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Mr. Tom Peake, Director
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 Radiation Protection Division
 U.S. Environmental Protection Agency
 1200 Pennsylvania Avenue NW
 Washington, D.C. 20460

Subject: Response 1 to U.S. Environmental Protection Agency’s questions on the Replacement Panels Planned Change Request dated April 17, 2024, and April 24, 2024, from Tom Peake to Michael Gerle

Reference: 1) EPA letter from Tom Peake to Michael Gerle, dated April 17, 2024; Subject: First set of questions on the Replacement Panels Planned Change Request
 2) EPA letter from Tom Peake to Michael Gerle, dated April 24, 2024; Subject: Second set of questions on the Replacement Panels Planned Change Request

Dear Mr. Peake:

In response to the U.S. Environmental Protection Agency’s (EPA) questions on the Replacement Panels Planned Change Request (RPPCR) from the above referenced letters, the U.S. Department of Energy (DOE) is responding to two of EPA’s questions (including sub-questions). The DOE will continue to submit phased responses to the EPA to ensure questions are answered promptly. Questions requiring clarification or more extensive analysis will be submitted at a later date. This submittal includes two enclosures:

- Enclosure 1: DOE’s responses to two of EPA comments concerning the RPPCR.
- Enclosure 2: Status Report of DOE responses to EPA questions on the RPPCR. The report is a table showing the status of all EPA questions received to date.

Below are the two responses provided in Enclosure 1.

EPA Letter Date	EPA Question Number	EPA Question Description
April 17, 2024	RPPCR1-References-1	Document Request
April 24, 2024	RPPCR2-General-1	Dimensions of replaced area and new panels

If you have any questions, please contact Dr. Anderson Ward at (575) 706-5291.

Sincerely,

Michael Gerle
 Director
 Environmental Regulatory Compliance Division
 Carlsbad Field Office

Enclosures (2)

Enclosure 1

**Department of Energy Response 1
to EPA's Questions on the RPPCR**

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RPPCR1-REFERENCES-1: Document Request

Please provide the following documents:

Carrier, W D. 2003. Goodbye, Hazen; Hello, Kozeny-Carman. ASCE Journal of Geotechnical and Geoenvironmental Engineering, November, pp. 1054-1056.

U.S. Department of Agriculture Soil Conservation Service (USDA). 1991. Measurement and Estimation of Permeability of Soils for Animal Waste Storage Facility Design, Technical Note 717 prepared by South National Technical Center.

DOE Response

On May 8, 2024, the Department of Energy provided the Environmental Protection Agency the two requested references via Kiteworks. These documents can be accessed via the link below:

<https://ppsftp.wipp.energy.gov/#/folder/baac7a30-32ea-4515-9184-9004375964af>

RPPCR2-GENERAL-1: Dimensions of replaced area and new panels

How much unused total repository area for waste disposal in square feet and square meters has been lost during WIPP's operational history, including the ground control and contamination issues from the 2014 incidents?

DOE Response

The DOE does not use area to measure the capacity of a disposal panel. Waste volume is the basis used to track disposal capacity and emplacement. Overall disposal capacity for waste is related to the authorized Land Withdrawal Act (LWA) limit of 6.2 million ft³ of transuranic TRU waste. The quantifiable physical space (volume) within a panel is based on the maximum transuranic (TRU) mixed waste capacity outlined in the *Hazardous Waste Facility Permit (HWFP)*, Part 4, Table 4.1.1, *Underground HWDUs* (NMED 2023). Table 4.1.1 of the HWFP reports the final TRU and TRU mixed waste volumes once a panel has been filled and closed.

The lost disposal capacity associated with Panels 1, 7, and 9 is described in the *Supplement Analysis for the Waste Isolation Pilot Plant Site Wide Operations*, Section 1.4.3, *Description of Specific Lost Disposal Capacity* (U.S. DOE 2021). There is no direct correlation between the LWA TRU waste volume and the area occupied by the waste because of the variability between the repository footprint and the various combinations of container types. Therefore, although RPPCR2-GENERAL-1 questions are based on lost disposal area, the subsequent discussions and responses focus on the calculated lost disposal capacity by volume in Panels 1, 7, and 9.

A summary is provided in Table 1 (under response to question RPPCR2-GENERAL-1c), *Lost TRU Waste Volume Capacity in Equivalent Panels and Estimated Lost Surface Area*. Also included in Table 1 are estimates of surface area lost for these panels for the purpose of comparison to volumetric disposal capacity lost. The total calculated lost disposal capacity volume is 1.88 equivalent panels.

RPPCR2-GENERAL-1a.

Approximately how much disposal area was lost in the repository due to radiological contamination and ground control issues stemming from the 2014 incidents?

DOE Response

The repository lost approximately 312,165 ft³ (8,840 m³) of TRU mixed waste disposal capacity in Panel 7, the equivalent of 0.46 panel, and 636,000 ft³ (18,000 m³) of TRU mixed waste disposal capacity from what would have been Panel 9, the equivalent of one panel. This loss of disposal capacity, 1.46 panels in total from Panels 7 and 9, is due to radiological contamination and deteriorated ground conditions stemming from the 2014 incidents.

