



Department of Energy

Carlsbad Field Office
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October 15, 2021

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

Subject: Class 2 Permit Modification Request, Hazardous Waste Facility Permit Number:
NM4890139088-TSDF

Dear Mr. Maestas:

Enclosed is the Class 2 Permit Modification Request for the following item:

- Update Panel 8 Volatile Organic Compound Room-Based Limits

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

If you have any questions, please contact Mr. Michael R. Brown at (575) 234-7476.

Sincerely,

REINHARD
KNERR

Reinhard Knerr
Manager
Carlsbad Field Office

Digitally signed by
REINHARD KNERR
Date: 2021.10.15 08:20:18
-06'00'

SEAN DUNAGAN
(Affiliate)

Sean Dunagan
President and Project Manager
Nuclear Waste Partnership LLC

Digitally signed by SEAN
DUNAGAN (Affiliate)
Date: 2021.10.14
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Enclosure

cc: w/enclosure

N. Barka, NMED *ED

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*ED denotes electronic distribution

Class 2 Permit Modification Request

Update Panel 8 Volatile Organic Compound Room-Based Limits

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

WIPP Permit Number - NM4890139088-TSDF

October 2021

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
HWDU	Hazardous Waste Disposal Unit
IDLH	Immediately Dangerous to Life or Health
LEL	lower explosive limit
NIOSH	National Institute of Occupational Safety and Health
NMAC	New Mexico Administrative Code
Permit	WIPP Hazardous Waste Facility Permit
PMR	Permit Modification Request
ppmv	parts per million [by volume]
RCRA	Resource Conservation and Recovery Act
RHV	[adjacent closed] room headspace volume
TRU	transuranic
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant

Overview of the Permit Modification Request

This document contains a Class 2 Permit Modification Request (**PMR**) for the Waste Isolation Pilot Plant (**WIPP**) Hazardous Waste Facility Permit (**Permit**), Permit Number NM4890139088-TSDF.

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

The hypothetical roof fall scenario in the closed room adjacent to the active disposal room is the basis for the volatile organic compound (**VOC**) room-based limits listed in Permit Part 4, Section 4.4, Table 4.4.1 – VOC Room-Based Limits. The scenario is described in the Resource Conservation and Recovery Act (**RCRA**) Part B Application (Appendix D9, *Exposure Assessment for Protection of the Atmosphere*; Attachment 1, *Examination of Roof Collapse Scenario* [DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997]).

This modification updates VOC room-based limits for Panel 8 due to a change in room height. The RCRA Part B Application Appendix D9 Attachment 1 methodology (DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997) is used to calculate the VOC room-based limits. This update maintains an equivalent level of worker protection in Panel 8 from VOCs as was required for Panels 1 through 7. For Panel 8, the nominal room height (*i.e.*, room height at the time of waste emplacement) will be 16 ft. The current VOC room-based limits were determined using a room height of 13 ft. Considering the change in room height for Panel 8, an update to VOC room-based limits is required to provide the same level of protection to underground waste emplacement workers. No changes are required to the conditions in the Permit affecting the Repository VOC Monitoring Program.

The Permittees are modifying Permit Part 4 related to VOC limits due to a change in room height for Panel 8:

- Part 4, *Geologic Repository Disposal*
 - Section 4.4.1, *Room-Based Limits*
 - Section 4.6.3.2, *Notification Requirements*
 - Section 4.6.3.3, *Remedial Action*

The Permittees are modifying the following Permit Attachments to ensure consistency relative to level of detail across respective Permit sections:

- Attachment A2, *Geologic Repository*
 - Section A2-2a(3), *Subsurface Structures, Underground Hazardous Waste Disposal Units (HWDUs)*
- Attachment A3, *Typical Disposal Panel*
- Attachment G, *Closure Plan, Figures*
 - Figure G-5, *Typical Disposal Panel*
- Attachment N, *Volatile Organic Compound Monitoring Plan*
 - Section N-1, *Introduction*
 - Section N-1a, *Background*

- Section N-1b, *Objectives of the Volatile Organic Compound Monitoring Plan*
- Section N-3e(2), *Data Evaluation and Reporting for Disposal Room VOC Monitoring*
- Figure N-4, *Disposal Room Sample Head Arrangement*

The requested modifications to the Permit and related supporting documents are provided in this PMR. The modifications to the text of the Permit have been identified using red text and double underline and a ~~strikeout~~ font for deleted information. Direct quotations are indicated by italicized text. The following information specifically addresses how compliance has been achieved with Permit Part 1, Section 1.3.1., for submission of this Class 2 PMR.

The exact changes to the Permit text are described in item 1 below and also found in Appendix B of this PMR. These changes do not reduce the ability of the Permittees to provide continued protection to human health and the environment.

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

The changes to the descriptive text and tables in the applicable Permit sections are summarized below:

- Permit Part 4, Section 4.4.1, *Room-Based Limits*.
 - The Permit condition is modified to specify that Table 4.4.1 applies to Panels 1-7 only. The language immediately preceding Table 4.4.1 is changed from, "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," to, "The measured concentration of VOCs in any open (active) room and in each closed room in active panels within Underground HWDUs Panels 1-7 shall not exceed the limits specified in Table 4.4.1."
 - The title of Table 4.4.1 is modified from "VOC Room-Based Limits" to "VOC Room-Based Limits for Panels 1-7."
 - Additional text is added immediately following Table 4.4.1 to specify that the Panel 8 VOC room-based limits are in a new table (Table 4.4.2). The added text reads as follows: "The measured concentration of VOCs in any open (active) room and in each closed room in active panels within Underground HWDU Panel 8 shall not exceed the limits specified in Table 4.4.2."
 - A new table is added to indicate the VOC room-based limits for Panel 8 (Table 4.4.2).
 - Immediately following Table 4.4.2, the following text is added: "There are no maximum concentration limits for other VOCs." This additional language provides consistency with language immediately following existing Table 4.4.1.
- Permit Part 4, Section 4.6.3.2, *Notification*.
 - The Permit condition is modified to provide consistency with updates to Permit Part 4, Section 4.4.1 regarding panel specific VOC room-based limits. The language in

the first sentence is changed from, "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," to, "The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the concentration of any VOC specified in either Table 4.4.1 or Table 4.4.2, as appropriate, in any closed room in an active panel or in the immediately adjacent closed room exceeds the action levels specified in Table 4.6.3.2 or Table 4.6.3.3, as appropriate."

- The title of Table 4.6.3.2 is modified from, "Action Levels for Disposal Room Monitoring," to, "Action Levels for Disposal Room Monitoring in Panels 1-7."
- A new table is added to indicate the VOC room-based monitoring action levels in Panel 8 (Table 4.6.3.3).
- Permit Part 4, Section 4.6.3.3, *Remedial Action*.
 - The Permit condition is modified to provide consistency with updates to Permit Part 4, Section 4.4.1, regarding Panel specific VOC room-based limits. The language in the first sentence is changed from, "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," to, "Upon receiving validated analytical results that indicate one or more of the VOCs specified in Table 4.4.1 or Table 4.4.2, in any of the closed rooms in an active panel has reached the '50% Action Level' in Table 4.6.3.2 or Table 4.6.3.3, as appropriate, the sampling frequency for such closed rooms will increase to once per week."
 - The Permit condition is modified to provide consistency with updates to Permit Part 4, Section 4.4.1, regarding Panel specific VOC room-based limits. The language in the second sentence is changed from, "The once per week sampling will continue either until the concentration 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," to, "The once per week sampling will continue either until the concentration in the closed room(s) fall below the '50% Action Level', or until closure of Room 1 of the panel, whichever occurs first."
 - The Permit condition is modified to provide consistency with updates to Permit Part 4, Section 4.4.1, regarding Panel specific VOC room-based limits. The language in the third sentence is changed from "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," to, "If one or more of the VOCs in Table 4.4.1 or Table 4.4.2 in the active open room or immediately adjacent closed room reaches the '95% Action Level' in Table 4.6.3.2 or Table 4.6.3.3, as appropriate, another sample will be taken to confirm the existence of such a condition."

- The Permit condition is modified to provide consistency with updates to Permit Part 4, Section 4.4.1, regarding Panel specific VOC room-based limits. The language in the fourth sentence is changed from, “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,” to, “If the second sample confirms that one or more of VOCs in the immediately adjacent closed room have reached the ‘95% Action Level’, 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.”
- Permit Attachment A2, Section A2-2a(3), *Subsurface Structures, Underground Hazardous Waste Disposal Units (HWDUs)*.
 - The second paragraph, fifth sentence is modified from, “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,” to, “The rooms in Panels 1-7 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.”
 - Additional text is added to the end of the second paragraph and reads as follows: “The rooms in Panels 8 will have nominal dimensions of 16 ft (5.0 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.”
- Permit Attachment A3, *Typical Disposal Panel*.
 - Figure nomenclature is added to the existing figure along with a modification to the figure title. The modification reads as follows: “Figure A3-1, Typical Disposal Panel Dimensions for Panels 1-7”.
 - A new figure, “Figure A3-2, Typical Disposal Panel Dimensions for Panel 8”, is added to illustrate the change in room height for Panel 8.
- Permit Attachment G, *List of Figures*.
 - The existing figure, Figure G-5, is being separated into two figures, Figure G-5a and Figure G-5b to differentiate between Panels 1-7, and Panel 8, respectively.
- Permit Attachment G, *Figures*.
 - The existing figure title of Figure G-5 is modified from “Figure G-5, Typical Disposal Panel,” to, “Figure G-5a, Typical Disposal Panel Dimensions for Panels 1-7”
 - A new figure, “Figure G-5b, Typical Disposal Panel Dimensions for Panel 8”, is added to illustrate the change in room height for Panel 8.

- Permit Attachment N, *List of Figures*.
 - The existing figure, Figure N-4, is being separated into two figures, Figure N-4a and Figure N-4b to differentiate between Panels 1-7, and Panel 8, respectively.
- Permit Attachment N, Section N-1, *Introduction*.
 - The second sentence is modified from, "...; 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," to, "...; 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 4.4.1, 4.4.2, 4.6.3.2, and 4.6.3.3."
- Permit Attachment N, Section N-1a, *Background*.
 - The third sentence is modified from, "Each room is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 13 ft (4 m) high," to, "Each room in Panels 1-7 is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 13 ft (4 m) high."
 - Additional text is added after the third sentence and reads as follows: "Each room in Panel 8 is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 16 ft (5 m) high."
- Permit Attachment N, Section N-1b, *Objectives of the Volatile Organic Compound Monitoring Plan*.
 - The second bullet, first sentence is modified from, "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," to, "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 or Table 4.4.2, as appropriate."
 - The second bullet, second sentence is modified from, "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," to, "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 or Table 4.6.3.3, as appropriate."
- Permit Attachment N, Section N-3e(2), *Data Evaluation and Reporting for Disposal Room VOC Monitoring*.
 - The first paragraph, last sentence is modified from, "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," to, "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 or Table 4.6.3.3, as appropriate.”

- The second paragraph is modified from, “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,” to, “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 or Table 4.4.2 exceeds the action levels specified in Permit Part 4, Table 4.6.3.2 or Table 4.6.3.3, respectively.”
- Permit Attachment N, *Figures*.
 - The existing figure title of Figure N-4 is modified from “Figure N-4, Disposal Room Sample Head Arrangement,” to, “Figure N-4a, Disposal Room Sample Head Arrangement for Panels 1-7”.
 - A new figure, “Figure N-4b, Disposal Room Sample Head Arrangement for Panel 8”, is added to illustrate the change in room height for Panel 8.

Changes are described in Appendix A, *Table of Changes*, with the exact changes identified in Appendix B, *Revised Permit Text*, of this PMR. Appendix A provides a list of updates by Permit section. Appendix B provides the exact modifications to the existing Permit language; changes are tracked using red text and double underline for modifications and a ~~strikeout~~ font for deletions. Appendix C, *Basis for Panel 8 VOC Room-Based Limits Update*, documents the methodology used to update the VOC room-based limits for Panel 8.

