIER MATERIAL WILL CONSIST OF RUN-OF-MINE SALT OR OTHEI SUITABLE NON-FLAMMABLE MATERIAL AS DESIGNATED BY THE COGNIZANT ENGIN

3. SUBSTANTIAL BARRIER MATERIAL SHOULD BE AGAINST THE WASTE FACE. THE HI THE SUBSTANTIAL BARRIER NEAR THE WASTE WILL BE AT LEAST EQUAL TO THE H OF THE BOTTOM OF THE TOP ROW OF WASTE.

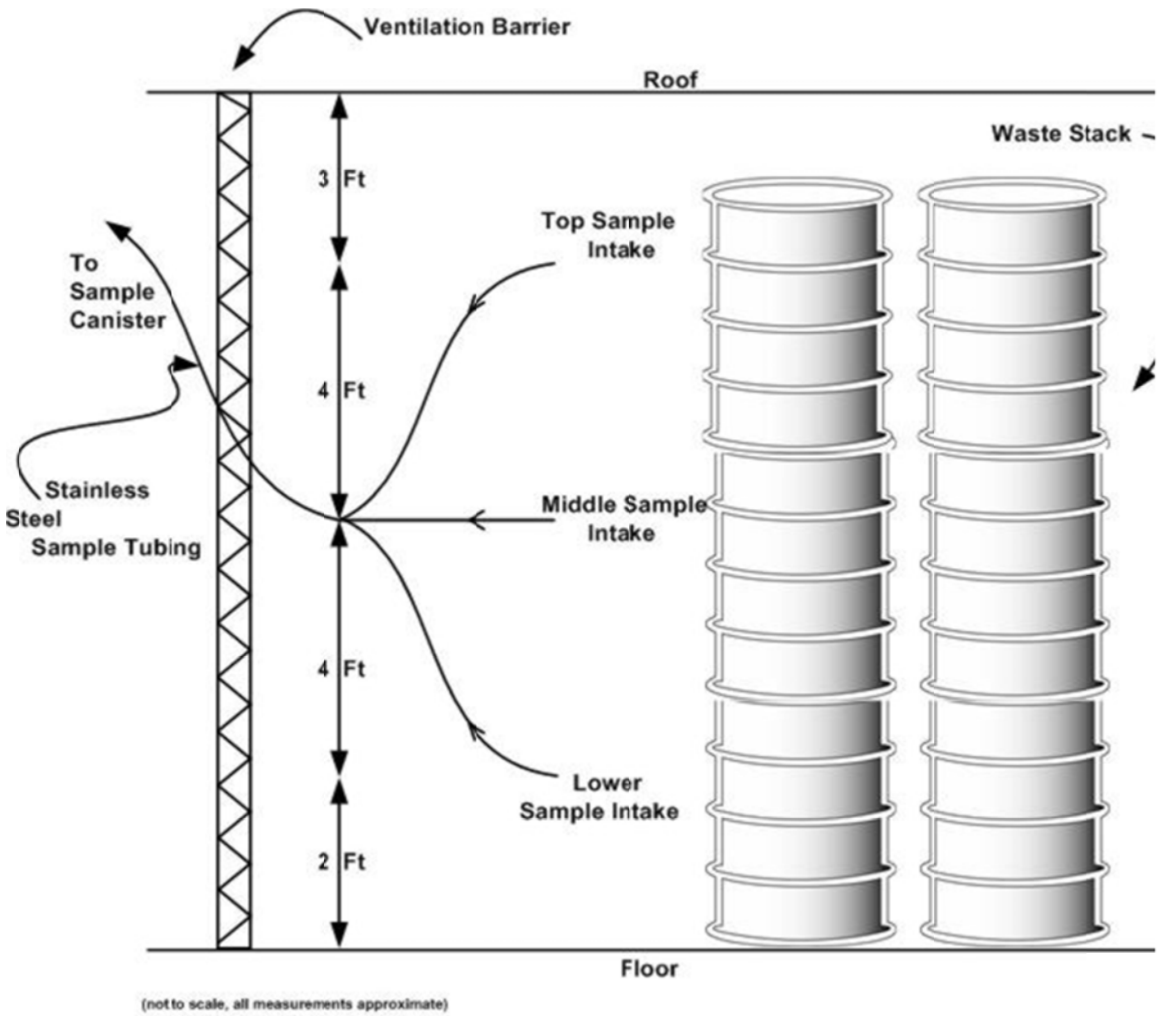
4. DIMENSIONS INDICATED ARE MINIMUMS. THE HEIGHT OF THE SUBSTANTIAL BARR MEASURED AT THE WASTE FACE. THE LENGTH OF THE SUBSTANTIAL BARRIER IS MEASURED FROM THE BOTTOM OF THE WASTE FACE TO THE TOE OF THE SUBST/ BARRIER MATERIAL.

~~Figure N1-1~~
~~Typical Substantial Barrier and Bulkhead~~

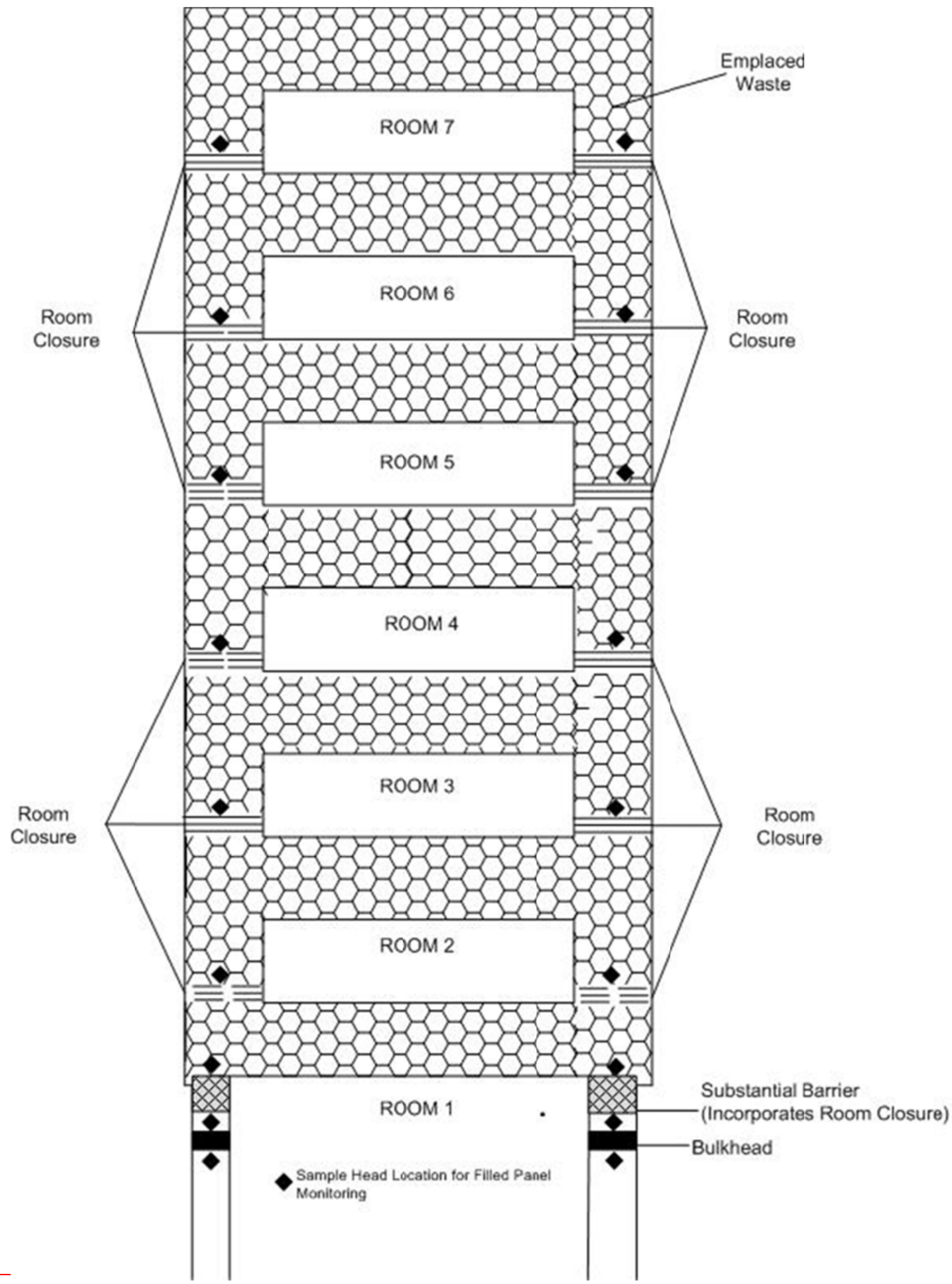


Not to Scale. All dimensions are nominal.

