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

June 27, 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: Fourth 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 (DOE) submittal of the RPPCR. This letter transmits a set of agency technical questions and comments (see enclosure). The EPA would appreciate a timely response to these questions, as well as the previous sets of questions sent to the DOE, to help expedite the EPA review.

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

Sincerely,

DANIEL SCHULTHEISZ
Digitally signed by DANIEL SCHULTHEISZ
Date: 2024.06.27 15:16:11 -04'00'

Tom Peake
Director
Center for Waste Management and Regulations

ENCLOSURE
1. Fourth set of technical questions on the RPPCR

cc: Anderson Ward, DOE CBFO
Justin Marble, DOE EM
Lee Veal, EPA
Ray Lee, EPA

Jay Santillan, EPA
Xinyue Tong, EPA
Winifred Okoye, EPA
EPA Docket

Enclosure 1: Fourth set of technical questions on the RPPCR

RPPCR4-Corrosion-1: Steel Packaging and Waste Iron-Based Metals/Alloys Surface Area Recalculation

EPA has identified some issues in the calculation of iron-based metals/alloys surface area used in the RPPCR PA including the use of an outdated inventory, errors in surface area calculations for specific containers, and assumptions inconsistent with agreements discussed in the CRA-2019 Issues Table (see Issue #26, Santillan 2023). Please recalculate the steel packaging and waste iron-based metals/alloys surface areas for the RPPCR inventory.

1. Boatwright (2022) provides inventory information for emplaced, stored, and projected waste containers as of the RPPCR PA December 31, 2021 inventory cutoff date. Please use these data to recalculate the packaging steel surface area to mass ratio.
2. Please review the surface area calculations for all containers listed by Boatwright (2022), and provide detailed calculations (i.e., with a spreadsheet) that includes the payload container dimensions, the identities and dimensions of any overpacked containers, and the results of the surface area calculations per container for each container type. In this calculation, please also -
    a. Correct errors in container surface areas listed below:
        i. The corrected surface area per container for the SCA-30G1 container should be approximately 7.11 m^2. For shielded container SCA-30G1, Day (2015) and King (2021) added the surface area of an overpacked 55-gallon drum to the payload container surface area. However, a 30-gallon drum is overpacked in this shielded container configuration (DOE 2022) instead of a 55-gallon drum. Day (2015) and King (2021) used a total SCA-30G1 shielded container surface area of 8.98 m^2.
        ii. The surface area for each S100 POC - 6" w/ Liner container should be approximately 5.41 m^2 instead of 6.34 m^2. Day (2015) and King (2021) provided a surface area for the 55-gallon S100 POC - 6" w/ Liner container that is the same as the surface area for the 55-gallon S300 POC - 12" w/ Liner container. It appears that the surface area of a 12” diameter pipe overpack was used to calculate the total surface area for the S100 POC instead of a 6” diameter pipe overpack.
    b. Identify the packaging steel mass for each shielded container type and include these containers in the packaging steel surface area calculation. King (2021) excluded shielded containers from the packaging steel surface area calculations because of the effects of the 1” thick lead shielding in the containers on the tare weight. However, DOE must know the mass of packaging steel in each of these containers to calculate the mass of packaging steel that is used in PA. Alternatively, the tare weight of the shielded containers can be corrected by subtracting the mass of lead in the shielding based on the shielding dimensions and lead density.
3. EPA stated during the review of the CRA-2019 PA that the waste iron-based metals/alloys surface area should be calculated for the RPPCR PA using two assumptions (Issue #26). Please recalculate the waste iron-based metals/alloys surface areas using each of these assumptions.:
    a. The surface area to mass ratio equals the ratio for 1-cm iron spheres (spherical waste assumption), and
    b. The surface area to mass ratio equals the ratio for a 55-gallon drum (55-gallon drum sheet metal surrogate assumption).

King (2021) used the waste and waste containers emplaced as of December 31, 2020 to calculate the packaging steel and waste iron-based metals/alloys surface area used in the RPPCR PA. However, the inventory cutoff date for the RPPCR PA is December 31, 2021 and King (2021) also omitted stored or projected waste and waste containers. DOE should recalculate the steel packaging and waste iron-based metals/alloys surface areas using the RPPCA PA inventory data.