RPPCR2-GENERAL-1a(i).

Approximately how much disposal area was lost in Panel 7 of the repository due to contamination and ground control?

DOE Response

Radiological contamination and deteriorated ground conditions resulted in the loss of most of Panel 7, Rooms 4, 6, and 7. The Supplement Analysis (SA), Figure 1-4, *Panel 7 Waste Emplacement and Abandoned Rooms* (U.S. DOE 2021), depicts the areas of Panel 7 that were not filled with waste. The maximum permitted TRU mixed waste disposal capacity of Panel 7 for both contact-handled (CH) and remote-handled (RH) TRU mixed waste was 685,100 ft³ (19,400 m³). When Panel 7 was closed in February 2023, the final TRU mixed waste disposed volume was 372,935 ft³ (10,560 m³). Therefore, the abandonment of portions of Panel 7, Rooms 4, 6, and 7, resulted in an estimated loss of 312,165 ft³ (8,840 m³) of volumetric disposal capacity. Based on the following equation, the lost disposal capacity in Panel 7 was the equivalent of 0.46 panel:

$$\frac{\text{Total Lost Disposal Capacity}}{\text{Total Maximum Panel Disposal Capacity}} = \text{\# of Equivalent Panels in Lost Disposal Capacity} \quad \text{Equation (1)}$$

Based on the numbers described above:

$$312,165 \text{ ft}^3 \div 685,100 \text{ ft}^3 = 0.46 \text{ panel}$$

Note that this calculation results in an equivalent-panel value slightly larger than what was reported in the SA (U.S. DOE 2021), since the closure of Panel 7 occurred after the SA was issued (i.e., 0.46 panel vs. 0.4 panel).

RPPCR2-GENERAL-1a(ii).

What is the disposal area of Panels 9 and 10, individually and combined, that DOE is no longer planning to use?

DOE Response

In order to be useable for the disposal of TRU mixed waste, Panel 9 would have required modification (e.g., excavation, relocation of existing utilities, etc.) to create the physical space equivalent to approximately one panel of waste, consistent with the assumptions of the 1997 *WIPP Disposal Phase Supplemental Environmental Impact Statement (SEIS-II)* (U.S. DOE 1997). The decision not to use Panel 9 for waste disposal, and the subsequent August 2019 closure of the area, due to worker safety concerns stemming from deteriorated ground conditions and contamination resulted in lost disposal capacity of approximately one panel, or 636,000 ft³ (18,000 m³) of TRU mixed waste, the permitted capacity of Panel 1.

The DOE is retaining the option to seek regulatory approval in the future for the use of selected portions of Panel 10 for TRU waste disposal; however, due to deteriorated ground conditions

and contamination, physical space in Panel 10 will likely be limited. The status of Panel 10 is not considered in the Replacement Panels Planned Change Request (RPPCR) in the determination of lost disposal capacity in the repository.

RPPCR2-GENERAL-1b.

Approximately how much disposal area has been lost in Panel 1 and any other panels in the repository due to unplanned delays and ground control issues prior to the 2014 incidents?

DOE Response

While the disposal capacity of Panels 3, 4, 5, and 6 was underutilized, any lost capacity realized in these panels was due to the combination of disposal container sizes and the placement of MgO backfill racks on the floor, not as a result of deteriorated ground conditions or radiological contamination. The lost disposal capacity associated with Panels 3 through 6 is not considered in the basis for the RPPCR. Panel 2 was filled to the maximum permitted capacity, as outlined in the HWFP, Part 4, Table 4.1.1 (NMED 2023).

Because of the age of Panel 1 when waste emplacement began in March 1999, and deteriorated ground conditions which had occurred since its mining in 1986, the decision was made not to use most of Panel 1, Rooms 4, 5, and 6 due to worker-safety concerns. The SA, Figure 1-3, *Panel 1 Waste Emplacement and Abandoned Rooms* (U.S. DOE 2021), shows the portions of Rooms 4, 5, and 6 that were underutilized. The maximum permitted TRU mixed waste disposal capacity of Panel 1 for CH TRU mixed waste was 636,000 ft³ (18,000 m³); however, the final CH TRU mixed waste volume emplaced was only 370,686 ft³ (10,497 m³), resulting in an estimated loss of 265,314 ft³ (7,513 m³) of volumetric disposal capacity. The total lost disposal capacity from Panel 1 is calculated using the Equation 1 as follows:

$$265,314 \text{ ft}^3 \div 636,000 \text{ ft}^3 = 0.42 \text{ panel}$$

As summarized in Table 1, the lost disposal capacity associated with Panels 1, 7, and 9 is calculated to be equivalent to 1.88 panels (1,213,479 ft³ [34,353 m³]), while replacement Panels 11 and 12 would result in a gain of two panels, the maximum permitted TRU mixed waste capacity of which totals 1,370,200 ft³ (38,800 m³).