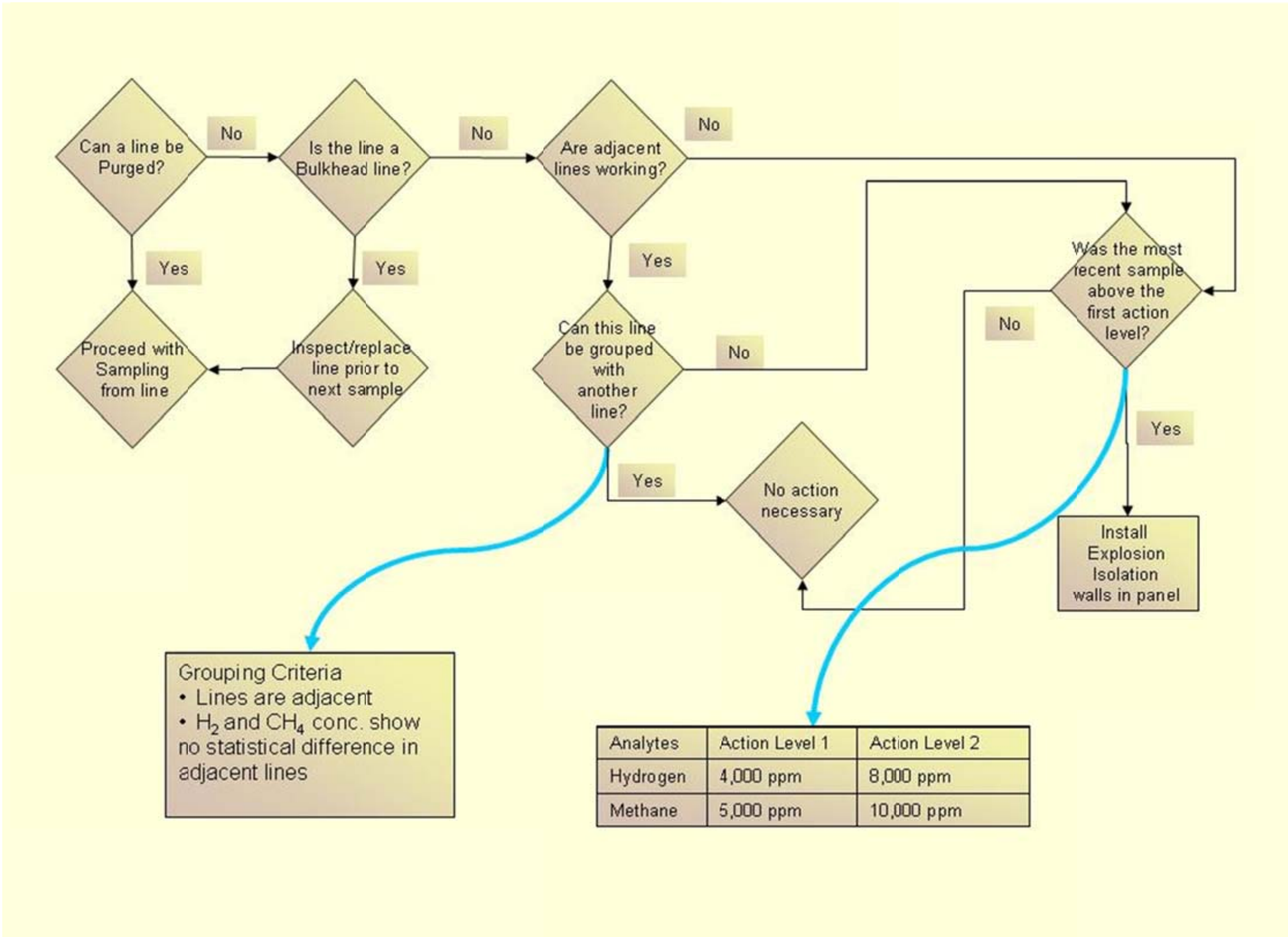
~~Figure N1-2~~
~~Typical Bulkhead~~



~~Figure N1-3~~
~~Typical Hydrogen and Methane Monitoring System~~



~~Figure N1-4~~
~~Typical Hydrogen and Methane Sampling Locations~~



~~Figure N1-5~~
~~Logic Diagram for Evaluating Sample Line Loss~~

1

PART 1 - GENERAL PERMIT CONDITIONS

1.1. AUTHORITY

This Permit is issued pursuant to the authority of the Secretary of the New Mexico Environment Department (**Secretary**) under the New Mexico Hazardous Waste Act (**HWA**), NMSA 1978, §§74-4-1 through 74-4-14, in accordance with the New Mexico Hazardous Waste Management Regulations (**HWMR**), 20.4.1 NMAC.

Pursuant to the Resource Conservation and Recovery Act (**RCRA**), 42 U.S.C. §§6901 to 6992k, and 40 CFR Part 271 and Part 272 Subpart GG, the State of New Mexico, through the Secretary, is authorized to administer and enforce the state hazardous waste management program under the HWA in lieu of the federal program.

This Permit contains terms and conditions that the Secretary has determined are necessary to protect human health and the environment, pursuant to 20.4.1.900 NMAC (incorporating 40 CFR §270.32(b)(2)).

Any violation of a condition in this Permit may subject the Permittees or their officers, employees, successors, and assigns to:

1) A compliance order under §74-4-10 of the HWA or §3008(a) of RCRA (42 U.S.C. §6928(a));

2) An injunction under §74-4-10 of the HWA or §3008(a) of RCRA (42 U.S.C. §6928(a)), or §7002(a) of RCRA (42 U.S.C. §6972(a));

3) Civil penalties under §§74-4-10 and 74-4-10.1 of the HWA or §§3008(a) and (g) of RCRA (42 U.S.C. §§6928(a) and (g)), or §7002(a) of RCRA (42 U.S.C. §6972(a));

4) Criminal penalties under §74-4-11 of the HWA or §§3008(d), (e), and (f) of RCRA (42 U.S.C. §§6928(d), (e), and (f)); or

5) Some combination of the foregoing.

The list of authorities in this paragraph is not exhaustive and the Secretary reserves the right to take any action authorized by law to enforce the requirements of this Permit.

1.2. EFFECT OF PERMIT

The Secretary issues this Permit to the United States Department of Energy (**DOE**), the owner and co-operator of the Waste Isolation Pilot Plant (**WIPP**) (EPA I.D. Number NM4890139088), and Nuclear Waste Partnership LLC, Management and Operating Contractor (**MOC**), the co-operator of WIPP. This Permit authorizes DOE and MOC (**the Permittees**) to manage, store, and dispose contact-handled (**CH**) and remote-handled (**RH**) transuranic (**TRU**) mixed waste at WIPP, and establishes the general and specific standards for these activities, pursuant to the HWA and HWMR.

As to those activities specifically authorized or otherwise specifically addressed under this Permit, compliance with this Permit during its term shall constitute compliance, for purposes of enforcement, with Subtitle C of RCRA and the HWA, and the implementing regulations at 40 CFR Parts 264, 266, and 268 except for those requirements that become effective by statute after the Permit has been issued [20 4.1.900 NMAC (incorporating 40 CFR §270.4)]

Compliance with this Permit shall not constitute a defense to any order issued or any action brought under Sections 74-4-10.E or 74-4-13 of the HWA; Sections 3008(a), 3008(h), 3013, or 7003 of RCRA; the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. §9601 et seq., commonly known as CERCLA) Sections 106(a), 104, or 107; or any other federal, state, or local law providing for protection of public health or the environment. This Permit does not convey any property rights of any sort or any exclusive privilege, nor authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. [20.4.1.900 NMAC (incorporating 40 CFR §§270.4, 270.30(g), and 270.32(b)(1))]

1.3. PERMIT ACTIONS

1.3.1. Permit Modification, Suspension, and Revocation

This Permit may be modified, suspended, and/or revoked for cause as specified in Section 74-4-4.2 of the HWA and 20.4.1.900 NMAC (incorporating 40 CFR §§270.41, 270.42, and 270.43). The filing of a request by the Permittees for a permit modification, suspension, or revocation, or the notification of planned changes or anticipated noncompliance, shall not stay any permit condition. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(f))]

1.3.2. Permit Renewal

The Permittees may renew this Permit by submitting an application for a new Permit at least 180 calendar days before the expiration date of this Permit. In reviewing any application for a Permit renewal, the Secretary shall consider improvements in the state of control and measurement technology and changes in applicable regulations. [20.4.1.900 NMAC (incorporating 40 CFR §§270.10(h) and 270.30(b))]

1.3.3. Permit Review

The Secretary shall review this Permit no later than five (5) years after the effective date of this Permit, and shall modify this Permit as necessary pursuant to Section 74-4-4.2 of the HWA and 20.4.1.900 NMAC (incorporating 40 CFR §270.41). Such modification(s) shall not extend the effective term of this Permit specified in Permit Section 1.7.2. [20.4.1.900 NMAC (incorporating 40 CFR §§270.41 and 270.50(b) and (d))]

1.4. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby. [40 CFR §124.16(a)(1) and (2)]

1.5. DEFINITIONS

Unless otherwise expressly provided herein, the terms used in this Permit shall have the meaning set forth in RCRA, HWA, and/or their implementing regulations.

1.5.1. Contact-handled Transuranic Mixed Waste

"Contact-handled transuranic mixed waste" means transuranic mixed waste with a surface dose rate not greater than 200 millirem per hour. [Pub. L. 102-579 (1992)]

1.5.2. Remote-handled Transuranic Mixed Waste

"Remote-handled transuranic mixed waste" means transuranic mixed waste with a surface dose rate of 200 millirem per hour or greater. For WIPP, the surface dose rate shall not exceed 1,000 rems per hour. [Pub. L. 102-579 (1992)]

1.5.3. Facility

"Facility" or "permitted facility" means the Waste Isolation Pilot Plant (**WIPP**) owned by the DOE and located approximately twenty six (26) miles east of Carlsbad, New Mexico, EPA I.D. Number NM4890139088. The WIPP facility comprises the entire complex within the WIPP Site Boundary as specified in the WIPP Land Withdrawal Act of 1992, Pub. L. 102-579 (1992), including all contiguous land, and structures, other appurtenances, and improvements on the Permittees' land, used for management, storage, or disposal of TRU mixed waste.

1.5.4. Permittees

"Permittees" means the United States Department of Energy (**DOE**), an agency of the Federal government, and the owner and co-operator of the WIPP facility; and Nuclear Waste Partnership LLC, Management and Operating Contractor (**MOC**), the co-operator of the WIPP facility. References to actions taken by "the Permittees" indicate actions that may be taken by either co-Permittee.

1.5.5. Secretary

"Secretary" means the Secretary of the New Mexico Environment Department (**NMED**), or designee.

1.5.6. TRU Waste

"TRU Waste" means waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for (A) high-level radioactive waste; (B) waste that the DOE Secretary has determined, with the concurrence of the EPA Administrator, does not need the degree of isolation required by the disposal regulations; or (C) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with part 61 of title 10, Code of Federal Regulations. [Pub. L. 102-579 (1992)]

1.5.7. TRU Mixed Waste

"TRU Mixed Waste" means TRU waste that is also a hazardous waste as defined by the HWA and 20.4.1.200 NMAC (incorporating 40 CFR §261.3).

1.5.8. Contact Handled Packages

"Contact Handled Packages" means TRUPACT-II, HalfPACT, and TRUPACT-III shipping containers and their contents.

1.5.9. Remote-Handled Packages

"Remote-Handled Packages" means both CNS 10-160B and RH-TRU 72-B shipping containers and their contents.