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

This PMR is classified as a Class 2 modification for the reason indicated below:

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

Updates to Permit conditions in this PMR do not alter the level of protectiveness afforded by the environmental performance standards imposed by Permit Part 4, or reduce the capacity of the facility to protect human health or the environment. Permit conditions for VOC room-based limits in Panel 8 are being added to maintain an equivalent level of worker protection as was required for Panels 1 through 7. No Permit conditions are being removed, and the list of hazardous waste managed at the WIPP facility remains unchanged.

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

Prior to the February 2014 fire and radiological event, Panel 8 mining began on the lower horizon, below Clay G (refer to Figure 1). Panel 8, Rooms 1 and 2 were fully mined, and Room 3 was partially mined (refer to Figure 2).

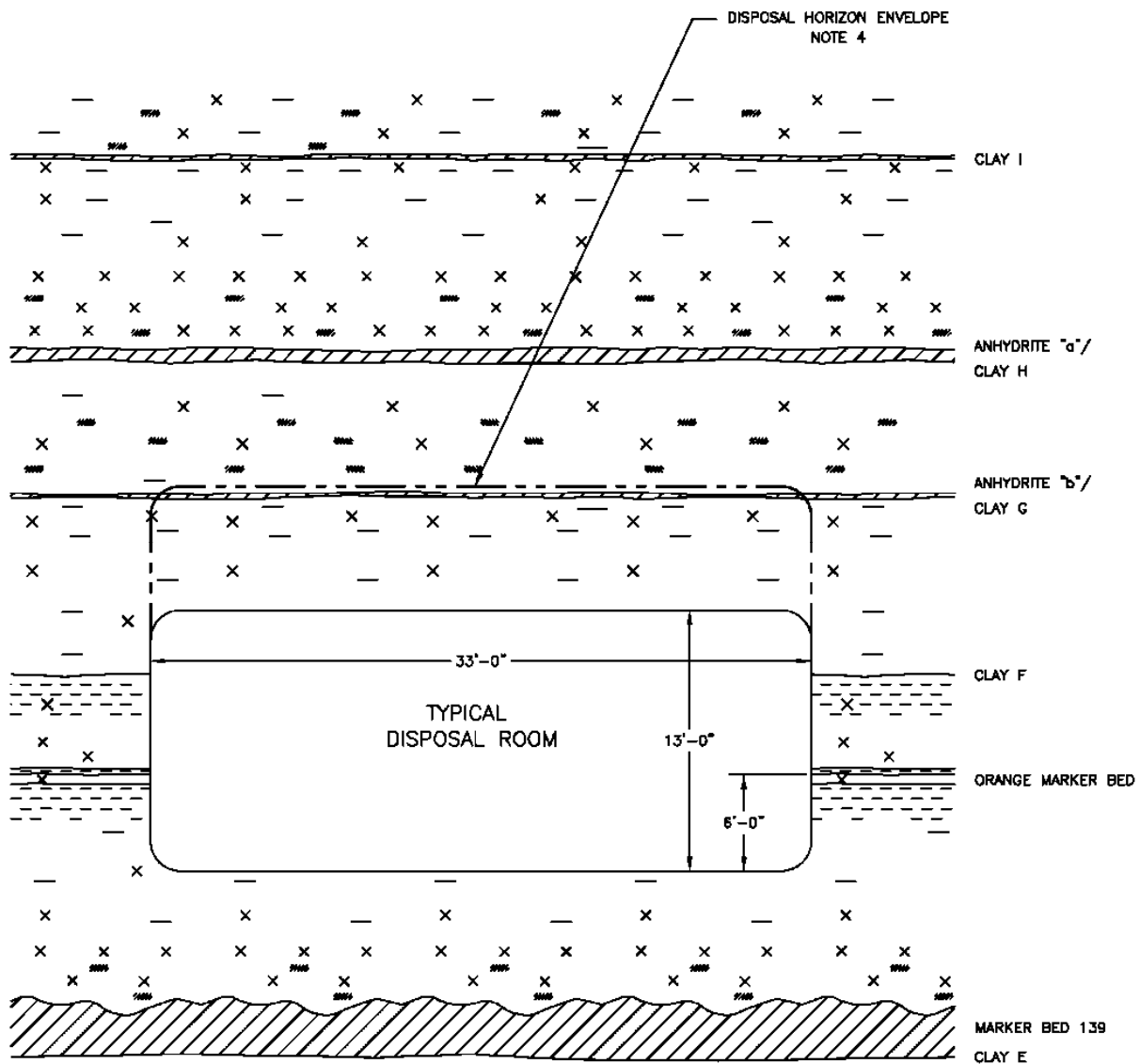


Figure 1: Disposal Horizon

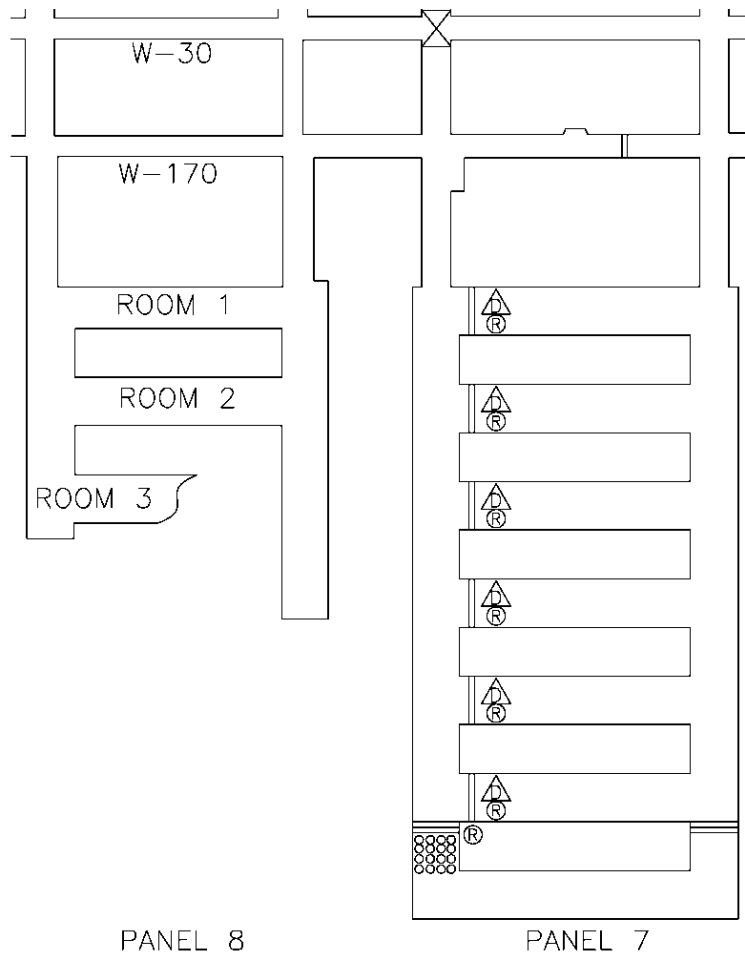


Figure 2: Panel 8 As-Built (January 2018)

Mining was suspended for approximately four years due to the February 2014 events. During the 4-year mining suspension, the back in Panel 8 developed significant low-angle shear fractures. To ensure long-term stability and safety of the panel after operations resumed, the decision was made to re-mine the existing back and to change the mining horizon for the remainder of Panel 8 to the upper horizon (*i.e.*, the back located at Clay G). With the back at Clay G and the floor nominally two feet below the Orange Marker Bed, 16-foot high drifts and rooms were needed.

The calculation of VOC room-based limits is based on a model that uses the headspace volume in a filled disposal room (refer to Appendix C). For Panel 8, the headspace volume increased because the rooms were excavated to a greater height. To ensure an equivalent level of worker protection as was required in Panels 1 through 7, the room-based limits in Panel 8 need to be updated appropriately to compensate for the increase in headspace volume. The VOC room-based limits for Panel 8 have been calculated resulting in updated Permit conditions. This modification is needed to incorporate the updated conditions into the Permit and to provide the NMED with the information to evaluate the protectiveness of these conditions.

In addition, the modified conditions also affect descriptive language in other portions of the Permit. Descriptive language is being updated to ensure consistency across the Permit.

Therefore, this modification is needed for the following reasons:

- Adds Permit conditions that provide an equivalent level of worker protection in Panel 8 for VOCs, as was required for Panels 1 through 7 due to a change in room height for Panel 8
- Documents the methodology used to calculate VOC room-based limits for Panel 8 in order for the NMED to evaluate the efficacy of the updates
- Documents the room dimensions for Panel 8
- Ensures other portions of the Permit reflect these updates

No Permit conditions are being removed, and the list of hazardous waste managed at the WIPP facility remains unchanged.

4. **20.4.1.900 NMAC (incorporating 40 §CFR 270.42 (b)(1)(iv)), requires the applicant to provide the applicable information required by 40 §CFR 270.13 through §270.21, §270.62 and §270.63.**

Table 1, *Regulatory Crosswalk*, describes those portions of the Permit that are affected by this PMR. Where applicable, regulatory citations in this modification reference Title 20, Chapter 4, Part 1, NMAC, revised December 1, 2018, incorporating 40 CFR Parts 264 and 270. 40 CFR §§270.16 through §270.21, §270.62, and §270.63 are not applicable at the WIPP facility. Consequently, they are not listed in Table 1.