EPA has identified several errors in the calculation of two of the steel container surface areas used by Day (2015) and King (2021) (see question 2a(i) and (ii)). In addition, the surface area calculations presented by Day (2015) and King (2021) do not provide complete information about the types and dimensions of the overpacked containers. The spreadsheet calculations requested in item 2, above, will provide additional clarity regarding the containers and surface area calculations.

EPA (2017, 2022) previously questioned the assumption used by King (2021) that the waste in each container would have the same surface area to mass ratio as its container. Because a large fraction of the iron-based metals/alloys waste in the projected inventory at closure will be compressed 55-gallon drums from the Advanced Mixed Waste Treatment Project (AMWTP) at Idaho National Laboratory, EPA continues to believe that using the ratio of the surface area to tare weight of a 55-gallon drum is a more defensible option for the sheet metal surrogate. Consequently, DOE should include this waste surrogate assumption in its calculations.

RPPCR4-Corrosion-2: Recalculation of D_s

In previous evaluations, EPA (2017, 2022) concluded that an average of the spherical waste surrogate assumption and the 55-gallon drum sheet metal surrogate is more defensible than using an upper-bound surface area. Please calculate this average value after performing the revised calculations requested in RPPCR4-Corrosion-1.

King (2021) does not adequately support the assumption that a higher anoxic corrosion rate will provide a conservative assessment of possible releases, and acknowledges that the PA calculations are nonlinear and complex. Information from the CRA-2019 Deferred PA has indicated that increased gas generation rates can decrease modeled repository releases under some circumstances. Knerr (2020) demonstrated that increased gas generation rates caused increased waste panel brine pressures, decreased waste panel brine saturation, and slightly decreased average total releases from the repository at low probabilities because of decreased direct brine releases. Consequently, the Agency cannot support an assertion that higher anoxic gas generation is a conservative assumption for the RPPCR without additional calculations to demonstrate this is the case. EPA requests DOE to perform these calculations so the Agency can understand whether differences in the RPPCR calculation versus the revised values will result in significant iron surface area changes that can impact anoxic gas generation and subsequent releases. EPA (2017, 2022) has previously concluded that an average of the spherical waste surrogate assumption and the 55-gallon drum sheet metal surrogate assumption is more defensible for calculating surface area.

Boatwright, W.L. 2022. *Estimation of Cellulose, Plastic, and Rubber Emplacement and Operational Materials in the Waste Isolation Pilot Plant for 2021.* Los Alamos National Laboratory, Carlsbad, New Mexico, LA-UR-22-32150.

Day, B. 2015. *Review of the Technical Basis for REFCON: ASDRUM, DRROOM, and VROOM Performance Assessment Analysis Parameters with Comparison to the Currently Emplaced Steel Surface Area per Unit Volume in the WIPP Repository.* Sandia National Laboratories, Carlsbad, New Mexico, ERMS 564670.

DOE (U.S. Department of Energy). 2022. *CH-TRAMPAC.* Revision 6, February 2022.

EPA (U.S. Environmental Protection Agency). 2017. *Technical Support Document for Section 194.24: Evaluation of the Compliance Recertification Actinide Source Term, Gas Generation, Backfill Efficacy, Water Balance, and Culebra Dolomite Distribution Coefficient Values*. Office of Radiation and Indoor Air, Docket No. EPA-HQ-OAR-2014-0609, June 2017.

EPA (U.S. Environmental Protection Agency). 2022. *Technical Support Document for Section 194.24: Evaluation of the Compliance Recertification (CRA-2019) Actinide Source Term, Gas Generation, Backfill Efficacy, Water Balance, and Culebra Dolomite Distribution Coefficient Values*. Office of Radiation and Indoor Air, Docket No. EPA-HQ-OAR-2019-0534, April 2022.

King, S. 2021. *Recalculation of Iron Surface Area for Iron Corrosion in the WIPP PA Calculation.* Sandia National Laboratories, Carlsbad, New Mexico, ERMS 576428.

Knerr, R. 2020. *Response 7 to U.S. Environmental Protection Agency's 2019 Compliance Recertification Application Completeness Comments Letters dated May 6, 2020, June 12, 2020, July 17, 2020 and September 11, 2020 from Tom Peake to Mike Brown*. U.S. Department of Energy, Carlsbad Field Office, Carlsbad, New Mexico. Letter to L.B. Veal, U.S. Environmental Protection Agency Radiation Protection Division, Washington, D.C. December 1, 2020.

Santillan, J. 2023. *Revised CRA-2019 Issues Table.* Email from Jay Santillan to Anderson Ward, August 24, 2023.