1.5.10. Containment Pallet

"Containment pallet" means a device capable of holding a minimum of one 55-gallon drum, or 85-gallon drum, or 100-gallon drum or a standard waste box, or a ten-drum overpack and that has internal containment for up to ten percent of the volume of the containers on the containment pallet.

1.5.11. Waste Characterization

"Waste characterization" or "characterization" means the activities performed by or on behalf of the waste generator/storage sites (**sites**) to obtain information used by the Permittees to satisfy the general waste analysis requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13(a)). Characterization occurs before waste containers have been certified for disposal at WIPP.

1.5.12. Waste Confirmation

"Waste confirmation" or "confirmation" means the activities performed by the Permittees or the co-Permittee DOE, pursuant to Permit Attachment C7 (TRU Waste Confirmation), to satisfy the requirements specified in Section 310 of Pub. L. 108-447. Confirmation occurs after waste containers have been certified for disposal at WIPP.

1.5.13. Substantial Barrier

"Substantial barrier" means salt or other non-combustible material installed between the waste face and the bulkhead to protect the waste from events such as ground movement or vehicle impacts. The substantial barrier incorporates the chain link and brattice cloth room closure specified in Permit Attachment A2.

1.5.14. Bulkhead

"Bulkhead" means a steel structure, with flexible flashing, that is used to block ventilation as specified in Permit Attachment A2 (Geologic Repository).

1.5.15. Explosion-Isolation Wall

"Explosion-isolation wall" means the 12-foot wall intended as an explosion isolation device that has been constructed to initially close Panels 1, 2, and 5 subsequent to the completion of waste emplacement~~is part of the approved panel-closure system specified in Permit Attachment G1 (Detailed Design Report for an Operation Phase Panel Closure System)~~.

1.5.16. Filled Panel

"Filled panel" means an Underground Hazardous Waste Disposal Unit specified in Permit Part 4 that will no longer receive waste for emplacement.

1.5.17. Internal Container

"Internal container" means a container inside the outermost container examined during radiography or visual examination (**VE**). Drum liners, liner bags, plastic bags used for contamination control, capillary-type labware, and debris not designed to hold liquid at the time of original waste packaging are not internal containers.

1.5.18. Observable Liquid

"Observable liquid" means liquid that is observable using radiography or VE as specified in Permit Attachment C (Waste Analysis Plan).

1.5.19. Filled Room

"Filled Room" means a room in an Underground Hazardous Waste Disposal Unit as specified in Permit Part 4 that will no longer receive waste for emplacement.

1.5.20. Active Room

"Active Room" means a room in an Underground Hazardous Waste Disposal Unit as specified in Permit Part 4 that contains emplaced TRU waste and is not a filled room.

1.6. EFFECT OF INACCURACIES IN PERMIT APPLICATION

This Permit is based on the assumption that all information contained in the permit application and the administrative record is accurate and that the Facility will be constructed and operated as specified in the application. The permit application consists of information submitted in September 2009 and supplementary technical documents.

Any inaccuracies found in the submitted information may be grounds for the termination or modification of this Permit in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.41, §270.42, and §270.43) and for potential enforcement action.

1.7. DUTIES AND REQUIREMENTS

1.7.1. Duty to Comply

The Permittees shall comply with all conditions of this Permit, except to the extent and for the duration such noncompliance is authorized in an emergency permit specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.61). Any Permit noncompliance, except under the terms of an emergency permit, constitutes a violation of RCRA and/or HWA and is grounds for enforcement action; for Permit modification, suspension, or revocation; or for denial of a Permit modification or renewal application. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(a))]

1.7.2. Permit Term

This Permit shall be effective for a fixed term not to exceed ten years from the effective date. The effective date of this Permit shall be 30 days after notice of the Secretary's decision has been served on the Permittees or such later time as the Secretary may specify. [20.4.1.900 NMAC (incorporating 40 CFR §270.50(a))]

1.7.3. Duty to Reapply

If the Permittees wish to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittees shall apply for and obtain a new Permit. The Permittees shall submit an application for a new Permit at least 180 calendar days before the expiration date of this Permit. [20.4.1.900 NMAC (incorporating 40 CFR §§270.10(h), 270.30(b))]

1.7.4. Continuation of Expiring Permits

If the Permittees have submitted a timely and complete application for renewal of this Permit as specified in 20.4.1.900 NMAC (incorporating 40 CFR §§270.10, 270.13 through 270.29), this Permit shall remain in effect until the effective date of the new Permit if, through no fault of the Permittees, the Secretary has not issued a new Permit on or before the expiration date of this Permit. [20.4.1.900 NMAC (incorporating 40 CFR §270.51)]

1.7.5. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittees in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(c))]

1.7.6. Duty to Mitigate

In the event of noncompliance with this Permit, the Permittees shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(d))]

1.7.7. Proper Operation and Maintenance

The Permittees shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittees to achieve compliance with the conditions of this Permit. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(e))]

1.7.8. Duty to Provide Information

The Permittees shall furnish to the Secretary, within a reasonable time frame as specified by the Secretary, any relevant information which the Secretary may request to determine whether cause exists for modifying, suspending, or revoking this Permit, or to determine compliance with this Permit. The Permittees shall also furnish to the Secretary, upon request, copies of records required to be kept by this Permit. Information and records requested by the Secretary pursuant to this condition shall be provided in a paper or an electronic format acceptable to the Secretary. [20.4.1.500 and .900 NMAC (incorporating 40 CFR §§264.74(a) and 270.30(h))]

1.7.9. Inspection and Entry

The Permittees shall allow the Secretary, or authorized representatives, upon the presentation of credentials and other documents as may be required by law and at reasonable times, the following inspection and entry privileges specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.30(i)):

1.7.9.1. Entrance to Premises

To enter upon the Permittees' premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;

1.7.9.2. Access to Records

To have access to and copy any records that must be kept under the conditions of this Permit;

1.7.9.3. Inspection

To have access to, inspect, and obtain photographs of any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

1.7.9.4. Sampling

To sample or monitor, for the purposes of assuring Permit compliance or as otherwise authorized by RCRA and/or HWA, any substances or parameters at any location. If the Secretary obtains any sample, prior to leaving the premises the Secretary shall give the Permittees a receipt describing the sample obtained and, if requested, a portion of each sample of equal weight or volume to the portion retained. If any analysis is made of the sample, the Secretary shall promptly furnish a copy of the results of the analysis to the Permittees.

Permit Section 1.7.9 shall not be construed to limit, in any manner, the Secretary's authority under Section 74-4-4.3 of the HWA.

1.7.10. Monitoring and Records

1.7.10.1. Representative Sampling

For the purposes of monitoring, the Permittees shall take samples and measurements representative of the monitored activity. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(j)(1))]

1.7.10.2. Record Retention

Beginning with the effective date of this Permit, the Permittees shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports and records required by this Permit until closure. If original strip chart recordings are more than three years old, copies are acceptable. The Permittees shall retain the waste minimization certification required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(9)), and records of all data used to complete the application for this Permit for a period of at least 3 years from the date of certification or application. The Secretary may extend these periods at any time, and these periods shall be automatically extended during the course of any unresolved enforcement action regarding this facility. The Permittees shall maintain records from all ground-water monitoring wells and associated ground-water surface elevations, during the active life of the facility and the post-closure period. [20.4.1.500 NMAC (incorporating 40 CFR §264.74(b)), 20.4.1.501 NMAC, and 20.4.1.900 (incorporating §270.30(j)(2))]

1.7.10.3. Monitoring Records Contents

As specified by 20.4.1.900 NMAC (incorporating 40 CFR §270.30(j)(3)), records of monitoring information shall include:

i. The dates, exact place, and times of sampling or measurements;

ii. The names of individuals who performed the sampling or measurements;

iii. The dates analyses were performed;

iv. The names of individuals who performed the analyses;

v. The names of analytical techniques or methods used; and

vi. The results of such analyses.

1.7.11. Reporting Requirements

1.7.11.1. Reporting Planned Changes

The Permittees shall give notice to the Secretary, as soon as possible, of any planned physical alterations or additions to the permitted facility. The Permittees shall post a link to the planned change notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(1))]

1.7.11.2. Reporting Anticipated Noncompliance

The Permittees shall give advance notice to the Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The Permittees shall post a link to the planned change notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. The Permittees shall not store or dispose TRU mixed waste in any modified portion of the facility (except as provided in 20.4.1.900 NMAC (incorporating 40 CFR §270.42)) until the following conditions specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(2)) are satisfied:

i. The Permittees have submitted to the Secretary, by certified mail or hand delivery, a letter signed by the Permittees and a New Mexico registered professional engineer stating that the facility has been constructed or modified in compliance with this Permit, and:

ii. The Secretary has either inspected the modified portion of the facility and finds it is in compliance with the conditions of this Permit; or waived the inspection or, within 15 calendar days of the date of submission of the letter required above, has not notified the Permittees of his intent to inspect.

1.7.12. Transfer of Permits

The Permittees shall not transfer this Permit to any person, unless the Secretary has approved a permit modification request for such transfer in writing. The Secretary shall require modification or revocation and reissuance of this Permit as specified by 20.4.1.900 NMAC (incorporating 40 CFR §§270.40 and 270.41(b)(2)) to identify the new Permittees and incorporate other applicable requirements under the HWA, RCRA, and their implementing regulations. The prospective new Permittee shall file a disclosure statement with the Secretary, if applicable and as specified at §74-4-4.7 of the HWA, prior to modification or revocation and re-issuance of the Permit.

Before transferring ownership or operation of the facility during its active life or post-closure care period, the Permittees shall notify the new owner or operator in writing as required by 20.4.1.500 and .900 NMAC (incorporating 40 CFR §§264.12(c) and 270.30(l)(3)).

1.7.13. 24 Hour and Subsequent Reporting

1.7.13.1. Oral Report

As required by 20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(6)(i)), within 24 hours from the time the Permittees become aware of the circumstances, the Permittees shall report orally to the Secretary any noncompliance which may endanger human health or the environment, including:

i. Information concerning release of any TRU mixed or hazardous waste that may cause an endangerment to public drinking water supplies; and

ii. Any information of a release or discharge of TRU mixed or hazardous waste, or of a fire or explosion from the facility, which could threaten the environment or human health outside the facility.

