OFFICE OF RADIATION AND INDOOR AIR
WASHINGTON, D.C. 20460

August 12, 2024

Mr. Michael Gerle, Director
Environmental Regulatory Compliance Division
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

Re: Fifth set of questions on the Replacement Panels Planned Change Request (RPPCR)

Dear Mr. Gerle:

The U.S. Environmental Protection Agency is continuing its review of the U.S. Department of Energy's submittal of the RPPCR. This letter transmits a set of agency technical questions related to DOE's 12-panel repository calculation (see enclosure). The EPA would appreciate a timely response to these questions, as well as the previous sets of questions sent to DOE, to help expedite its review. In addition to the written questions, EPA would like to have a technical exchange on this same topic.

If you have any questions concerning this request, please contact Jay Santillan at (202) 343-9343 or at Santillan.Jay@epa.gov.

Sincerely,

Peake, Tom
Digitally signed by Peake, Tom
Date: 2024.08.12 16:19:04 -04'00'

Tom Peake
Director
Center for Waste Management and Regulations

ENCLOSURE
1. Fifth set of technical questions on the RPPCR (12 Panel Repository Analysis)

cc: Anderson Ward, DOE CBFO
Justin Marble, DOE EM

Lee Veal, EPA
Ray Lee, EPA
Winifred Okoye, EPA
EPA Docket

**Enclosure 1: Fifth set of technical questions on the RPPCR (12 Panel Repository Analysis)**

**This fifth set of RPPCR questions relate to DOE's 12-panel repository analysis presented in Hansen et al. (2023) ERMS 580656.**

## RPPCR2-12PanelAnalyses

*Note: This question (RPPCR2-12PanelAnalyses) was sent to DOE in EPA's second set of RPPCR technical questions on April 24, 2024.*

EPA is interested in the possibility of using the individual panel releases shown in Figure 3 of ERMS 580656 Estimation of Releases from a 12-Panel Repository by Hansen et al. (2023) to estimate releases from a 12-panel repository. We have the following two questions:

1. Please provide a detailed explanation of how the individual panel releases shown in Figure 3 of ERMS 580656 were calculated, with accompanying conceptual descriptions and justifications.
2. Please provide an explanation of how the individual panel releases shown in Figure 3 of ERMS 580656 accumulate to yield the combined releases of all 19 panels shown in Figure 4-43 of ERMS 581044 (the RPPCR PA).

**Please also answer the following new questions below:**

## RPPCR5-12PanelAnalyses-1

Can the mean CCDFs for the individual release pathways be combined in such a way that the joint distribution for total releases, if not technically correct, can be shown to be a conservative overestimate?

## RPPCR5-12PanelAnalyses-2

Can the data points defining the total release CCDFs for the RPPCR PA be traceable to the source data from individual waste panels and release pathways?

## RPPCR5-12PanelAnalyses-3

What difficulties would be encountered in preparing a 12-panel baseline PA, what would be their impact, and how would they be overcome?

*Because the scope of the RPPCR is only for the approval of two replacement panels, a 12-panel repository configuration for future PA calculations would be useful and EPA would like to understand the complexities in setting up this 12-panel PA.*

## RPPCR5-12PanelAnalyses-4

What is the effect on the integrated joint distribution of total releases if it is assumed that each waste panel contains 1/19 of the RPPCR PA inventory and normalized releases by individual pathway are the same for each waste panel?

*As noted by Hansen et al. (2023) and illustrated in Figures 1 and 2, normalized releases in EPA units are essentially the same for each waste panel in the 19-panel RPPCR PA. This is not unexpected because each panel has essentially the same volume, the same inventory, and the same footprint. EPA would like to*

*understand how the similarity of total normalized releases of individual pathways would affect the joint distribution of all pathways.*

## RPPCR5-12PanelAnalyses-5

Following a presentation by Seth King, the APPA Peer Panel concluded "If the panel closures function as expected, the ROMPCS has the effect of turning the 3D repository, including both its disturbed (excavated) zones and the overlying DRZ, into a series of cuboidal, semi-isolated regions." Is there sufficient evidence of this isolation to support a conclusion that the waste panels' performance is sufficiently similar and that their functionality is sufficiently independent that a 10-panel PA could be considered to exclude Panels 9 and 10, and include Panels 11 and 12?

*In addition to the assumption of uniform releases, there are also indications that the waste panels are acting independently from one another. This behavior is supported by the presence of tight ROM salt panel closures in 15 of the 19 waste panels modeled in the RPPCR PA, and also by the natural creep closure that is not modeled but will occur in the remaining four panels. In recognition of this, during the 19-panel APPA Peer Review DOE observed that the PA results suggest that the waste panels are behaving more as independent, isolated units, unaffected by changes in conditions in neighboring panels. This isolation became increasingly evident with the addition of nine new panels in the APPA, each of which has ROM salt panel closures. The peer reviewers agreed with this observation (e.g., Falta et al. 2021, pp. 30, 32). The effect of such isolation on a 12-panel PA is that, if waste panels behave as isolated units, it does not matter where they are in the repository.*

## RPPCR5-12PanelAnalyses-6: Effects of 12-Panel vs. 19-Panel Minimum Brine Volumes on Actinide Solubilities and Repository Releases

Please address the potential effects of a smaller minimum brine volume and consequent increased organic ligand concentrations and +III actinide solubilities on estimated releases from a 12-panel repository.

*Baseline actinide solubilities used in the WIPP RPPCR PA were calculated using the 19-panel repository minimum brine volume (King 2021). The minimum brine volume for a 12-panel repository will be lower than the RPPCR PA value, which will result in higher EDTA concentrations and higher baseline +III actinide solubilities. Hansen et al. (2023) did not consider the effects of these higher baseline actinide solubilities on the estimated releases from a 12-panel repository.*

Falta, Ronald W., Mengsu Hu, Edward M. Kwicklis, Carl I. Steefel, Sherilyn C. Williams-Stroud, and John A. Thies 2021. Waste Isolation Pilot Plant, Additional Panels Performance Assessment (APPA) Changed Conceptual Models Peer Review Report. CBFO (U.S. Department of Energy, Carlsbad Field Office), Carlsbad, NM 2021. December.

Hansen, C., Brunell, S., King, S. (2023). Estimation of Releases from a 12-Panel Repository, Revision 0. Sandia National Laboratories, Carlsbad, NM. ERMS 580656.

King, S. (2021) Repository volume, DRZ volume, and minimum brine volume for a direct brine release for a repository with new panels. Sandia National Laboratories, Carlsbad, NM. ERMS 576475.