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

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

Table 1: Regulatory Crosswalk

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the Permit or Permit Application	Yes	No
§270.13		Contents of Part A permit application	Attachment B, Part A		✓
§270.14(b)(1)		General facility description	Attachment A		✓
§270.14(b)(2)	§264.13(a)	Chemical and physical analyses	Attachment C		✓
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Attachment C		✓
	§264.13(c)	Off-site waste analysis requirements	Attachment C		✓
§270.14(b)(4)	§264.14(a-c)	Security procedures and equipment	Part 2.6.		✓
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Attachment E		✓
	§264.174	Container inspections	Attachment E		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Attachment E		✓
§270.14(b)(6)		Request for waiver from preparedness and prevention requirements of Part 264 Subpart C	NA		✓
§270.14(b)(7)	264 Subpart D	Contingency plan requirements	Attachment D		✓
	§264.51	Contingency plan design and implementation	Attachment D		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment D		✓
	§264.53	Contingency plan copies	Attachment D		✓
	§264.54	Contingency plan amendment	Attachment D		✓
	§264.55	Emergency coordinator	Attachment D		✓
	§264.56	Emergency procedures	Attachment D		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Part 2.10.		✓
§270.14(b)(8) (i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Part 2.10.		✓
§270.14(b)(8) (ii)		Runoff or flood prevention (e.g., berms, trenches, and dikes)	Part 2.10.		✓
§270.14(b)(8) (iii)		Prevention of contamination of water supplies	Part 2.10.		✓
§270.14(b)(8) (iv)		Mitigation of effects of equipment failure and power outages	Part 2.10.		✓
§270.14(b)(8) (v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Part 2.10.		✓
§270.14(b)(8) (vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Part 4 Attachment A2 Attachment N		✓
	264 Subpart C	Preparedness and Prevention	Part 2.10.		✓
	§264.31	Design and operation of facility	Part 2.10.		✓
	§264.32	Required equipment	Part 2.10. Attachment D		✓
	§264.33	Testing and maintenance of equipment	Attachment E		✓
	§264.34	Access to communication/alarm system	Part 2.10.		✓
	§264.35	Required aisle space	Part 2.10.		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the Permit or Permit Application	Yes	No
	§264.37	Arrangements with local authorities	Attachment D		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes	Part 2.10.		✓
§270.14(b)(10)		Traffic pattern, volume, and controls, for example: Identification of turn lanes Identification of traffic/stacking lanes, if appropriate Description of access road surface Description of access road load-bearing capacity Identification of traffic controls	Attachment A4		✓
§270.14(b)(11)(i) and (ii)	§264.18(a)	Seismic standard applicability and requirements	Part B, Rev. 6 Chapter B		✓
§270.14(b)(11)(iii-v)	§264.18(b)	100-year floodplain standard	Part B, Rev. 6 Chapter B		✓
	§264.18(c)	Other location standards	Part B, Rev. 6 Chapter B		✓
§270.14(b)(12)	§264.16(a-e)	Personnel training program	Part 2 Attachment F		✓
§270.14(b)(13)	264 Subpart G	Closure and post-closure plans	Attachments G & H		✓
§270.14(b)(13)	§264.111	Closure performance standard	Attachment G		✓
§270.14(b)(13)	§264.112(a), (b)	Written content of closure plan	Attachment G		✓
§270.14(b)(13)	§264.112(c)	Amendment of closure plan	Attachment G		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure. Notifications of closure for Panels 1-6 have been provided to NMED. They are in the administrative record.	Attachment G		✓
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Attachment G		✓
§270.14(b)(13)	§264.113	Time allowed for closure	Attachment G		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Attachment G		✓
§270.14(b)(13)	§264.115	Certification of closure	Attachment G		✓
§270.14(b)(13)	§264.116	Survey plat	Attachment G		✓
§270.14(b)(13)	§264.117	Post-closure care and use of property	Attachment H		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Attachment H		✓
§270.14(b)(13)	§264.178	Closure/containers	Attachment G		✓
§270.14(b)(13)	§264.601	Environmental performance standards-Miscellaneous units	Attachment G		✓
§270.14(b)(13)	§264.603	Post-closure care	Attachment G		✓
§270.14(b)(14)	§264.119	Post-closure notices	Attachment H		✓
§270.14(b)(15)	§264.142	Closure cost estimate	NA		✓
	§264.143	Financial assurance	NA		✓
§270.14(b)(16)	§264.144	Post-closure cost estimate	NA		✓
	§264.145	Post-closure care financial assurance	NA		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the Permit or Permit Application	Yes	No
§270.14(b)(17)	§264.147	Liability insurance	NA		✓
§270.14(b)(18)	§264.149-150	Proof of financial coverage	NA		✓
§270.14(b)(19)(i), (vi), (vii), and (x)		Topographic map requirements Map scale and date Map orientation Legal boundaries Buildings Treatment, storage, and disposal operations Run-on/run-off control systems Fire control facilities	Attachment B Part A		✓
§270.14(b)(19)(ii)	§264.18(b)	100-year floodplain	Attachment B Part A		✓
§270.14(b)(19)(iii)		Surface waters	Attachment B Part A		✓
§270.14(b)(19)(iv)		Surrounding Land use	Attachment B Part A		✓
§270.14(b)(19)(v)		Wind rose	Attachment B Part A		✓
§270.14(b)(19)(viii)	§264.14(b)	Access controls	Attachment B Part A		✓
§270.14(b)(19)(ix)		Injection and withdrawal wells	Attachment B Part A		✓
§270.14(b)(19)(xi)		Drainage on flood control barriers	Attachment B Part A		✓
§270.14(b)(19)(xii)		Location of operational units	Attachment B Part A		✓
§270.14(b)(20)		Other federal laws Wild and Scenic Rivers Act National Historic Preservation Act Endangered Species Act Coastal Zone Management Act Fish and Wildlife Coordination Act Executive Orders	Attachment B Part A		✓
§270.15	§264 Subpart I	Containers	Attachment A1		✓
	§264.171	Condition of containers	Attachment A1		✓
	§264.172	Compatibility of waste with containers	Attachment A1		✓
	§264.173	Management of containers	Attachment A1		✓
	§264.174	Inspections	Attachment E Attachment A1		✓
§270.15(a)	§264.175	Containment systems	Attachment A1		✓
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Part 2		✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Part 2		✓
	§264.178	Closure	Attachment G		✓
§270.15(e)	§264.179	Air emission standards	Part 4 Attachment N		✓
§270.23	264 Subpart X	Miscellaneous units	Attachment A2 Attachment O		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the Permit or Permit Application	Yes	No
§270.23(a)	§264.601	Detailed unit description	Attachment A2 Attachment O	✓	
§270.23(b)	§264.601	Hydrologic, geologic, and meteorologic assessments	Part 5 Attachment L		✓
§270.23(c)	§264.601	Potential exposure pathways	Part 4 Attachment A2 Attachment N		✓
§270.23(d)		Demonstration of treatment effectiveness	NA		✓
	§264.602	Monitoring, analysis, inspection, response, reporting, and corrective action	Part 2 Part 4 Part 5 Attachment A2 Attachment N Attachment O	✓	
	§264.603	Post-closure care	Attachment H Attachment H1		✓
	264 Subpart E	Manifest system, record keeping, and reporting	Part 2 Attachment C		✓

Appendix A Table of Changes

Table of Changes

Affected Permit Section	Explanation of Change
Permit Part 4, Section 4.4.1, <i>Room-Based Limits.</i>	Modified the language immediately preceding Table 4.4.1 from, "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," to, "The measured concentration of VOCs in any open (active) room and in each closed room in active panels within Underground HWDUs Panels 1-7 shall not exceed the limits specified in Table 4.4.1."
	Modified the title of Table 4.4.1 from "VOC Room-Based Limits," to, "VOC Room-Based Limits for Panels 1-7".
	Added text immediately following Table 4.4.1: "The measured concentration of VOCs in any open (active) room and in each closed room in active panels within Underground HWDU Panel 8 shall not exceed the limits specified in Table 4.4.2."
	Added Table 4.4.2, VOC Room-Based Limits for Panel 8.
	Added text immediately following Table 4.4.2: "There are no maximum concentration limits for other VOCs". This additional language provides consistency with language immediately following existing Table 4.4.1.
Permit Part 4, Section 4.6.3.2, <i>Notification.</i>	Modified the language in the first sentence from, "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," to, "The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the concentration of any VOC specified in either Table 4.4.1 or Table 4.4.2, as appropriate, in any closed room in an active panel or in the immediately adjacent closed room exceeds the action levels specified in Table 4.6.3.2 or Table 4.6.3.3, as appropriate."
	Modified the title of Table 4.6.3.2 from, "Action Levels for Disposal Room Monitoring," to, "Action Levels for Disposal Room Monitoring in Panels 1-7".
	Added Table 4.6.3.3, Action Levels for Disposal Room Monitoring in Panel 8.
Permit Part 4, Section 4.6.3.3, <i>Remedial Action.</i>	Modified the language in the first sentence from, "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," to, "Upon receiving validated analytical results that indicate one or more of the VOCs specified in Table 4.4.1 or Table 4.4.2, in any of the closed rooms in an active panel has reached the '50% Action Level' in Table 4.6.3.2 or Table 4.6.3.3, as appropriate, the sampling frequency for such closed rooms will increase to once per week."
	Modified the language in the second sentence from, "The once per week sampling will continue either until the concentration 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," to, "The once per week sampling will continue either until the concentration in the closed room(s) fall below the '50% Action Level', or until closure of Room 1 of the panel, whichever occurs first."

Affected Permit Section	Explanation of Change
Permit Part 4, Section 4.6.3.3, <i>Remedial Action</i> .	Modified the language in the third sentence from, "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," to, "If one or more of the VOCs in Table 4.4.1 or Table 4.4.2 in the active open room or immediately adjacent closed room reaches the '95% Action Level' in Table 4.6.3.2 or Table 4.6.3.3, as appropriate, another sample will be taken to confirm the existence of such a condition."
	Modified the language in the fourth sentence from, "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," to, "If the second sample confirms that one or more of VOCs in the immediately adjacent closed room have reached the '95% Action Level', 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."
Permit Attachment A2, Section A2-2a(3), <i>Subsurface Structures, Underground Hazardous Waste Disposal Units (HWDUs)</i> .	Modified the second paragraph, fifth sentence from, "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," to, "The rooms in Panels 1-7 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."
	Added text to the end of the second paragraph: "The rooms in Panels 8 will have nominal dimensions of 16 ft (5.0 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."
Permit Attachment A3, <i>Typical Disposal Panel</i> .	Added figure nomenclature to the existing figure: "Figure A3-1, Typical Disposal Panel Dimensions for Panels 1-7".
	Added Figure A3-2, Typical Disposal Panel Dimensions for Panel 8.
Permit Attachment G, <i>List of Figures</i>	Separated Figure G-5 into two figures: Figure G-5a and Figure G-5b.
Permit Attachment G, <i>Figures</i> .	Modified the existing title of Figure G-5 from, "Figure G-5, Typical Disposal Panel," to, "Figure G-5a, Typical Disposal Panel Dimensions for Panels 1-7".
	Added Figure G-5b, Typical Disposal Panel Dimensions for Panel 8.
Permit Attachment N, <i>List of Figures</i>	Separated Figure N-4 into two figures: Figure N-4a and Figure N-4b.
Permit Attachment N, Section N-1, <i>Introduction</i> .	Modified the second sentence from, "...; 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," to, "...; 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 4.4.1, 4.4.2, 4.6.3.2, and 4.6.3.3."

Affected Permit Section	Explanation of Change
Permit Attachment N, Section N-1a, <i>Background</i> .	Modified the third sentence from, "Each room is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 13 ft (4 m) high," to, "Each room in Panels 1-7 is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 13 ft (4 m) high."
	Added text after the third sentence: "Each room in Panel 8 is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 16 ft (5 m) high."
Permit Attachment N, Section N-1b, <i>Objectives of the Volatile Organic Compound Monitoring Plan</i>	Modified the second bullet, first sentence from, "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," to, "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 or Table 4.4.2, as appropriate."
	Modified the second bullet, second sentence from, "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," to, "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 or Table 4.6.3.3, as appropriate."
Permit Attachment N, Section N-3e(2), <i>Data Evaluation and Reporting for Disposal Room VOC Monitoring</i>	Modified the first paragraph, last sentence from, "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," to, "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 or Table 4.6.3.3, as appropriate."
	Modified the second paragraph from, "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," to, "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 or Table 4.4.2 exceeds the action levels specified in Permit Part 4, Table 4.6.3.2 or Table 4.6.3.3, respectively."
Permit Attachment N, <i>Figures</i> .	Modified Figure N-4 from, "Figure N-4, Disposal Room Sample Head Arrangement," to, "Figure N-4a, Disposal Room Sample Head Arrangement for Panels 1-7"
	Added Figure N-4b, Disposal Room Sample Head Arrangement for Panel 8.

Appendix B
Revised Permit Text

PART 4 - GEOLOGIC REPOSITORY DISPOSAL

4.4 VOLATILE ORGANIC COMPOUND LIMITS

4.4.1 Room-Based Limits

The measured concentration of VOCs in any open (active) room and in each closed room in active panels within an Underground HWDUs Panels 1-7 shall not exceed the limits specified in Table 4.4.1 below:

Table 4.4.1 - VOC Room-Based Limits <u>for Panels 1-7</u>	
Compound	VOC Room-Based Concentration Limit (PPMV)
Carbon Tetrachloride	9,625
Chlorobenzene	13,000
Chloroform	9,930
1,1-Dichloroethylene	5,490
1,2-Dichloroethane	2,400
Methylene Chloride	100,000
1,1,2,2-Tetrachloroethane	2,960
Toluene	11,000
1,1,1-Trichloroethane	33,700
Trichloroethylene	48,000

There are no maximum concentration limits for other VOCs.

The measured concentration of VOCs in any open (active) room and in each closed room in active panels within Underground HWDU Panel 8 shall not exceed the limits specified in Table 4.4.2:

<u>Table 4.4.2 – VOC Room-Based Limits for Panel 8</u>	
<u>Compound</u>	<u>VOC Room-Based Concentration Limit (PPMV)</u>
<u>Carbon Tetrachloride</u>	<u>3,208</u>
<u>Chlorobenzene</u>	<u>13,000</u>
<u>Chloroform</u>	<u>3,310</u>
<u>1,1-Dichloroethylene</u>	<u>1,830</u>
<u>1,2-Dichloroethane</u>	<u>800</u>
<u>Methylene Chloride</u>	<u>33,333</u>
<u>1,1,2,2-Tetrachloroethane</u>	<u>986</u>
<u>Toluene</u>	<u>8,023</u>
<u>1,1,1-Trichloroethane</u>	<u>11,233</u>
<u>Trichloroethylene</u>	<u>16,000</u>

There are no maximum concentration limits for other VOCs.