The oral report shall be made by calling the Hazardous Waste Bureau's main telephone number during regular business hours, or by calling the New Mexico Department of Public Safety dispatch telephone number during non-business hours, and requesting that the report be forwarded to the NMED spill number.

1.7.13.2. Description of Occurrence

The description of the occurrence and its cause shall include:

i. Name, address, and telephone number of the Permittees;

ii. Name, address, and telephone number of the facility;

iii. Date, time, and type of incident;

iv. Name and quantity of materials involved;

v. The extent of injuries, if any;

vi. An assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

vii. Estimated quantity and disposition of recovered material that resulted from the incident. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(6)(ii))]

1.7.13.3. Written Notice

As required by 20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(6)(iii)), the Permittees shall submit a written notice within five calendar days of the time the Permittees become aware of the circumstances. The written notice shall contain the information required in Permit Section 1.7.13.2 and the following information:

i. A description of the noncompliance and its cause;

ii. The period(s) of the noncompliance including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and

iii. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

The Secretary may waive the five-day written notice requirement in favor of a written report within 15 calendar days if justifiable cause is provided in advance. The Permittees shall post a link to the written notice or report transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

1.7.13.4. Contingency Plan Implementation

If the Contingency Plan is implemented, the Permittees shall comply with the reporting requirements specified in Permit Attachment D (RCRA

Contingency Plan). [20.4.1.500 NMAC (incorporating 40 CFR §264.56(i))]

1.7.14. Other Noncompliance

The Permittees shall report to the Secretary all other instances of noncompliance not otherwise required to be reported above, in Permit Sections 1.7.10 through 1.7.13, at the time monitoring reports are submitted annually in October. The reports shall contain the information specified in Permit Section 1.7.13 and 20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(10)).

1.7.15. Other Information

Whenever the Permittees become aware that they failed to submit any relevant facts in the Permit application, or submitted incorrect information in the Permit application or in any report to the Secretary, the Permittees shall promptly submit such facts or information in writing to the Secretary. The Permittees shall post a link to the transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(l)(11))]

1.8. ADMISSIBILITY OF DATA

The Permittees waive any objection to the admissibility as evidence of any data required by this Permit in any administrative or judicial action to enforce a condition of this Permit.

1.9. SIGNATORY REQUIREMENT

The Permittees shall sign and certify, as specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.11) all applications, reports required by this Permit, or information submitted to or requested by the Secretary. [20.4.1.900 NMAC (incorporating 40 CFR §270.30(k))]

1.10. SUBMITTAL OF REPORTS, NOTIFICATIONS, AND INFORMATION TO THE SECRETARY

1.10.1. Information Submittal

The Permittees shall submit, by certified mail or hand delivery or by electronic transmittal with a subsequent hard copy, all reports, notifications, or other submissions which are submitted to or requested by the Secretary or required by this Permit, to:

Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Telephone Number: (505) 476-6000
Facsimile Number: (505) 476-6030

1.10.2. Approval of Submittals

All documents prepared by the Permittees under the terms of this Permit and submitted to the Secretary that are subject to the provisions of 20.4.2 NMAC shall be subject to the procedures set forth therein. Documents requiring the Secretary's approval that are not subject to the provisions of 20.4.2 NMAC may be reviewed and approved, approved with modifications or directions, disapproved, denied, or rejected by the Secretary.

Submittals and associated schedules, upon the Secretary's written approval, shall become enforceable as part of this Permit in accordance with the terms of the Secretary's written approval, and such documents, as approved, shall control over any contrary or conflicting requirements of this Permit. This provision does not affect any public process that is otherwise required by this Permit, the HWA, or its implementing regulations, including 40 CFR §270.42 and 20.4.1.901 NMAC.

1.10.3. Extension of Time

The Permittees may seek an extension of time in which to perform a requirement of this Permit, for good cause, by sending a written request for extension of time and proposed revised schedule to the Secretary. The request shall state the length of the requested extension and describe the basis for the request. The Secretary will respond in writing to any request for extension following receipt of the request. If the Secretary denies the request for extension, reasons for the denial will be stated.

1.11. PUBLIC E-MAIL NOTIFICATION LIST

The Permittees shall develop and maintain an e-mail list to notify members of the public concerning actions identified in this Permit requiring e-mail notification. The Permittees shall send e-mail notifications required by this Permit to the e-mail list within seven days of the submittal date to the Secretary and shall include in the e-mail a direct link to the specific document to which it relates. The Permittees shall provide a link on the WIPP Home Page <http://www.wipp.energy.gov> whereby members of the public may review the actions requiring e-mail notification and submit a request to be placed on this list.

1.12. CONFIDENTIAL INFORMATION

The Permittees may claim confidentiality for any information submitted to or requested by the Secretary or required by this Permit. Any such claim must be asserted at the time of submittal in the manner prescribed on the application form, or in the case of other submittals, by stamping the words "confidential business information" on each page containing such information. If no claim is made, the Secretary may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information), to the extent authorized by Section 74-4-4.3(D) and (F) of the HWA and 20.4.1.100 and .900 NMAC (incorporating 40 CFR §260.2 and §270.12).

1.13. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

The Permittees shall comply with the recordkeeping and reporting requirements specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.73(a)) and elsewhere in this Permit.

The Permittees shall maintain at the facility, until closed as specified in Part 6, the following documents and all amendments, revisions and modifications to these documents:

1. Waste Analysis Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.13(b)) and this Permit, and records and results of waste analyses performed as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.13).

2. Inspection schedules, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)(2)) and this Permit, and records and results of inspections as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(d)).

3. Personnel training documents and records, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16(d)) and this Permit.

4. Contingency Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.53(a)) and this Permit, including summary reports and details of all incidents that require implementation of the contingency plan as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.56(i)).

5. Operating record, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73) and this Permit.

6. Closure Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.112(a)) and this Permit.

7. Post-Closure Plan as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.118(a)) and this Permit.

8. Procedures for limiting air emissions, as required by 20.4.1.500 and .900 NMAC (incorporating 40 CFR §§264.601(c) and 270.23(a)(2)) and this Permit.

9. All other documents required by Part 1, Permit Section 1.7.10, and Part 2.

1.14. INFORMATION REPOSITORY

1.14.1. Requirement for Information Repository

The Permittees shall establish and maintain an electronic Information Repository (**IR**) in accordance with the requirements of 20.4.1.1102 NMAC (incorporating 40 CFR §§124.33(c) through (f)) and 20.4.1.900 NMAC (incorporating 40 §270.30(m)). The documents contained in the IR shall be accessible to the public from the WIPP Home Page.

The Permittees shall establish the IR no later than the effective date of this Permit.

1.14.2. Contents of Information Repository

The Permittees shall ensure that the IR contains the following documents:

1. The Permittees' Part A and Part B Permit Applications associated with the permit renewal;

2. A complete copy of this Permit, as it may be modified;

3. Permit modifications at the request of the Permittees (i.e., Class 1, Class 1*, Class 2, Class 3, requests for determination of class) and temporary authorization requests associated with this Permit submitted pursuant to 20.4.1. 900 NMAC (incorporating 40 CFR §270.42) and any associated withdrawals by the Permittees and responses from the Secretary;

4. The Waste Minimization Report submitted pursuant to Permit Section 2.4;

5. Requests for extensions of time submitted pursuant to Permit Section 1.10.3;

6. Corrective action documents submitted pursuant to Permit Part 8;

7. Each report submitted pursuant to Permit Sections 1.7.11 and 1.7.13 if such report is required to be submitted in writing;

8. Notices of deficiency or disapproval (**NODs**), NOD responses, final approval letters, and directives from the Secretary associated with the documents identified in paragraphs 1, 3, and 6 above;

9. Notices of violation, administrative compliance orders, responses to these documents required by the Secretary, and directives from the Secretary associated with the Permit;

10. Biennial Report submitted pursuant to Permit Section 2.14.2.

1.14.3. Index of Information Repository

The Permittees shall ensure that the IR includes an index of the documents contained in the IR identifying all document titles, publications dates, and authors. This index shall be accessible on the internet through the WIPP Home Page. The Permittees shall ensure that all documents are searchable and printable.

The Permittees shall add new documents to the IR within ten days after the new documents are submitted to, or received from, the Secretary.

1.14.4. Notification to Public of Information Repository

The Permittees shall inform the public of the existence of the IR and how it may be accessed by the following methods:

1. Written notice to all individuals on the facility mailing list 30 days after the IR becomes operational;

2. Public notice in area newspapers, including the Carlsbad Current-Argus, Albuquerque Journal, and Santa Fe New Mexican, when the IR becomes operational;

3. Continuous notice on the WIPP Home Page of the existence of the IR; and

4. In the public notice related to any permit modification notification or request submitted by the Permittees, including permit renewals.

1.15. COMMUNITY RELATIONS PLAN

1.15.1. Requirement for Community Relations Plan

The Permittees shall establish and implement a Community Relations Plan (**CRP**) to describe how the Permittees will keep communities and interested members of the public informed of Permit-related activities, including waste management, closure, post-closure, and corrective action, as specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.32(b)(2)). The CRP shall explain how communities and interested members of the public can participate in Permit-related activities.

The Permittees shall implement and post the CRP on the WIPP Home Page within 180 days of the effective date of this Permit. The Permittees shall maintain the CRP until the termination of this Permit.

1.15.2. Contents of Community Relations Plan

The CRP must describe how the Permittees will accomplish the following elements:

1. Identify and establish an open working relationship with communities and interested members of the public;

2. Establish a productive government-to-government relationship between the Permittee DOE and affected tribes and pueblos;

3. Keep communities and interested members of the public informed of permit actions of interest (e.g., implementation of the Contingency Plan, Permit modification requests, Permit compliance issues);

4. Minimize disputes and resolve differences with communities and interested members of the public;

5. Provide a mechanism for the timely dissemination of information in response to individual requests; and

6. Provide a mechanism for communities and interested members of the public to provide feedback and input to the Permittees.