Table 1 also provides estimates of surface area lost in Panels 1, 7, and 9, which totals 224,870 ft² (20,891 m²).

RPPCR2-GENERAL-1c.

What is the combined total disposal area of replacement Panels 11 and 12?

DOE Response

The dimensions of the replacement panels only differ from Panels 1 through 8 in room height (14 ft vs. 13 ft); therefore, the surface area of replacement Panels 11 and 12 will be equivalent

to that of existing Panels 1 through 8 (124,146 ft² [11,534 m²]), for a combined total disposal area of 248,292 ft². Likewise, the disposal volume of Replacement Panels 11 and 12 will be equivalent to that of existing Panels 7 through 8. In accordance with the HWFP, Part 4, Table 4.1.1, the combined maximum CH and RH TRU mixed waste disposal capacity of replacement Panels 11 and 12 is 685,100 ft³ (19,400 m³).

As stated in the opening paragraph of this response, comparison of lost disposal area against surface area gained by the replacement panels is not meaningful; however, the following calculation may be used to obtain the number of equivalent panels based on estimated surface area lost:

$$\text{Total Surface Area Lost} \div \text{Surface Area of a Replacement Panel} = \text{\# Equivalent Panels Based on Surface Area Lost} \quad \text{Equation (2)}$$

Using the total estimated surface area lost from Table 1 (224,870 ft²) and the surface area of a replacement panel (124,146 ft²), the number of equivalent panels based on surface area lost is as follows:

$$224,870 \text{ ft}^2 \div 124,146 \text{ ft}^2 = 1.8 \text{ panels}$$

The breakdown of equivalent panels lost based on surface area per panel is provided in Table 1.

Table 1. Lost TRU Waste Volume Capacity in Equivalent Panels and Estimated Lost Surface Area

Panel	Calculated TRU Mixed Waste Capacity Lost (m ³)	Calculated TRU Mixed Waste Capacity Lost (m ³)	Estimated Surface Area Lost (m ²)	Estimated Surface Area Lost (m ²)	Equivalent Panels Lost (Based on Volume)	Equivalent Panels Lost (Based on Area)
1	265,314	7,513	43,964	4,084	0.42	0.35
2	0	0	0	0	0.00	0.0
3–6	n/a	n/a	n/a	n/a	n/a	n/a
7	312,165	8,840	43,956	4,084	0.46	0.35
Equivalent Panel 9	636,000	18,000 ^a	136,950	12,723	1.0	1.1
Equivalent Panel 10	n/a	n/a	n/a	n/a	n/a	n/a
TOTAL	1,213,479	34,353	224,870	20,891	1.88 ^b	1.8

n/a – Not Applicable

Note a: Table 4.1.1 of the HWFP rounds the volume to 18,000 m³, and this value is also used in the SA calculations (636,000 ft³ is actually 18,010 m³).

Note b: When the total *Calculated TRU Mixed Waste Capacity Lost* is divided by 685,100 ft³ (19,400 m³), the maximum TRU mixed waste capacity of Replacement Panels 11 and 12, the equivalent panels lost is calculated to be 1.77 panel.

References RPPCR2-General-1

New Mexico Environment Department (NMED). 2023. Waste Isolation Pilot Plant Hazardous Waste Facility Permit. November 2023.

[https://wipp.energy.gov/Library/Information_Repository_A/Searchable%20Permit_Class1_2item_April2024 .pdf](https://wipp.energy.gov/Library/Information_Repository_A/Searchable%20Permit_Class1_2item_April2024.pdf)

U.S. Department of Energy (DOE). 1997. WIPP Disposal Phase Supplemental Environmental Impact Statement (SEIS-II). DOE/EIL-0026-S-2. Carlsbad, NM: U.S. Department of Energy, Carlsbad Field Office.

<https://www.energy.gov/nepa/articles/eis-0026-s2-final-supplemental-environmental-impact-statement>

U.S. Department of Energy (DOE). 2021. Supplement Analysis for the Waste Isolation Pilot Plant Site- Wide Operations. Revision 0. April 8, 2021. DOE/EIS-0026-SA-12. Carlsbad, NM: U.S. Department of Energy, Carlsbad Field Office.

https://wipp.energy.gov/library/seis/DOE_EIS-0026-SA-12_SA_for_WIPP_Site-Wide_Operations_Rev0_Final_Sig_on_File.pdf

Enclosure 2

Department of Energy Response 1

Status Report of DOE Responses To EPA Questions on the RPPCR

Status Report of DOE Responses to EPA questions on the RPPCR			
EPA Comment Number	EPA Request Description	EPA Request Letter Date	DOE Response
RPPCR1-References-1	Document Request	April 17, 2024	Response 1
RPPCR2-General-1	Dimensions of replaced area and new panels	April 24, 2024	Response 1
End of Status Report			