4.6.3.2 Notification Requirements

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

Table 4.6.3.2 - Action Levels for Disposal Room Monitoring in Panels 1-7

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

<u>Table 4.6.3.3 - Action Levels for Disposal Room Monitoring in Panel 8</u>		
<u>Compound</u>	<u>50% Action Level for VOC Constituents of Concern in Any Closed Room, ppmv</u>	<u>95% Action Level for VOC Constituents of Concern in Active Open or Immediately Adjacent Closed Room, ppmv</u>
<u>Carbon Tetrachloride</u>	<u>1,604</u>	<u>3,047</u>
<u>Chlorobenzene</u>	<u>6,500</u>	<u>12,350</u>
<u>Chloroform</u>	<u>1,655</u>	<u>3,144</u>
<u>1,1-Dichloroethylene</u>	<u>915</u>	<u>1,738</u>
<u>1,2-Dichloroethane</u>	<u>400</u>	<u>760</u>
<u>Methylene Chloride</u>	<u>16,665</u>	<u>31,665</u>
<u>1,1,2,2-Tetrachloroethane</u>	<u>493</u>	<u>936</u>
<u>Toluene</u>	<u>4,011</u>	<u>7,621</u>
<u>1,1,1-Trichloroethane</u>	<u>5,616</u>	<u>10,671</u>
<u>Trichloroethylene</u>	<u>8,000</u>	<u>15,200</u>

4.6.3.3. Remedial Action

Upon receiving validated analytical results that indicate one or more of the VOCs specified in Table 4.4.1 or Table 4.4.2, in any of the closed rooms in an active panel has reached the “50% Action Level” in Table 4.6.3.2 or Table 4.6.3.3, 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 or Table 4.4.2, in the active open room or immediately adjacent closed room reaches the “95% Action Level” in Table 4.6.3.2 or Table 4.6.3.3, as appropriate, another sample will be taken to confirm the existence of such a condition. If the second sample confirms that one or more of VOCs in the immediately adjacent closed room have reached the “95% Action Level” ~~in Table 4.6.3.2~~, 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.

ATTACHMENT A2

GEOLOGIC REPOSITORY

Underground Hazardous Waste Disposal Units (HWDUs)

During the terms of this and the preceding Permit, the TRU mixed waste volume emplaced in the repository will not exceed the maximum capacities listed in Permit Part 4, Table 4.1.1 for each HWDU. CH TRU mixed waste will be disposed of in Underground HWDUs identified as Panels 1 through 8. 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 in Panels 1-7 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. The rooms in Panel 8 will have nominal dimensions of 16 ft (5.0 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.

ATTACHMENT A3

TYPICAL DISPOSAL PANEL

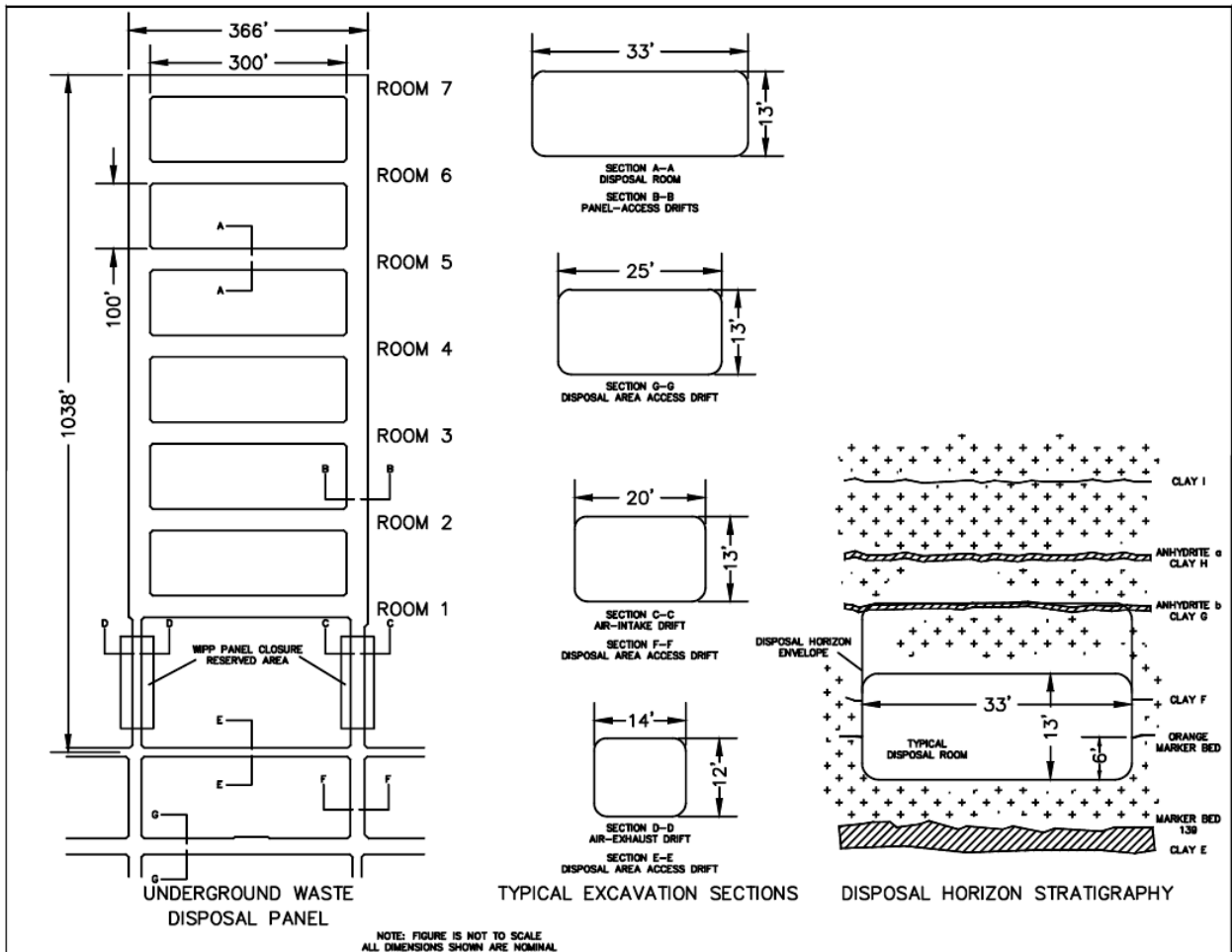


Figure A3-1
Typical Disposal Panel Dimensions for Panels 1-7

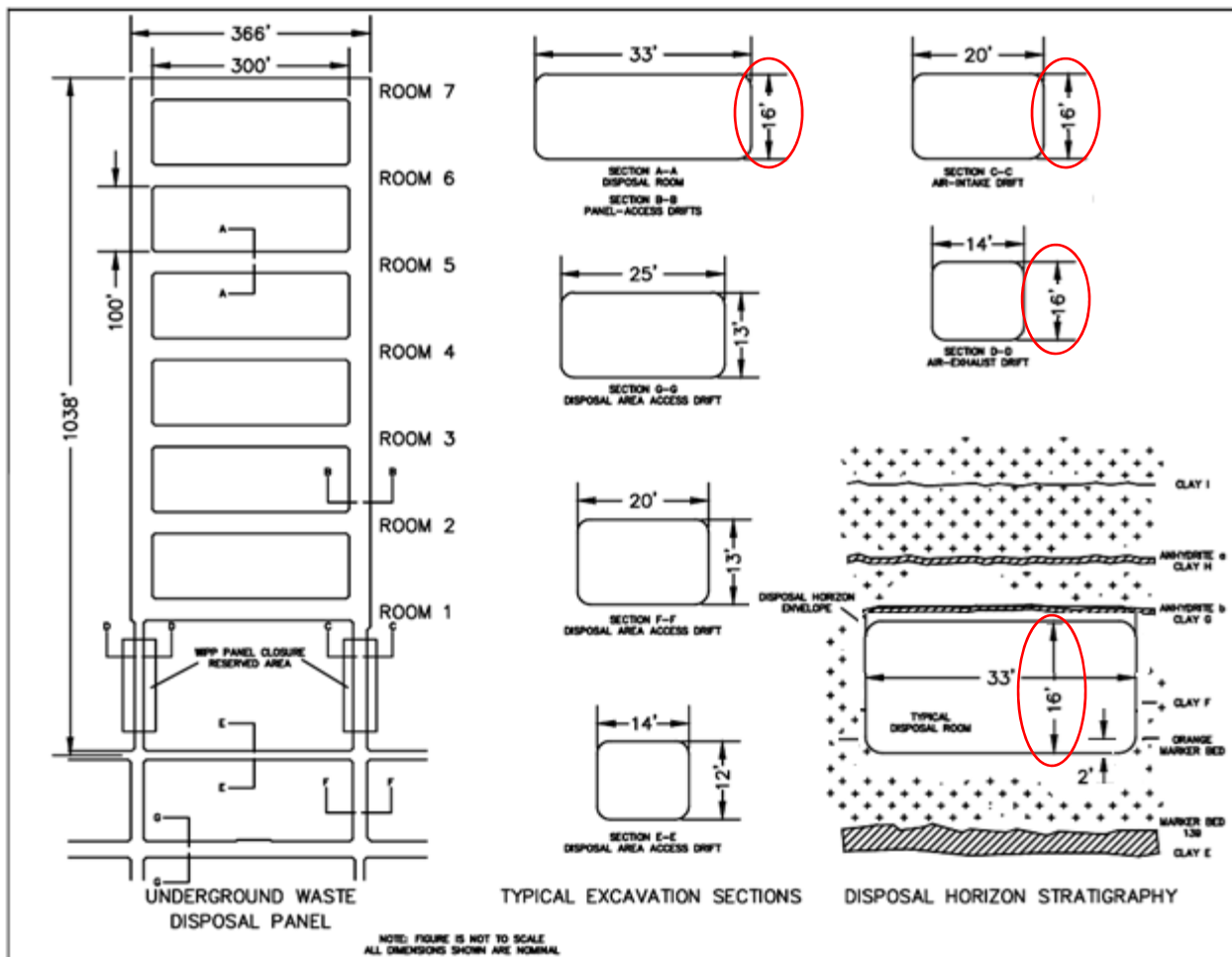


Figure A3-2
Typical Disposal Panel Dimensions for Panel 8

ATTACHMENT G

CLOSURE PLAN

LIST OF FIGURES

Figure	Title
Figure G-1	Location of Underground HWDUs and WPC Locations
Figure G-2	WIPP Panel Closure Schedule
Figure G-3	WIPP Facility Final Closure 84-Month Schedule
Figure G-4	Bulkhead and ROM Salt Locations
Figure G-4a	Typical Substantial Barrier and Bulkhead
Figure G-5	Typical Disposal Panel
<u>Figure G-5a</u>	<u>Typical Disposal Panel Dimensions for Panels 1-7</u>
<u>Figure G-5b</u>	<u>Typical Disposal Panel Dimensions for Panel 8</u>
Figure G-6	Approximate Locations of Boreholes in Relation to the WIPP Underground