1.15.3. <u>Government to Government Consultation</u>

DOE shall consult on a government-to-government basis with affected tribes and pueblos in New Mexico when developing the CRP in an effort to ensure the program is responsive to their needs. DOE shall document in the operating record of this Permit and post on the WIPP Home Page all consultations, communications, agreements, and disagreements between DOE and affected tribes and pueblos in New Mexico only with the express approval of those entities, regarding the development of the CRP. The CRP shall specify how DOE will consult on a government-to-government basis with affected tribes and pueblos annually concerning how they may be made better informed of the issues related to this Permit.

1.15.4. <u>Initial Consultation on Community Relations Plan</u>

The Permittees shall communicate with and solicit comments from communities and interested members of the public when developing the CRP in an effort to ensure the program is responsive to their needs. The Permittees shall document in the operating record of this Permit all consultations, communications, agreements, and disagreements between the Permittees and all participating entities, with the approval of those entities, regarding the development of the CRP.

1.15.5. <u>Annual Compilation of Comments on Community Relations Plan</u>

The CRP shall specify how the Permittees will solicit comments from communities and interested members of the public annually concerning how they may be made better informed of the issues related to this Permit. The CRP shall specify that the Permittees will annually post on the WIPP Home Page a compilation of all such comments, including any statements of disagreement, with the approval of those entities in a manner set forth in the CRP.

1.16. <u>DISPUTE RESOLUTION</u>

1.16.1. <u>Applicability</u>

In the event DOE disagrees, in whole or in part, with either an action on a final audit report by NMED (as specified in Permit Section 2.3.2.4) or an evaluation by NMED of DOE's provisional approval of an AK Sufficiency Determination Request for a particular waste stream (as specified in Permit Attachment C), DOE may seek dispute resolution. The dispute resolution procedure in this Permit Section shall be the exclusive mechanism for resolving disputes related to NMED’s final audit report action or a determination that DOE’s provisional approval for a particular waste stream is inadequate.

1.16.2. Notice to NMED

To invoke dispute resolution, DOE shall notify NMED in writing within seven calendar days of receipt of the action or determination in dispute. Such notice shall be sent to the Hazardous Waste Bureau Chief and must set forth the specific matters in dispute, the position DOE asserts should be adopted, a detailed explanation for DOE’s position, and any other matters considered necessary for the dispute resolution. For AK Sufficiency Determination disputes, DOE shall also submit all factual data, analysis, opinion, and other documentation upon which they relied for their provisional approval, and any other information that supports their position. NMED shall acknowledge receipt of notification by e-mail sent to DOE’s representative as designated in their written notification.

1.16.3. Tier I - Informal Negotiations

DOE and NMED shall make all reasonable, good faith efforts to informally resolve disputes related to NMED’s determination. DOE and NMED shall meet or teleconference within 15 calendar days from NMED’s receipt of notice to commence negotiations to resolve the dispute. DOE and NMED shall have 30 calendar days from NMED’s receipt of notice to resolve the dispute. If an agreement is reached, NMED shall promptly inform DOE of the terms of the agreement in writing. DOE shall comply with the terms of such agreement or, if appropriate, submit a revised submittal and implement the same in accordance with such agreement. If an agreement is not reached, NMED shall promptly inform DOE in writing that an agreement has not been reached.

1.16.4. Tier II - Final Decision of the Secretary

In the event agreement is not reached within the 30 calendar day period, DOE may submit a written Request for Final Decision to the Secretary. The Request must be submitted within seven calendar days after receipt of notification from NMED that an agreement under Tier I was not reached. The Secretary will notify the Permittees in writing of the decision on the dispute, and the Permittees shall comply with the terms and conditions of the decision. Such decision shall be the final resolution of the dispute and shall be enforceable under this Permit.

1.16.5. Actions Not Affected by Dispute

With the exception of those matters under dispute, the Permittees shall proceed to take any action required by those portions of the submission and of this Permit that NMED determines are not affected by the dispute.

1.16.6. E-Mail Notifications

If DOE submits a notice to NMED pursuant to Permit Section 1.16.2, the Permittees shall post a link to the notice on the WIPP Home Page, and inform those on the e-mail notification list as specified in Permit Section 1.11. After receipt of NMED's letter concerning the conclusion of any Tier I negotiations, the Permittees shall post a link to the NMED letter on the WIPP Home Page, and shall inform those on the e-mail notification list as specified in Permit Section 1.11. If a Tier I agreement is not reached and DOE submits a Tier II request for final decision to the Secretary, the Permittees shall post a link to the request on the WIPP Home Page, and shall inform those on the e-mail notification list as specified in Permit Section 1.11. After receiving notice of the final action by the Secretary, the Permittees shall post a link to the final action on the WIPP Home Page and shall inform those on the e-mail notification list as specified in Permit Section 1.11.

PERMIT ATTACHMENTS

Permit Attachment A2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Geologic Repository” - Appendix M2).

Permit Attachment C (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Waste Analysis Plan” - Chapter B).

Permit Attachment C7 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Permittee Level TRU Waste Confirmation Processes” - Appendix B7).

Permit Attachment D (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “RCRA Contingency Plan” - Chapter F).

Permit Attachment G1, “WIPP Panel Closure Design Description and Specifications.” ~~(as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Detailed Design Report for an Operation Phase Panel Closure System” – Appendix I1)~~

PART 4 - GEOLOGIC REPOSITORY DISPOSAL

4.1. DESIGNATED DISPOSAL UNITS

This Part authorizes the management and disposal of contact-handled (**CH**) and remote-handled **(RH**) transuranic (**TRU**) mixed waste containers in the Underground Hazardous Waste Disposal Units (**Underground HWDUs**) identified herein. Specific facility and process information for the management and disposal of CH and RH TRU mixed waste in the Underground HWDUs is incorporated in Permit Attachment A2 (Geologic Repository).

4.1.1. Underground Hazardous Waste Disposal Units

The Underground HWDUs are located at the WIPP facility approximately 2150 feet (665 meters) below the ground surface within the Salado formation. An Underground HWDU is a single excavated panel, consisting of seven rooms and two access drifts, designated for disposal of TRU mixed waste containers.

The Permittees may dispose TRU mixed waste in the Underground HWDUs, provided the Permittees comply with the following conditions:

4.1.1.1. Disposal Containers

The Permittees shall dispose TRU mixed waste in containers specified in Permit Section 4.3.1.

4.1.1.2. Disposal Locations and Quantities

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

i. The Permittees may submit a Class 1 permit modification requiring prior approval of the Secretary in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42(a)) to increase the CH TRU mixed waste capacity by 35,300 ft^3 (1,000 m^3) or less, and the RH TRU mixed waste capacities in Panels 5 and 6 to a maximum of 22,950 ft^3 (650 m^3).

At least 15 calendar days before submittal to NMED, the Permittees shall post a link to the Class 1 permit modification on the WIPP Home Page and inform those on the e-mail notification list.

ii. Notwithstanding Permit Section 4.1.1.2.i, any Underground HWDU CH TRU waste capacity may be increased by up to 25 percent of the total maximum capacity in Table 4.1.1 by submitting a Class 2 permit modification request in accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42(b)).

Table 4.1.1 - Underground HWDUs

Description[1]	**Waste Type**	**Maximum Capacity**[2]		**Final Waste Volume**
Panel 1	CH TRU	636,000ft^3 (18,000 m^3)		370,800 ft^3 (10,500 m^3)
Panel 2	CH TRU	636,000 ft^3 (18,000 m^3)		635,600 ft^3 (17,998 m^3)
Panel 3	CH TRU	662,150 ft^3 (18,750 m^3)		603,600 ft^3 (17,092 m^3)
Panel 4	CH TRU	662,150 ft^3 (18,750 m^3)		503,500 ft^3 (14,258 m^3)
	RH TRU	12,570 ft^3 (356 m^3)		6,200 ft^3 (176 m^3)
Panel 5	CH TRU	662,150 ft^3 (18,750 m^3)		562,500 ft^3 (15,927m^3)
	RH TRU	15,720 ft^3 (445 m^3)		8,300 ft^3 (235 m^3)
Panel 6	CH TRU	662,150 ft^3 (18,750 m^3)		510,900 ft^3 (14,468 m^3)
	RH TRU	18,860 ft^3 (534 m^3)		7,500 ft^3 (214 m^3)
Panel 7	CH TRU	662,150 ft^3 (18,750 m^3)		
	RH TRU	22,950 ft^3 (650 m^3)		
Panel 8	CH TRU	662,150 ft^3 (18,750 m^3)		
	RH TRU	22,950 ft^3 (650 m^3)		
Total	**CH TRU**	**5,244,900 ft^3 (148,500 m^3)**		
	RH TRU	**93,050 ft^3 (2,635 m^3)**		

[1] The area of each panel is approximately 124,150 ft2 (11,533 m2).
[2] "Maximum Capacity" is the maximum volume of TRU mixed waste that may be emplaced in each panel. The maximum repository capacity of "6.2 million cubic feet of transuranic waste" is specified in the WIPP Land Withdrawal Act (Pub. L. 102-579, as amended)

4.2. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

4.2.1. Permitted Waste

The Permittees may dispose TRU mixed waste in the Underground HWDUs, provided the Permittees comply with the following conditions:

4.2.1.1. Waste Analysis Plan

The TRU mixed waste shall be characterized to comply with the waste analysis plan specified in Permit Section 2.3.1.

4.2.1.2. TSDF Waste Acceptance Criteria

The TRU mixed waste shall comply with the treatment, storage, and disposal facility (**TSDF**) waste acceptance criteria specified in Permit Section 2.3.3.

4.2.1.3. Hazardous Waste Numbers

The TRU mixed waste shall contain only hazardous waste numbers specified in Permit Section 2.3.4.

Derived waste may be disposed in the Underground HWDUs as specified in Permit Section 2.3.5.

4.2.2. Prohibited Waste

4.2.2.1. General Prohibition

The Permittees shall not dispose any TRU mixed waste that fails to comply with Permit Section 4.2.1.

4.2.2.2. Specific Prohibition

After this Permit becomes effective, the Permittees shall not dispose non-mixed TRU waste in any Underground HWDU unless such waste is characterized in accordance with the requirements of the WAP specified in Permit Section 2.3.1. The Permittees shall not dispose TRU mixed waste in any Underground HWDU if the Underground HWDU contains non-mixed TRU waste which was disposed of after this Permit became effective and was not characterized in accordance with the requirements of the WAP.

4.3. DISPOSAL CONTAINERS

4.3.1. Acceptable Disposal Containers

The Permittees shall use containers that comply with the requirements for U.S. Department of Transportation shipping container regulations (49 CFR §173 - Shippers - General Requirements for Shipment and Packaging, and 49 CFR §178 - Specifications for Packaging) for disposal of TRU mixed waste at WIPP. The Permittees are prohibited from disposing TRU mixed waste in any container not specified in Permit Attachment A1 (Container Storage), Section A1-1b, as set forth below:

4.3.1.1. Standard 55-gallon (208-liter) Drum

Standard 55-gallon drums are configured as a 7-pack or as an individual unit.

4.3.1.2. Standard Waste Box (**SWB**)

An SWB is configured as an individual unit.

4.3.1.3. Ten-drum Overpack (**TDOP**)

A TDOP is configured as an individual unit.

4.3.1.4. 85-gallon (322-liter) Drum

85-gallon drums are configured as a 4-pack or as an individual unit.

4.3.1.5. 100 gallon (379-liter) Drum

100-gallon drums are configured as a 3-pack or as an individual unit.

4.3.1.6. RH TRU Canister

An RH TRU canister is configured as an individual unit.

4.3.1.7. Standard Large Box 2 (**SLB2**)

An SLB2 is configured as an individual unit.

4.3.1.8. Shielded Container

Shielded containers are configured as a three-pack.

4.3.2. Condition of Containers

If a container holding TRU mixed waste is not in good condition (e.g., severe rusting, apparent structural defects) or if it begins to leak prior to disposal in an Underground HWDU, the Permittees shall manage the TRU mixed waste containers specified in Permit Section 4.3.1 as specified in Permit Attachment A1 and in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.171).

4.4. VOLATILE ORGANIC COMPOUND LIMITS

The Permittees shall limit releases to the air of volatile organic compound waste constituents (**VOCs**) as specified by the following conditions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)):

4.4.1. Room-Based Limits

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

Table 4.4.1 - VOC Room-Based Limits

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

There are no maximum concentration limits for other VOCs.

4.4.2. Determination of VOC Room-Based Limits

The Permittees shall confirm the VOC concentration and emission rate limits identified in Permit Section 4.4.1 using the VOC Monitoring Plan specified in Permit Attachment N (Volatile Organic Compound Monitoring Plan). The Permittees shall conduct monitoring of VOCs as specified in Permit Sections 4.6.2 and 4.6.3.

~~4.4.3. Ongoing Disposal Room VOC Monitoring in Panels 3 Through 8~~

~~The Permittees shall continue disposal room VOC monitoring in Room 1 of Panels 3 through 8 after completion of waste emplacement until final panel closure unless the explosion-isolation wall specified in Permit Attachment G1 (Detailed Design Report for an Operation Phase Panel Closure System) is installed in the panel.~~

4.5. DESIGN, CONSTRUCTION, AND OPERATION REQUIREMENTS

The Permittees shall design, construct, and operate the Underground HWDUs as specified by the following conditions and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601):

4.5.1. Repository Design

The Permittees shall construct each Underground HWDU in conformance with the requirements specified in Permit Attachment A2 and Permit Attachment A3 (~~Drawing Number 51-W-214-W, "Underground Facilities~~ Typical Disposal Panel~~"~~).

4.5.2. Repository Construction

4.5.2.1. Construction Requirements

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

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

Prior to disposal of TRU mixed waste in a newly constructed Underground HWDU, the Permittees shall comply with the certification requirements specified in Permit Section 1.7.11.2.

4.5.2.2. Notification Requirements

At least 30 calendar days prior to the projected start date of excavation of each Underground HWDU, the Permittees shall provide written notification to the Secretary stating the projected start date of excavation, along with supporting rationale (e.g., projected waste receipt rate, etc.). The Permittees shall post a link to the notification transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

Prior to disposal of TRU mixed waste in a newly constructed Underground HWDU, the Permittees shall comply with the certification requirements specified in Permit Section 1.7.11.2.

4.5.3. Repository Operation

4.5.3.1. Underground Traffic Flow

The Permittees shall restrict and separate the ventilation and traffic flow areas in the underground TRU mixed waste handling and disposal areas from the ventilation and traffic flow areas for mining and construction equipment, except that during waste transport in W-30, ventilation need not be separated north of S-1600.

The Permittees shall designate routes for the traffic flow of TRU mixed waste handling equipment and construction equipment as required by Permit Attachment A4 (Traffic Patterns), Section A4-4, “Underground Traffic.” These routes will be recorded on a mine map that is posted in a location where persons entering the underground can read it. Whenever the routes are changed, the map will be updated. Maps will be available in facility files until facility closure.

4.5.3.2. Ventilation

The Permittees shall maintain a minimum active room ventilation rate of 35,000 standard ft^3/min (scfm) in each active room when waste disposal is taking place and workers are present in the room, as specified in Permit Attachment A2, Section A2-2a(3), “Subsurface Structures (Underground Ventilation System Description),” and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)). 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.

4.5.3.3. Ventilation Barriers

The Permittees shall construct ventilation barricades in active Underground HWDUs to restrict the flow of mine ventilation air through full disposal rooms, as specified in Permit Attachment A2, Section A2-2a(3), "Subsurface Structures (Underground Ventilation System Description)" and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)).

4.6. MAINTENANCE AND MONITORING REQUIREMENTS

The Permittees shall maintain and monitor the Underground HWDUs as specified by the following conditions and as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.601 and 264.602):

4.6.1. Geomechanical Monitoring

4.6.1.1. Implementation of Geomechanical Monitoring Program

The Permittees shall implement a geomechanical monitoring program in each Underground HWDU as specified in Permit Attachment A2, Section A2-5b(2), "Geomechanical Monitoring" and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602).

4.6.1.2. Reporting Requirements

The Permittees shall submit to the Secretary an annual report in October evaluating the geomechanical monitoring program and shall include geomechanical data collected from each Underground HWDU during the previous year, as specified in Permit Attachment A2, Section A2-5b(2), "Geomechanical Monitoring", and shall also include a map showing the current status of HWDU mining.~~ The Permittees shall also submit at that time an annual certification by a registered professional engineer certifying the stability of any explosion-isolation walls. The Permittees shall post a link to the geomechanical monitoring report transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.~~

4.6.1.3. Notification of Adverse Conditions

When evaluation of the geomechanical monitoring system data identifies a trend towards unstable conditions which requires a decision whether to terminate waste disposal activities in any Underground HWDU, the Permittees shall provide the Secretary with the same report provided to the WIPP Operations Manager within seven calendar days of its issuance, as specified in Permit Attachment A2, Section A2-5b(2)(a), "Description of the Geomechanical Monitoring System". The Permittees shall post a link to the adverse condition notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

4.6.2. Repository Volatile Organic Compound Monitoring

4.6.2.1. Implementation of Repository VOC Monitoring

The Permittees shall implement repository VOC monitoring and the Laboratory Performance Evaluation Plan (**LPEP**) or proficiency testing, as specified in Permit Attachment N (Volatile Organic Compound Monitoring Plan) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602 and §264.601(c)). The Permittees shall implement repository VOC monitoring until the certified closure of all Underground HWDUs.

4.6.2.2. Reporting Requirements

The Permittees shall report to the Secretary semi-annually in April and October the data and analysis of the VOC Monitoring Plan.

4.6.2.3. Notification Requirements

After each sampling event for the compounds listed in Table 4.6.2.3, the Permittees shall calculate the total and running annual averages for the carcinogenic and the total non-carcinogenic risk to the non-waste surface worker, using the methodology in Attachment N and the recommended EPA risk factors listed in Table 4.6.2.3.

The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the total and/or the running annual average carcinogenic risk to the non-waste surface worker exceeds 10^{-5} or the total and/or the running annual average non-carcinogenic risk as measured by the hazard index exceeds 1.0.

The Permittees shall post a link to any exceedance notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

The Permittees shall review EPA risk factors and the tentatively identified compound list annually and will submit the appropriate permit modification to update Table 4.6.2.3 as needed.

Table 4.6.2.3 – Recommended EPA Risk Factors		
Compound	**Carcinogenic IUR $(ug/m^3)^{-1}$**	**Non-carcinogenic RfC (mg/m^3)**
Carbon Tetrachloride	6.0×10^{-6}	1.0×10^{-1}
Chlorobenzene	N/A	5.0×10^{-2}
Chloroform	2.3×10^{-5}	9.8×10^{-2}
1,1-Dichloroethylene	N/A	2.0×10^{-1}
1,2-Dichloroethane	2.6×10^{-5}	7.0×10^{-3}
Methylene Chloride	1.0×10^{-8}	6.0×10^{-1}
1,1,2,2-Tetrachloroethane	5.8×10^{-5}	N/A
Toluene	N/A	5.0
1,1,1-Trichloroethane	N/A	5.0
Trichloroethylene	4.1×10^{-6}	2.0×10^{-3}

IUR = Inhalation Unit Risk from EPA Integrated Risk Information System (IRIS) Database

RfC = Reference Concentration from EPA IRIS Database

N/A = not applicable (No value published in the IRIS Database)

4.6.2.4. Remedial Action

If the running annual average for the total carcinogenic risk due to releases of VOCs specified in Table 4.6.2.3 exceeds 10^{-5}, or if the running annual average for the total non-carcinogenic hazard index due to releases of VOCs specified in Table 4.6.2.3 exceeds 1.0, the Permittees shall cease disposal in the active CH waste disposal room and install ventilation barriers as specified in Permit Section 4.5.3.3. Alternatively, prior to reaching these action levels, the Permittees may propose an alternative remedial action plan to the Secretary. The Permittees may implement such plans in lieu of closing the active room only after approval by the Secretary.