ATTACHMENT G CLOSURE PLAN

FIGURES

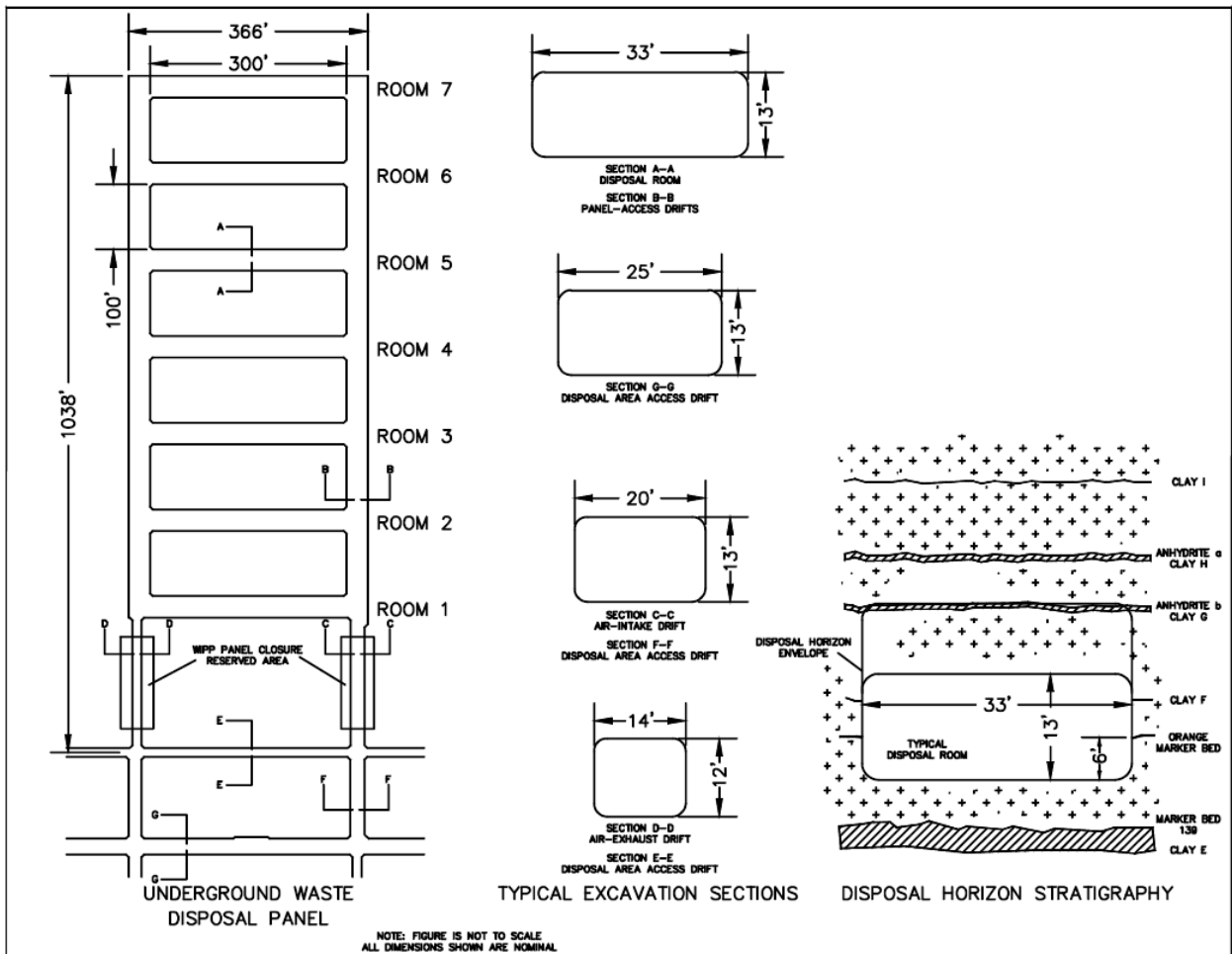


Figure G-5a
Typical Disposal Panel Dimensions for Panels 1-7

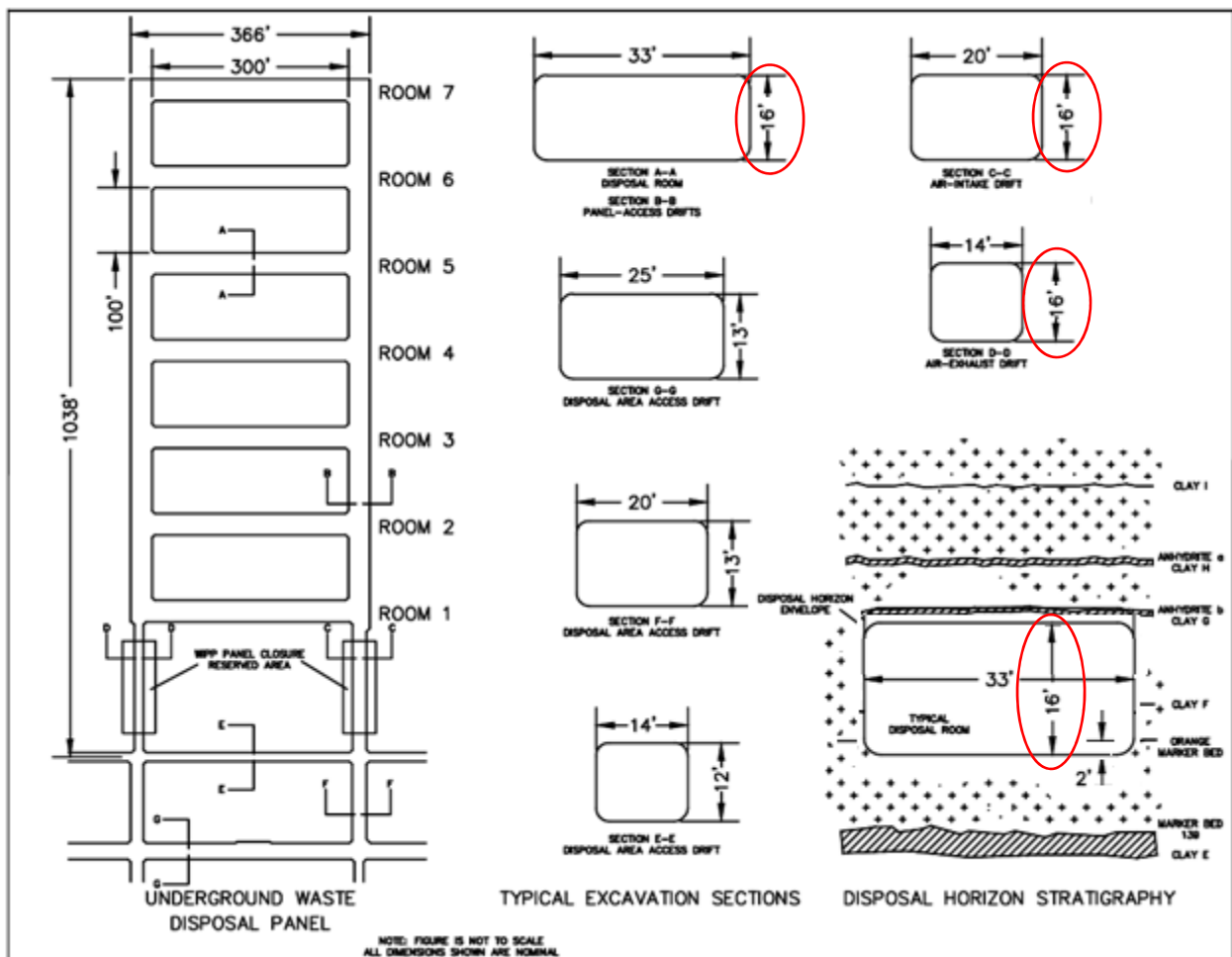


Figure G-5b
Typical Disposal Panel Dimensions for Panel 8

ATTACHMENT N
VOLATILE ORGANIC COMPOUND MONITORING PLAN

LIST OF FIGURES

Figure	Title
Figure N-1	Repository VOC Monitoring Locations
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Figure N-3	Typical Disposal Room VOC Monitoring Locations
Figure N-4	Disposal Room Sample Head Arrangement
<u>Figure N-4a</u>	<u>Disposal Room Sample Head Arrangement for Panels 1-7</u>
<u>Figure N-4b</u>	<u>Disposal Room Sample Head Arrangement for Panel 8</u>

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 4.4.1, 4.4.2, 4.6.3.2, and 4.6.3.3 ~~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 in Panels 1-7 is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 13 ft (4 m) high. Each room in Panel 8 is approximately 300 ft (91 m) long, 33 ft (10 m) wide, and 16 ft (5 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.

N-1b Objectives of the Volatile Organic Compound Monitoring Plan

- 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 or Table 4.4.2, as appropriate. ~~Appropriate remedial~~ 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 or Table 4.6.3.3, as appropriate.

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 or Table 4.6.3.3, as appropriate.

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 or Table 4.4.2 exceeds the action levels specified in Permit Part 4, Table 4.6.3.2 or Table 4.6.3.3, respectively.