If the running annual average for the total carcinogenic risk due to releases of VOCs specified in Table 4.6.2.3 exceeds 10^{-5} or if the running annual average for the total non-carcinogenic hazard index due to releases of VOCs specified in Table 4.6.2.3 exceeds 1.0 for six consecutive months, the Permittees shall close the affected Underground HWDU as specified in Permit Section 4.1.1. Alternatively, prior to reaching these action levels for six consecutive months, the Permittees may propose an alternative remedial action plan to the Secretary. The Permittees may implement such plans in lieu of closing the active HWDU only after approval by the Secretary.

For any remedial action taken under this Permit Section, the Permittees shall submit to the Secretary written quarterly status reports, beginning 30 calendar days after the Permittees submit the initial notification in Permit Section 4.6.2.3 which resulted in the remedial action. The quarterly status report shall analyze the cause of exceedance, describe the implementation and results of the remedial action, and describe measures taken to prevent future exceedances. The Permittees shall submit such reports until the Secretary determines the remedial action has been completed in accordance with all applicable requirements of this Permit.

4.6.3. Disposal Room Volatile Organic Compound Monitoring

4.6.3.1. Implementation of Disposal Room VOC Monitoring

The Permittees shall implement disposal room VOC monitoring as specified in Permit Attachment N and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602 and §264.601(c)) and Section 310 of Public Law 108-447.

4.6.3.2. Notification Requirements

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

Table 4.6.3.2 - Action Levels for Disposal Room Monitoring

Compound	50% Action Level for VOC Constituents of Concern in Any Closed Room, ppmv	95% Action Level for VOC Constituents of Concern in Active Open or Immediately Adjacent Closed Room, ppmv
Carbon Tetrachloride	4,813	9,145
Chlorobenzene	6,500	12,350
Chloroform	4,965	9,433
1,1-Dichloroethylene	2,745	5,215
1,2-Dichloroethane	1,200	2,280
Methylene Chloride	50,000	95,000

1,1,2,2-Tetrachloroethane	1,480	2,812
Toluene	5,500	10,450
1,1,1-Trichloroethane	16,850	32,015
Trichloroethylene	24,000	45,600

4.6.3.3. Remedial Action

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

4.6.4. Mine Ventilation Rate Monitoring

4.6.4.1. Implementation of Mine Ventilation Rate Monitoring Plan

The Permittees shall implement the Mine Ventilation Rate Monitoring Plan specified in Permit Attachment O (WIPP Mine Ventilation Rate Monitoring Plan) until the certified closure of all Underground HWDUs and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602 and §264.601(c)).

4.6.4.2. Reporting Requirements

The Permittees shall report to the Secretary annually in October the results of the data and analysis of the Mine Ventilation Rate Monitoring Plan.

4.6.4.3. Notification Requirements

The Permittees shall evaluate compliance with the minimum active room ventilation rate specified in Permit Section 4.5.3.2 on a monthly basis. The Permittees shall report to the Secretary in the annual report specified in Permit Section 4.6.4.2 whenever the evaluation of the mine ventilation monitoring program data identifies that the ventilation rate specified in the Permit Section 4.5.3.2 has not been achieved.

~~4.6.5. Hydrogen and Methane Monitoring~~

~~4.6.5.1. Implementation of Hydrogen and Methane Monitoring~~

~~The Permittees shall implement the Hydrogen and Methane Monitoring Plan specified in Permit Attachment N1 (Hydrogen and Methane Monitoring Plan).~~

~~4.6.5.2. Reporting Requirements~~

~~The Permittees shall report to the Secretary semi-annually in April and October the data and analysis of the Hydrogen and Methane Monitoring Plan.~~

~~4.6.5.3. Notification Requirements~~

~~The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the concentration of hydrogen or methane in a filled panel exceeds the action levels specified in Table 4.6.5.3 below.~~

~~The Permittees shall post a link to the notification letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.~~

~~**Table 4.6.5.3 - Action Levels for Hydrogen and Methane Monitoring**~~		
~~**Compound**~~	~~**Action Level 1**~~	~~**Action Level 2**~~
~~Hydrogen~~	~~4,000 ppm~~	~~8,000 ppm~~
~~Methane~~	~~5,000 ppm~~	~~10,000 ppm~~

~~4.6.5.4. Remedial Action~~

~~Upon receiving validated analytical results that indicate at least one compound exceeded “Action Level 1” in Table 4.6.5.3, the sampling frequency in that filled panel will increase to once per week. Upon receiving validated analytical results that indicate at least one compound exceeded “Action Level 2” in Table 4.6.5.3 in two consecutive weekly samples, the Permittees shall install in that panel the explosion-isolation wall specified in Permit Attachment G1.~~

~~4.6.5.5. Sampling Line Loss~~

~~The Permittees shall notify the Secretary in writing within seven calendar days of the discovery of loss of sampling line(s). The Permittees shall evaluate any loss of sampling lines as described in Permit Attachment N1, Section N1-5b, “Sample Tubing”, and shall notify the Secretary in writing within seven calendar days the results of such evaluation. The Permittees shall also post a link to such notification letters on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11~~

4.7. INSPECTION SCHEDULES AND PROCEDURES

The Permittees shall inspect the Underground HWDUs at least weekly, as specified in Permit Attachment E (Inspection Schedule, Process and Forms), Tables E-1 and E-1a, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15). The Permittees shall perform these inspections to detect malfunctions, signs of deterioration, operator errors, discharges, or any other factors which have caused or may cause a release of hazardous wastes or hazardous waste constituents to the environment or which may compromise the ability of any Underground HWDU to comply with the environmental performance standards in 20.4.1.500 NMAC (incorporating 40 CFR §264.601).

4.8. RECORDKEEPING

4.8.1. Underground HWDU Location Map

The Permittees shall maintain, in the operating record, a map containing the exact location and dimensions of each Underground HWDU with respect to permanently surveyed benchmarks.

4.8.2. Disposal Waste Type and Location

The Permittees shall maintain, in the operating record, a record identifying the types and quantities of TRU mixed waste in each Underground HWDU and the disposal location of each container or container assembly (e.g., a 7-pack of standard 55-gallons drums) within each Underground HWDU, using the following fields from the WWIS data dictionary:

1. Panel Number

2. Room Number or Drift Number
3. Row Number (for CH TRU mixed waste) or Borehole Number (for RH TRU mixed waste)
4. Column Number (for CH TRU mixed waste)
5. Column Height (for CH TRU mixed waste)
6. Container Type Code
7. Container Identification Number
8. Manifest Document Number
9. Disposal Date

The Permittees shall also maintain, in the operating record, a map or diagram depicting the location and quantity of each waste. The map or diagram shall include a cross reference to specific manifest document numbers, if the waste was accompanied by a manifest, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(2)).

4.8.3. Ventilation Rate

The Permittees shall maintain, in the operating record, a record identifying any non-conformance to the ventilation rate specified in Permit Section 4.5.3.2.

PERMIT ATTACHMENTS

Permit Attachment A1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Container Storage" – Appendix M1).

Permit Attachment A2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Geologic Repository" – Appendix M2).

Permit Attachment A3 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Underground Facilities Typical Disposal Panel" – Drawing Number 51-W-214-W, Appendix M3).

Permit Attachment A4 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Traffic Patterns" – Chapter G).

Permit Attachment E (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Inspection Schedule, Process and Forms" - Chapter D).

Permit Attachment G1, "WIPP Panel Closure Design Description and Specifications." ~~(as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Detailed Design Report for an Operation Phase Panel Closure System" – Appendix I1).~~

Permit Attachment N (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, " Volatile Organic Compound Monitoring Plan" - Chapter N).

~~Permit Attachment N1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Hydrogen and Methane Monitoring Plan" - Appendix N1)~~

Permit Attachment O (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "WIPP Mine Ventilation Rate Monitoring Plan" - Chapter Q).

PART 6 – CLOSURE REQUIREMENTS

6.1. OVERVIEW

This Part specifies the closure requirements for the WIPP facility. The Permittees shall close the permitted Container Storage Units and Underground Hazardous Waste Disposal Units (**Underground HWDUs**) in accordance with the requirements in 20.4.1.500 NMAC (incorporating 40 CFR §§264.110 through 264.116 and §264.178), this Permit Part, and the procedures described in Permit Attachment G (Closure Plan).

6.2. PERFORMANCE STANDARD

The Permittees shall close the facility as specified in Permit Attachment G and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.111).

6.3. AMENDMENT TO CLOSURE PLAN

The Permittees shall amend Permit Attachment G, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.112(c)), whenever necessary.

6.4. NOTIFICATION OF CLOSURE

The Permittees shall notify the Secretary in writing at least 60 calendar days prior to the date on which they expect to begin partial closure, i.e., closure of an Underground Hazardous Waste Disposal Unit (**Underground HWDU**), or final closure of the facility as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.112(d) and 264.601). The Permittees shall post a link to the closure notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

6.5. TIME ALLOWED FOR CLOSURE

6.5.1. Partial Closure

Upon completion of disposal operations in an Underground HWDU, the Permittees shall complete partial closure activities as specified in Permit Attachment G, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.113).

6.5.2. Final Facility Closure

After receiving the final volume of TRU mixed waste, the Permittees shall remove from the facility all non-mixed hazardous waste, dispose in the Underground HWDUs all TRU-mixed hazardous waste and derived waste, and complete closure activities as specified in Permit Attachment G and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.113).

6.6. DISPOSAL OR DECONTAMINATION OF EQUIPMENT, STRUCTURES, AND SOILS

The Permittees shall decontaminate or dispose of all contaminated equipment, structures, and soils, as specified in Permit Attachment G and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.114).

6.7. CERTIFICATION OF CLOSURE

Within 60 calendar days of completion of closure of each Underground HWDU, and within 60 calendar days of completion of final closure, the Permittees shall certify in writing to the Secretary that the Underground HWDUs and/or facility have been closed as specified in Permit Attachment G and as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.115 and 264.601).

6.8. SURVEY PLAT

No later than the submission of the certification of closure of each Underground HWDU, the Permittees shall submit a survey plat detailing the location and dimensions of each Underground HWDU with respect to permanently surveyed benchmarks, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.116).

6.9. CLOSURE OF PERMITTED CONTAINER STORAGE UNITS

At closure of the WHB Unit and Parking Area Unit, the Permittees shall remove all hazardous waste and hazardous waste residues from the containment system, in accordance with the procedures in Permit Attachment G, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.111 and 264.178).