ATTACHMENT N
VOLATILE ORGANIC COMPOUND MONITORING PLAN
FIGURES

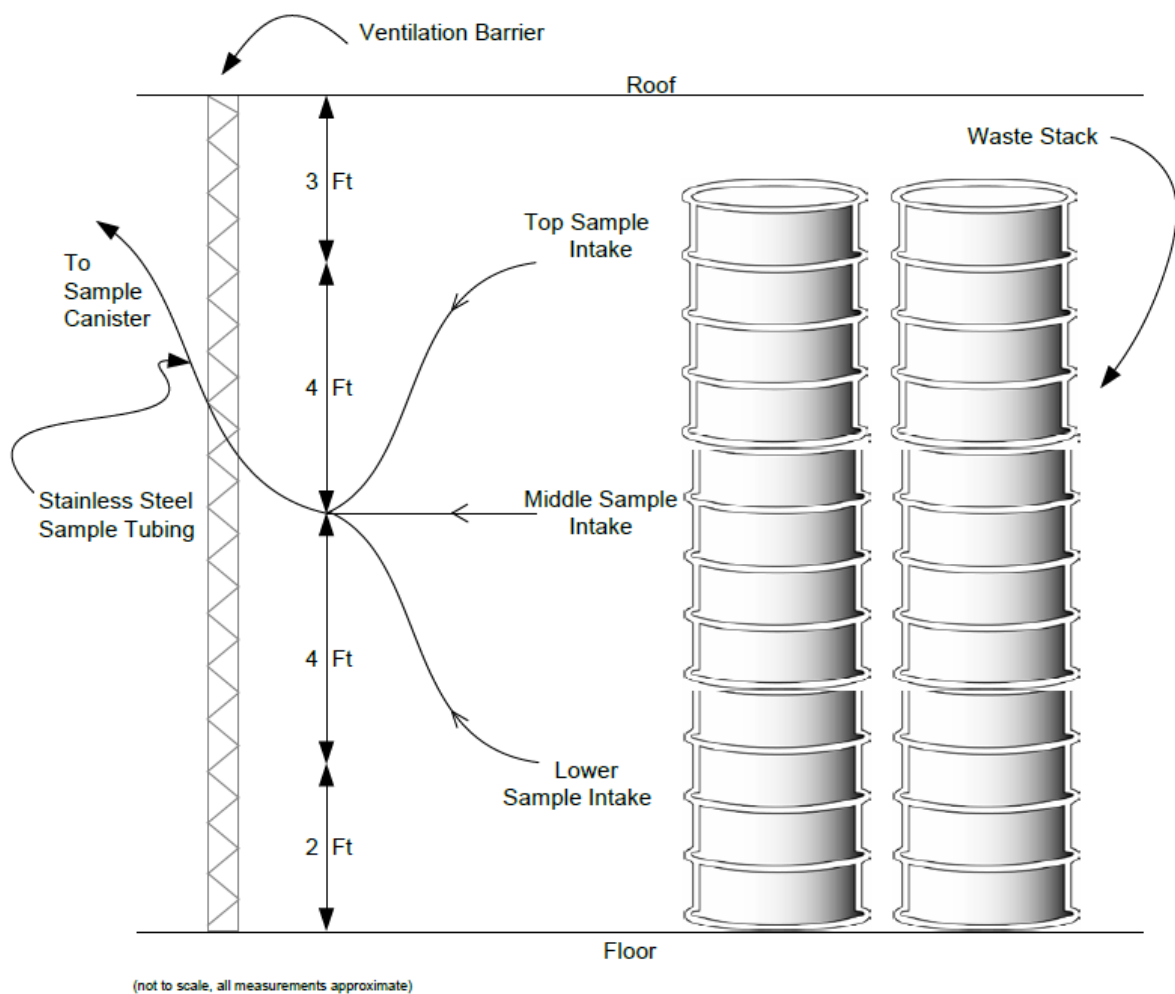


Figure N-4a
Disposal Room Sample Head Arrangement for Panels 1-7

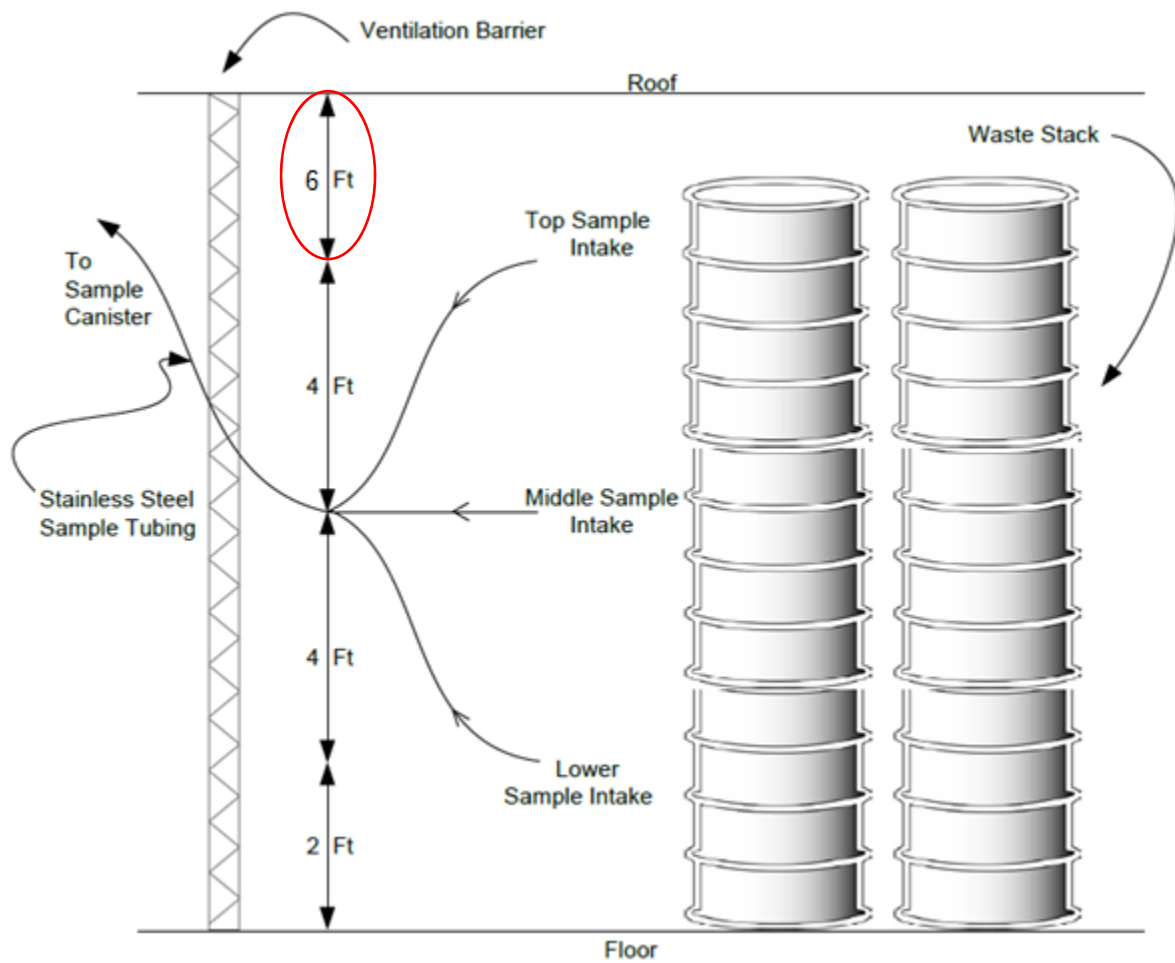


Figure N-4b
Disposal Room Sample Head Arrangement for Panel 8

Appendix C
Basis for Panel 8 VOC Room-Based Limits Update

APPENDIX C – Basis for Panel 8 VOC Room-Based Limits Update

1.0 Introduction

The hypothetical roof fall scenario in the closed room adjacent to the active disposal room is the basis for the volatile organic compound (VOC) room-based limits listed in Permit Part 4.4, Table 4.4.1 – VOC Room-Based Limits. The purpose of this appendix is to use the RCRA Part B Application Appendix D9 Attachment 1 methodology (DOE/WIPP-91-005, Revision 6.3, dated July 18, 1997) to calculate VOC limits for Panel 8 due to a change in room height. For Panel 8, the nominal room height (*i.e.*, room height at the time of waste emplacement) will be 16 ft. The current VOC room-based limits were determined using a room height of 13 ft. Considering the change in room height for Panel 8, a change to VOC limits is required.

2.0 Background

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

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

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

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

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

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

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

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

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

3.0 Methodology to Determine Current Permit VOC Room-Based Limits

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

RCRA Part B Appendix D9 Assumptions

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

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

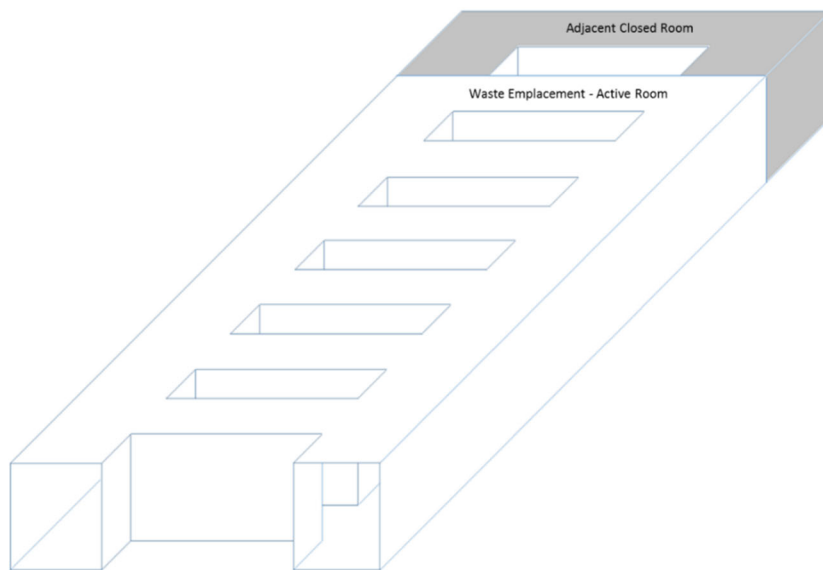


Figure C-1: TRU Waste Disposal Panel with Seven Rooms

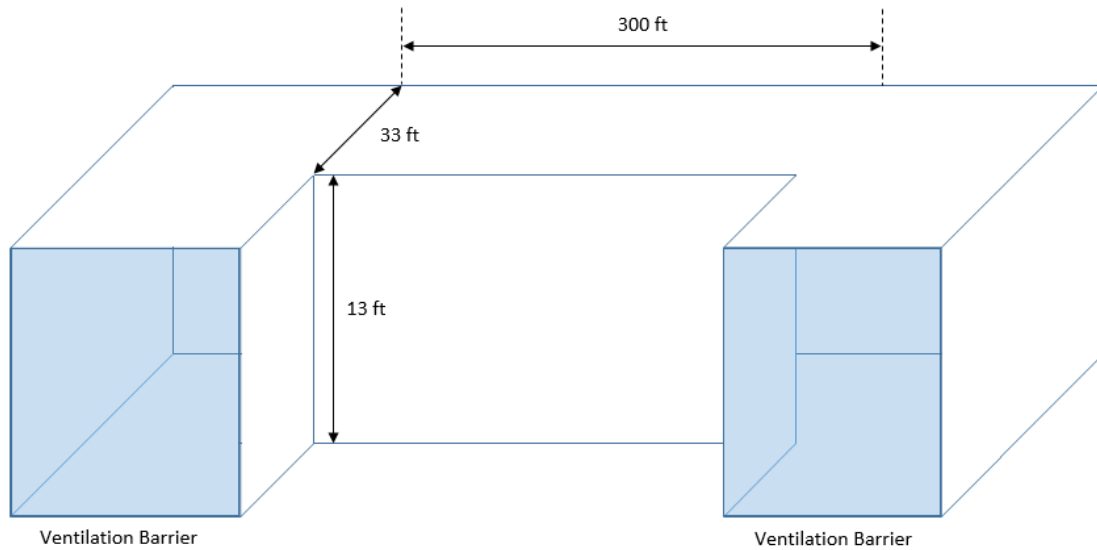


Figure C-2: Adjacent Closed Room with Ventilation Barriers

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

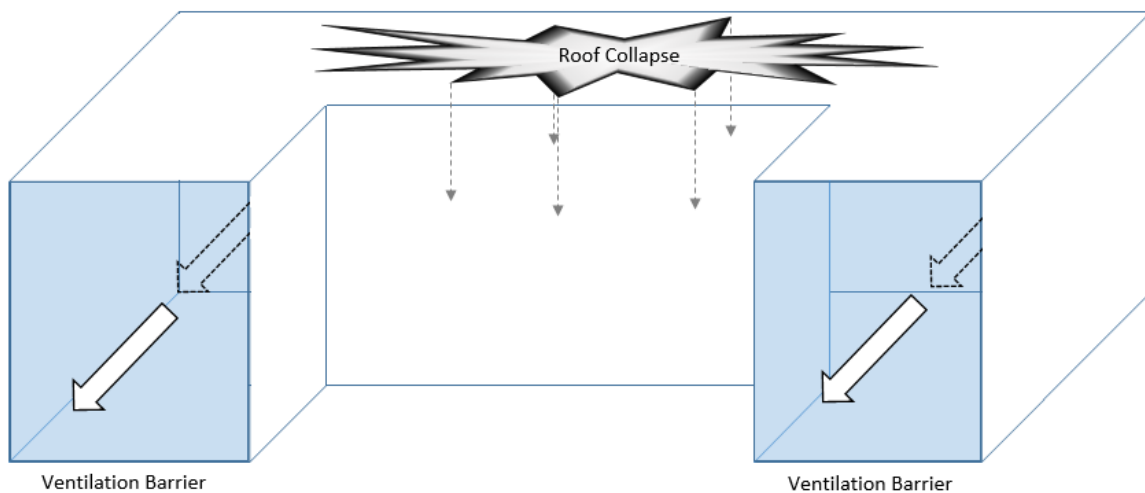


Figure C-3: Roof Fall in Adjacent Closed Room

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

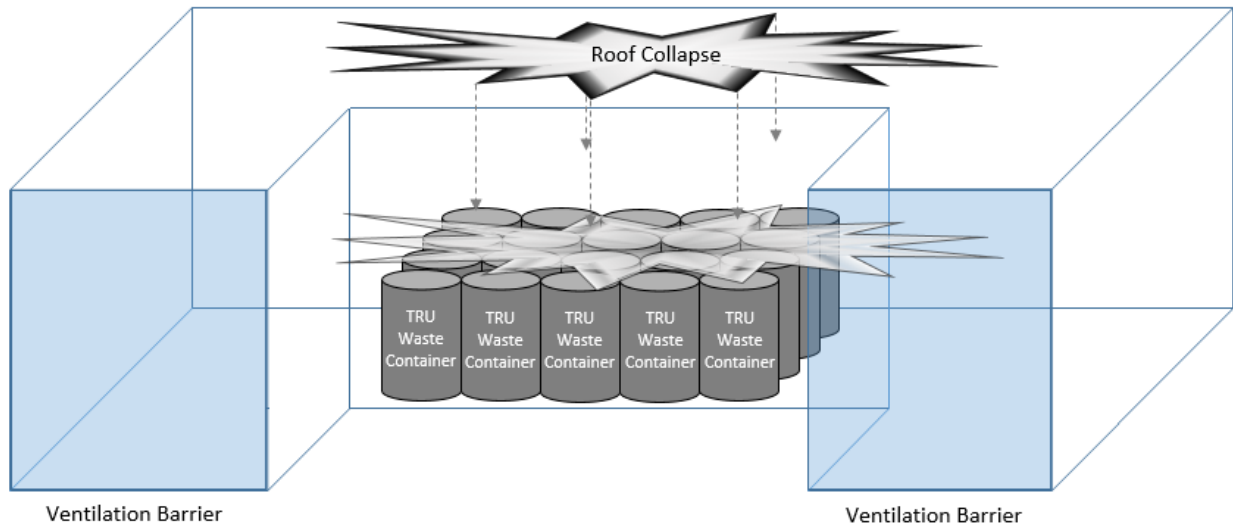


Figure C-4a: Roof Fall Scenario Propagation – Initiating Event

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

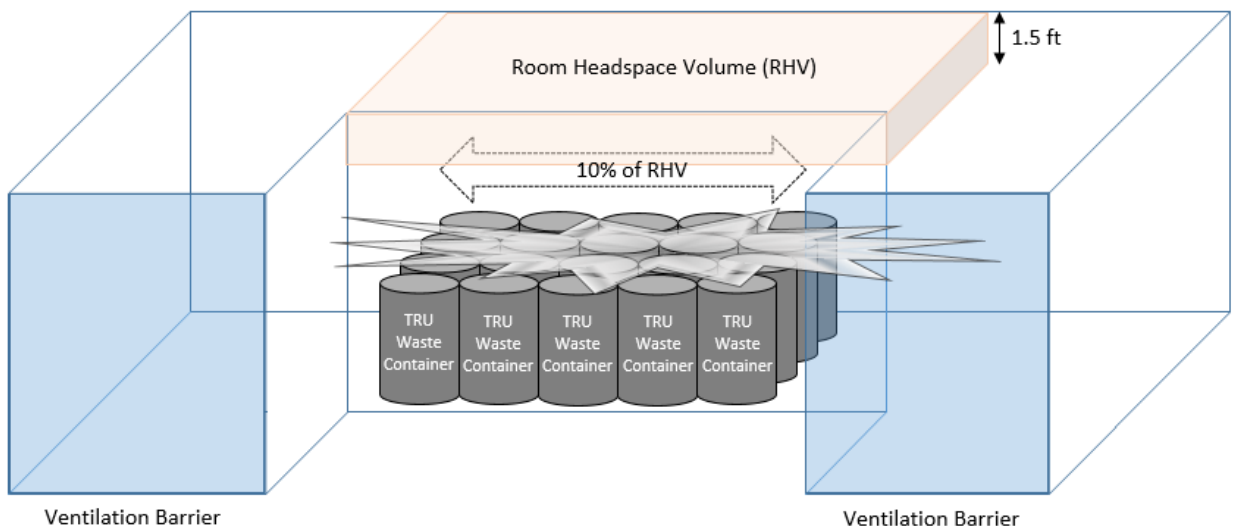


Figure C-4b: Roof Fall Scenario Propagation – Displaced Volume Migration

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

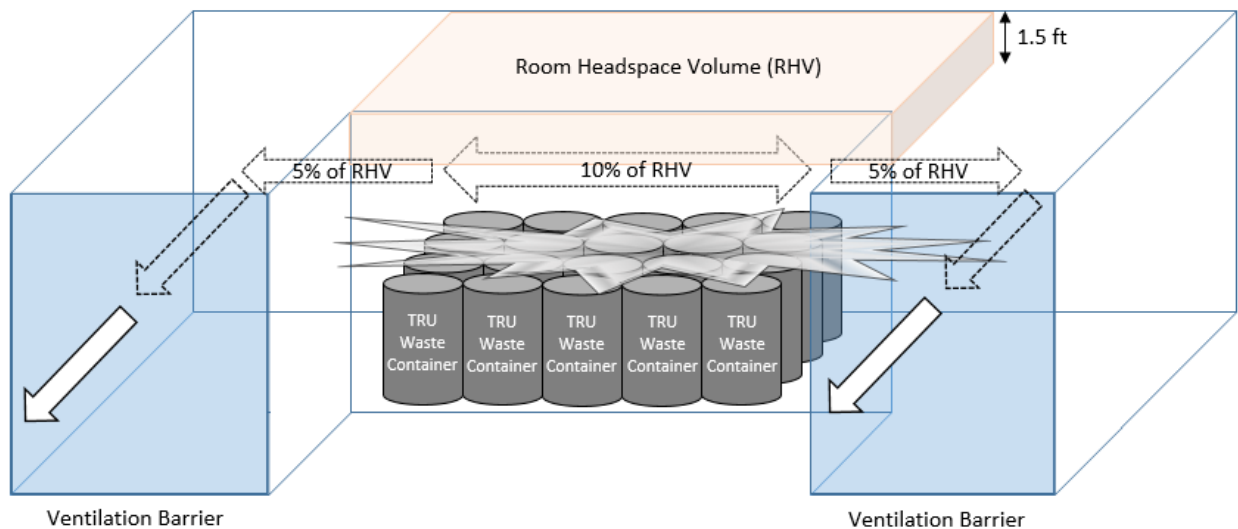


Figure C-4c: Roof Fall Scenario Propagation – VOCs Enter Active Room

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

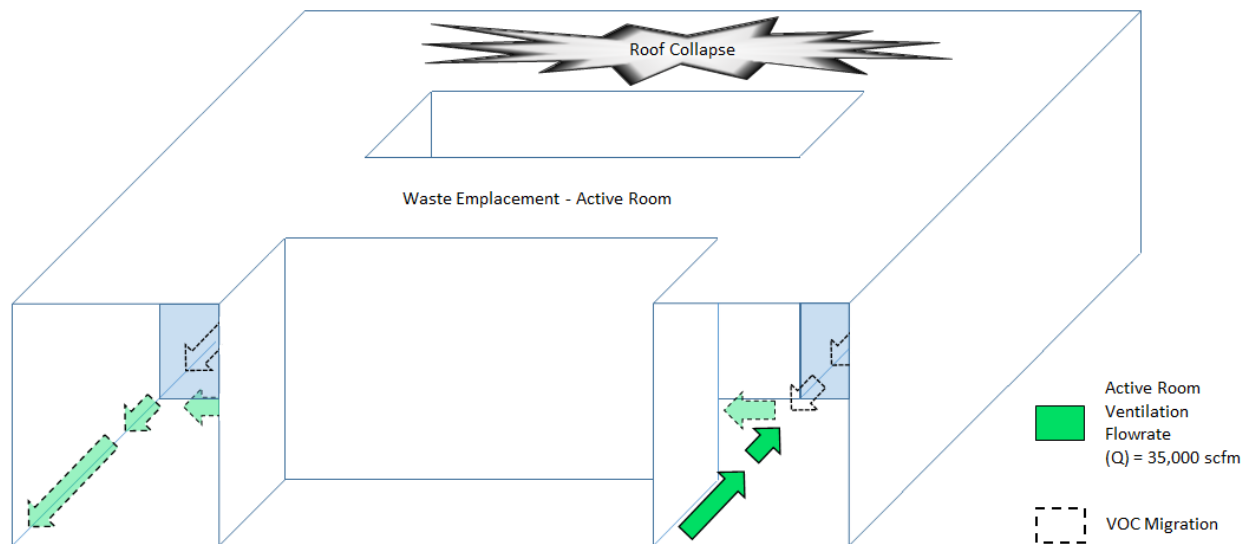


Figure C-5: Waste Emplacement in Active Room with Roof Fall in Adjacent Closed Room

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

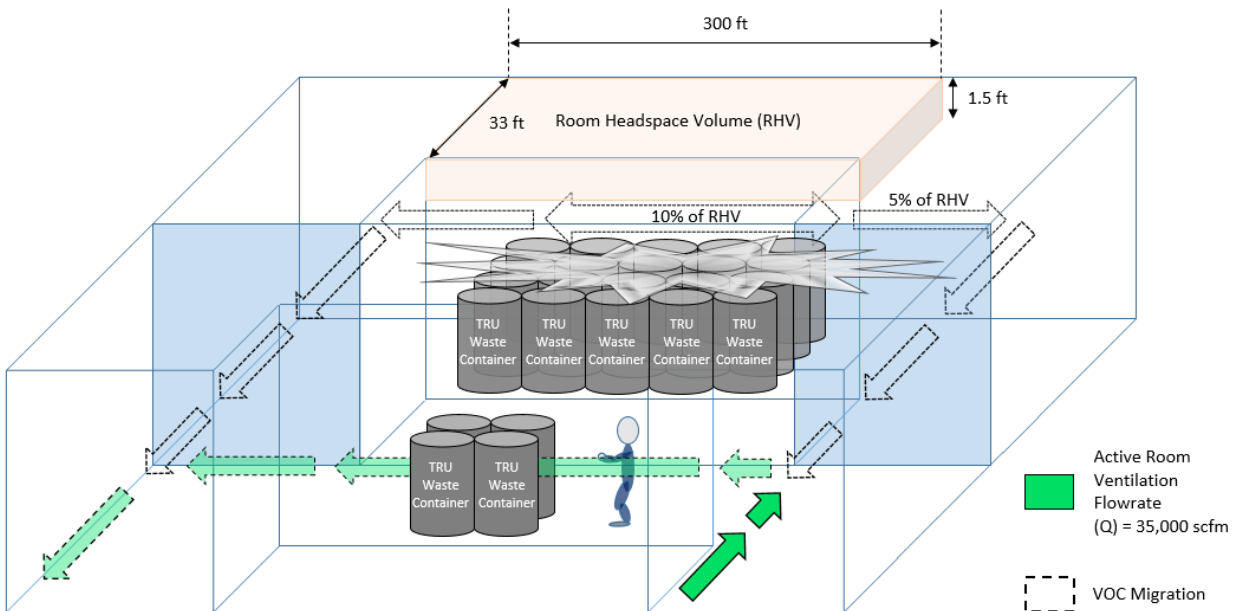


Figure C-6: Potential WIPP Worker Exposure from Roof Fall in Adjacent Closed Room

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

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

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

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

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

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

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

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

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

4.0 Calculation Methodology

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

$$C_1V_1 = C_2V_2$$

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

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

Solve for the COC:

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

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

Figure C-7 illustrates the health-based limit calculation methodology.