6.10. CLOSURE OF PERMITTED DISPOSAL UNITS

6.10.1. Panel Closure

The Permittees shall close each Underground HWDU in a manner that meets the closure standard for volatile organic compounds in Table 6.10.1, which represent health based levels (**HBLs**) at the location of the nearest permanent downwind resident. Upon completion of disposal in an Underground HWDU, the Permittees shall provide written notification to the Secretary stating the final volume of TRU mixed waste emplaced in the Underground HWDU. The Permittees shall also close the Underground HWDU as specified in Permit Attachment G and Permit Attachment G1 (*WIPP Panel Closure Design Description and Specifications*~~Detailed Design Report for an Operation Phase Panel Closure System~~). The Permittees shall post a link to the final panel volume notice transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11.

Table 6.10.1. WIPP Panel Closure Volatile Organic Compound Closure Standard for Public Exposures	
Volatile Organic Compound	**WIPP HBL μg/m^3**
Carbon Tetrachloride	0.33
Toluene	5,000
Trichloroethylene	0.39
Chloroform	0.087
Methylene Chloride	101
1,1,1-Trichloroethane	5,000
1,1,2,2-Tetrachloroethane	0.035
1,2-Dichloroethane	0.077
1,1-Dichloroethylene	200
Chlorobenzene	50.0

6.10.2. Repository Closure

Upon completion of disposal in the repository and closure of all Underground HWDUs, the Permittees shall close the repository as specified in Permit Attachment G and Permit Attachment G2 (Shaft Sealing System Compliance Submittal Design Report).

6.10.3. Repository Post-Closure

Upon completion of repository closure as specified in Permit Section 6.10.2, the Permittees shall comply with all post-closure requirements as specified in Permit Part 7, Post-Closure Care.

PERMIT ATTACHMENTS

Permit Attachment G, “Closure Plan.” ~~(as modified from WIPP RCRA Part B Permit Application, “Closure Plans, Post-Closure Plans, and Financial Requirements” - Chapter I).~~

Permit Attachment G1, “WIPP Panel Closure Design Description and Specifications.” ~~(as modified from WIPP RCRA Part B Permit Application, “Detailed Design Report for an Operation Phase Panel Closure System” - Appendix I1).~~

Permit Attachment G2 (as modified from WIPP RCRA Part B Permit Application, “Shaft Sealing System Compliance Submittal Design Report” - Appendix I2).

PART 7 - POST-CLOSURE CARE PLAN

7.1. OVERVIEW

This Part specifies the post-closure care requirements for the WIPP facility. Post-closure care requirements are applicable to Underground Hazardous Waste Disposal Units (**Underground HWDUs**) and include requirements for routine inspection and maintenance of the closed panel entry drifts, and air monitoring as required. Post-closure care requirements apply immediately after certification of closure of each Underground HWDU and continue for 30 years after final closure of the facility. Post-closure care requires active institutional controls including fencing and warning signs, inspections, maintenance, monitoring of ground water, and control and cleanup of releases.

7.2. UNIT IDENTIFICATION

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

7.3. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

The Permittees shall conduct post-closure care after completion of closure of each Underground HWDU identified in Permit Section 7.2 and shall continue post-closure care for thirty (30) years after the date of certification of final closure of the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(a)(1)). The Permittees may request, at any time during the post-closure care period, a Permit modification to shorten the applicable post-closure care period. The Secretary may shorten the post-closure care period if the Secretary finds the reduced period is sufficient to protect human health and the environment, as provided by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(a)(2)(i)). The Secretary may extend the applicable post-closure care period if the Secretary finds an extension is necessary to protect human health and the environment, as provided by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(a)(2)(ii)).

7.3.1. Post-Closure Plan

The Permittees shall implement the Post-Closure Plan in Permit Attachment H and Permit Attachment H1 (Active Institutional Controls During Post-closure), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(d), §264.118(b) and §264.603).

7.3.2. Post-Closure Care and Monitoring

7.3.2.1. General Monitoring, Inspection, and Maintenance Requirements

The Permittees shall monitor and perform inspections of the Underground HWDU closures, and perform maintenance of the accessible bulkheads of the closures, as necessary~~closed Underground HWDU access drifts after construction of each HWDU closure system, as specified in Permit Attachment A2 (Geologic Repository)~~. The Permittees shall monitor and maintain the components, structures and equipment of the waste containment systems at the facility as specified in Permit Attachments H and H1, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(a)(1)(ii)).

7.3.2.2. Air Monitoring Requirements

The Permittees shall maintain ventilation and perform daily monitoring of the mine ventilation air downstream from closed Underground HWDUs at the beginning of days when work is to be performed downstream from the closed Underground HWDUs. The Permittees shall implement the Volatile Organic Compound Monitoring Plan in Permit Attachment N (Volatile Organic Compound Monitoring Plan) during the post-closure care period for closed Underground HWDUs, until six (6) months after the certification of closure of all Underground HWDUs, as specified in Permit Section 4.6.2. [20.4.1.500 NMAC (incorporating 40 CFR §264.117(a), §264.601 and §264.603)]

7.3.2.3. Detection Monitoring Program

The Permittees shall maintain and implement the Detection Monitoring Program during the post-closure care period as specified in Part 5 and Permit Attachment L (WIPP Ground-water Detection Monitoring Program Plan), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264 Subpart F and §264.117(a)(1)).

7.3.3. Security

The Permittees shall comply with the applicable post-closure security requirements as specified in Permit Attachments H and H1 and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(b)(2)).

7.3.4. Post-Closure Disturbance

The Permittees shall not allow any use of the facility surface area above the Underground HWDUs designated in Permit Section 7.2 which could disturb the integrity of the shaft sealing systems or any components of the waste containment system, or the function of the facility monitoring systems during the post-closure care period, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.117(c)), except as allowed under 20.4.1.500 NMAC (incorporating 40 CFR §264.117(c)(1) or (2)).

7.4. NOTICES AND CERTIFICATION

7.4.1. Disposal Unit Records

No later than 60 calendar days after certification of closure of each Underground HWDU, the Permittees shall submit to the Secretary and the local zoning authority, or the authority with jurisdiction over local land use, a record of the type, location, and quantity of TRU mixed waste disposed in each Underground HWDU, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.119(a)).

7.4.2. Deed Notice

Within 60 calendar days of certification of closure of the first Underground HWDU and within 60 calendar days of certification of the last Underground HWDU, the Permittees shall comply with the following conditions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.119(b)):

7.4.2.1. Deed Recordation

The Permittees shall record, in accordance with New Mexico law, a notation on the deed to the facility property, or on some other instrument that is normally examined during a title search, that will in perpetuity notify any potential purchaser of the property that:

(i) The land has been used to manage TRU mixed waste; and

(ii) Its use is restricted under 20.4.1.500 NMAC (incorporating 40 CFR §264 Subpart G) regulations; and

(iii) The survey plat and record of the type, location, and quantity of TRU mixed waste disposed in each Underground HWDU have been filed with the Secretary and the local zoning authority or the authority with jurisdiction over local land use.

7.4.2.2. Certification

The Permittees shall submit a certification to the Secretary, signed by the Permittees, stating the Permittees have recorded the notation specified in Permit Section 7.4.2.1, including a copy of the document(s) in which the notation has been placed, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.119(b)).

7.4.3. Removal of Wastes or Contaminated Soils

If the Permittees, or any subsequent owner or operator of the land upon which the Underground HWDUs are located, wishes to remove TRU mixed wastes, TRU mixed waste residues, or contaminated soils, they shall request a modification to this permit in accordance with the applicable requirements in 20.4.1.900 NMAC (incorporating 40 CFR Part 270) and 4.1.901. The Permittees or any subsequent owner or operator of the land shall demonstrate the removal of TRU mixed wastes will satisfy the criteria of 20.4.1.500 NMAC (incorporating 40 CFR §264.117(c) and §264.119(c)).

7.4.4. Completion of Post-Closure Care

No later than 60 calendar days after completion of the post-closure care period for each Underground HWDU, the Permittees shall submit to the Secretary, by registered mail, a certification that the post-closure care for the Underground HWDU was performed in accordance with the specifications in the approved Post-Closure Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.120). The Permittees and an independent New Mexico registered professional engineer shall sign the certification. The Permittees shall provide to the Secretary upon request the documentation supporting the professional engineer's certification, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.145(i) and §264.120).

7.5. POST-CLOSURE PERMIT MODIFICATIONS

The Permittees shall submit a written notification of or request for a permit modification to amend the approved Post-Closure Plan at any time during the active life of the facility or during the post-closure care period, as required by 20.4.1.500, .900, and .901 NMAC (incorporating 40 CFR §§264.118(d) and 270). The Permittees shall include a copy of the proposed amended Post-Closure Plan for approval by the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.118(d)).

7.5.1. Changes Requiring a Permit Modification

Changes to the approved Post-Closure Plan which require a permit modification include, but are not limited to, the following circumstances specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.118(d)(2)):

7.5.1.1. Operating Plans

Whenever changes in operating plans or facility design affect the approved Post-Closure Plan; or

7.5.1.2. Timing of Closure

Whenever there is a change in the expected year of final closure; or

7.5.1.3. Other Events

Whenever other events occur during the active life of the facility, including partial or final closure, that affect the approved Post-Closure Plan.

7.5.2. Timing of Permit Modification

The Permittees shall submit a written request for a permit modification at least 60 calendar days prior to the proposed change in facility design or operation, or no later than 60 calendar days after an unexpected event has occurred which affects the Post-Closure Plan, as required by 20.4.1.500 NMAC (incorporating §264.118(d)(3)).

PERMIT ATTACHMENTS

Permit Attachment A2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Geologic Repository" - Appendix M2).

Permit Attachment H (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Post-Closure Plan" - Chapter J).

Permit Attachment H1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Active Institutional Controls During Post-Closure" - Appendix J1).

Permit Attachment L (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "WIPP Ground-water Detection Monitoring Program Plan" – Chapter L).

Permit Attachment N (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Volatile Organic Compound Monitoring Plan" - Chapter N)