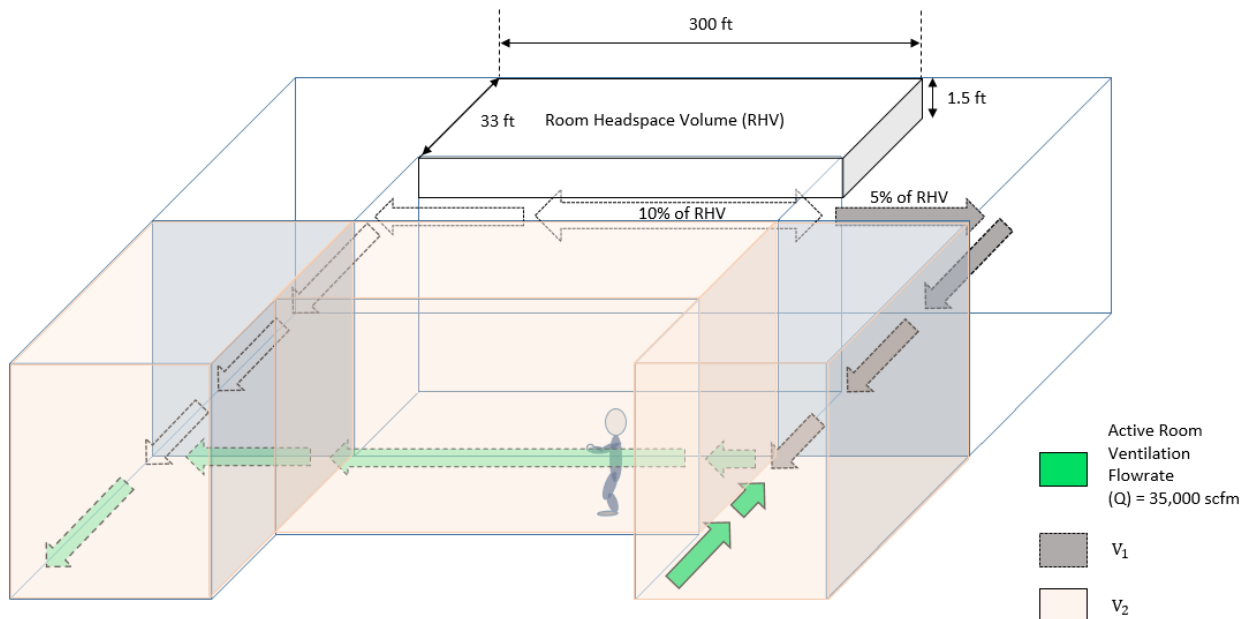


Figure C-7: Illustration of Health-Based Limit Calculation Methodology

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

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

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

Table C-2: LEL Analysis

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

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

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

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

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

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

5.0 VOC Room-Based Limit Updates for Panel 8

The same hypothetical adjacent closed room scenario and calculation methodology is used to determine the VOC room-based limits for Panel 8. The parameters previously discussed remain the same with the exception of the disposal room height. For Panel 8, the room height will be 16 ft instead of 13 ft, as in the original design. To provide an equivalent level of protection to the worker in the active room, the VOC room-based limits for Panel 8 are changed accordingly.

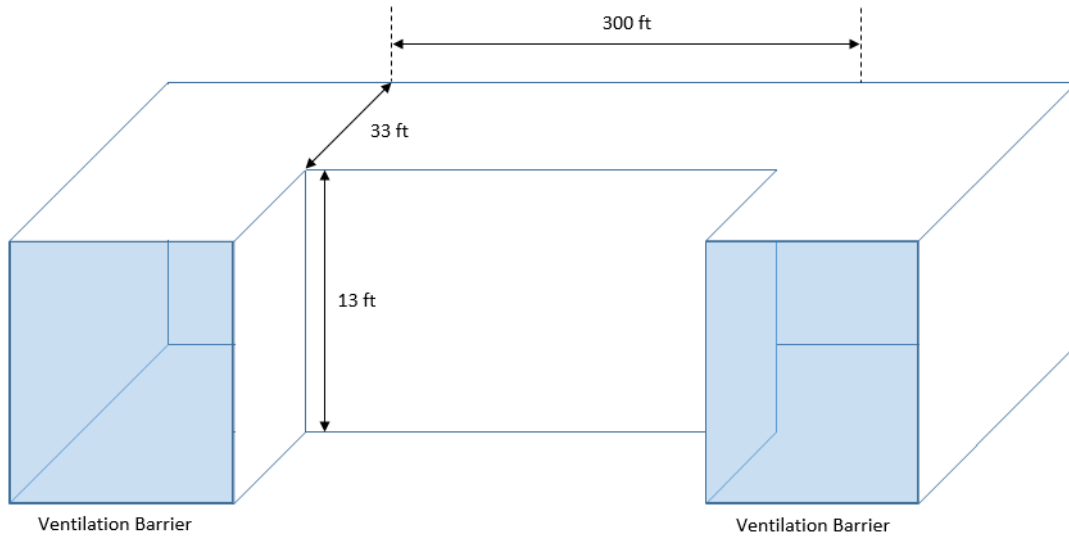


Figure C-8: Original Room Dimensions

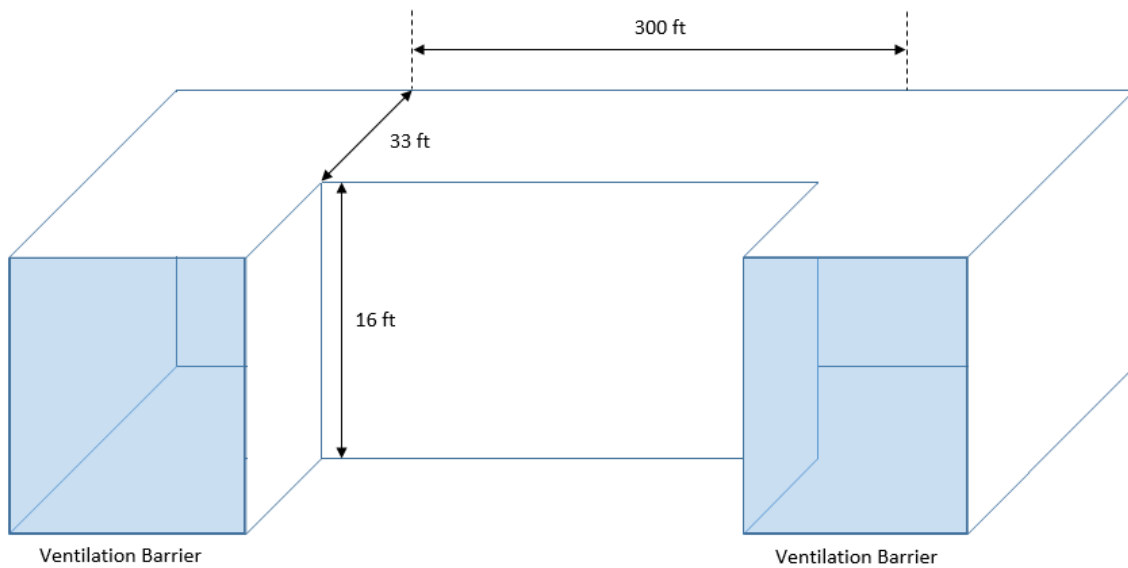


Figure C-9: Panel 8 Room Dimensions

Because the Panel 8 room height dimension is larger than the original panel design, the room headspace volume in the adjacent closed room increases from 1.5 feet to 4.5 feet. This increases the room headspace volume (**RHV**), which will change the health-based VOC room-based limits for Panel 8. Figure C-10 illustrates the modified scenario.

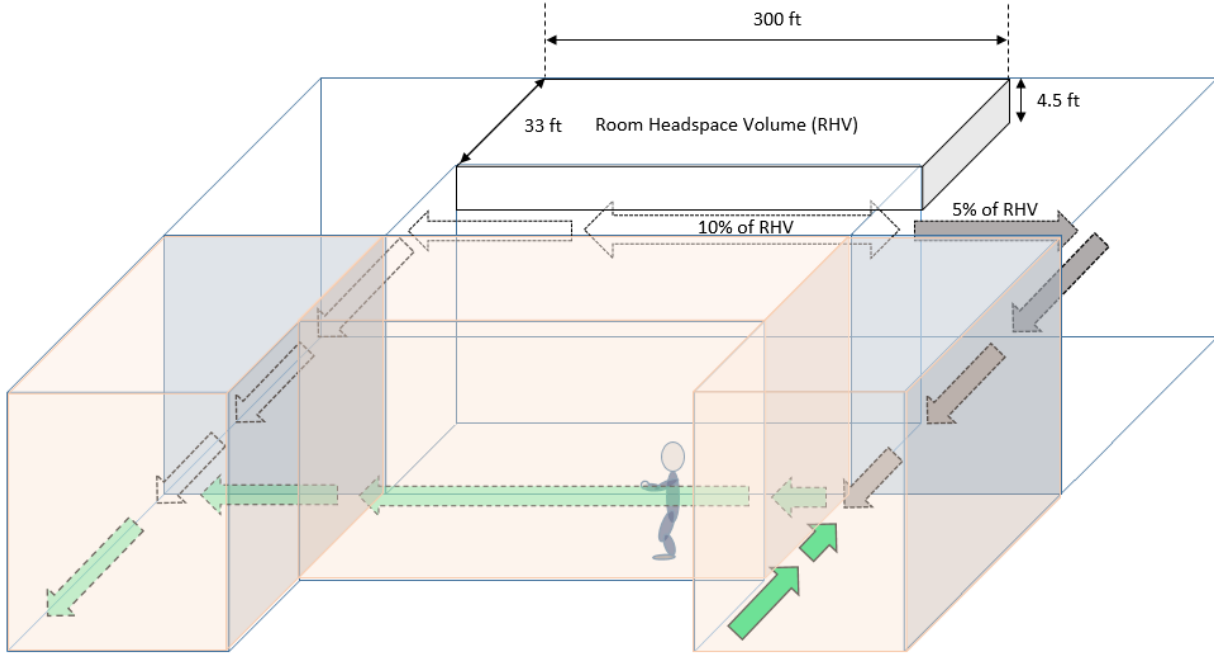


Figure C-10: Panel 8 WIPP Worker Exposure Scenario

Using the dilution rule, we can calculate the VOC room-based limits for the eight health-based analytes for Panel 8 as follows:

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

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

C_{new} \equiv health-based limits for Panel 8

V_{RHV_old} = 742.5 cubic feet

V_{RHV_new} = 5% of RHV new = $[(f) \times (RHV \text{ new})] = [(0.05) \times (300) \times (33) \times (4.5)]$

V_{RHV_new} = 2,227.5 cubic feet

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

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

$$\text{COC carbon tetrachloride} = \frac{(9,625 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 3,208 \text{ ppmv}$$

$$\text{COC chloroform} = \frac{(9,930 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 3,310 \text{ ppmv}$$

$$\text{COC 1,1-dichloroethylene} = \frac{(5,490 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 1,830 \text{ ppmv}$$

$$\text{COC 1,2-dichloroethane} = \frac{(2,400 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 800 \text{ ppmv}$$

$$\text{COC methylene chloride} = \frac{(100,000 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 33,333 \text{ ppmv}$$

$$\text{COC 1,1,2,2-tetrachloroethane} = \frac{(2,960 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 986 \text{ ppmv}$$

$$\text{COC 1,1,1-trichloroethane} = \frac{(33,700 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 11,233 \text{ ppmv}$$

$$\text{COC trichloroethylene} = \frac{(48,000 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 16,000 \text{ ppmv}$$

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

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

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

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

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

Now these health-based limits are changed for the Panel 8 room dimensions.

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

$$COC \text{ chlorobenzene} = \frac{(48,138 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 16,046 \text{ ppmv}$$

$$COC \text{ toluene} = \frac{(24,069 \text{ ppmv})(742.5 \text{ cubic feet})}{(2,227.5 \text{ cubic feet})} = 8,023 \text{ ppmv}$$

Table C-3: LEL Analysis for Panel 8

Compound	Limit Based on LEL	10% LEL Value [ppmv] (from NIOSH)	LEL Value [ppmv] (calculated)	Permit room-based limits [ppmv]
Chlorobenzene	Yes	1,300	13,000	13,000
Toluene	No	1,100	11,000	8,023

For Chlorobenzene: The LEL of 13,000 is still less than 16,046 ppmv; therefore, continue to use the LEL for this analyte.

For Toluene: The LEL of 11,000 is greater than 8,023 ppmv, therefore, the health-based limit will be used for this analyte (*i.e.*, IDLH hazard).

6.0 Conclusions

The equivalent VOC room-based limits for Panel 8, based on the nominal 16-foot room height are listed as follows:

Table C-4: Recommended VOC Room-Based Limits for Panel 8

VOC Room-Based Limits for Panel 8	
Compound	VOC Room-Based Concentration Limit (PPMV)
Carbon Tetrachloride	3,208
Chlorobenzene	13,000
Chloroform	3,310
1,1-Dichloroethylene	1,830
1,2-Dichloroethane	800
Methylene Chloride	33,333
1,1,2,2-Tetrachloroethane	986
Toluene	8,023
1,1,1-Trichloroethane	11,233
Trichloroethylene	16,000