Sandia National Laboratories

Operated for the United States Department of Energy
by National Technology and Engineering Solutions
of Sandia, LLC.

Albuquerque, New Mexico 87185-0101
Livermore, California 94551-0969

date: May 28, 2025

to: WIPP Records Center

from: Justin Wilgus, 08881
Sarah Brunell, 08881

Justin Wilgus Digitally signed by Justin Wilgus
Date: 2025.05.28 14:51:25 -06'00'

subject: ***Re-Calculation of the Location of Culebra Release Point 2 for Use in WIPP PA Rev. 1***

SUMMARY

The purpose of this memo is to update the location of Culebra Release Point 2 (CRP 2), originally documented in Bethune and Brunell (2022). Bethune and Brunell (2022) calculated CRP 2 as the centroid of Panels 11, 12, and 13 in a 19-panel representation of the WIPP repository which was used in the Replacement Panels Planned Change Request (RPPCR; Brunell et al., 2024). EPA has requested Performance Assessment (PA) calculations for the 2026 Compliance Recertification Application (CRA-2026) based on both a 12-panel (interim) and 19-panel (final) repository design (EPA, 2025). The exclusion of Panel 13 in the interim repository necessitates a re-calculation of the location of CRP 2. To simplify comparison between analysis results, the updated CRP 2 coordinates are anticipated to be used in both the 12-panel interim state PA and 19-panel final state PA for CRA-2026 (Hansen et al., 2025). The locations of other Culebra Release Points (CRP 1, CRP 3, and CRP 4) remain unchanged. This memo is revision 1 of the original that includes two additional appendices (A and B) and a numerical update to the spreadsheet on file.

CULEBRA RELEASE POINT 2 CALCULATION

The updated location for CRP 2 was determined by employing the same methodology described in Bethune and Brunell (2022). The spreadsheet detailing the UTM coordinates, latitude, longitude, and results of the calculation is archived at /data/cvs/CVSLIB/WIPP_EXTERNAL/ap214. The original and re-calculated UTM coordinates and corresponding grid locations in the PA code SECOTP2D (SECO; Bethune, 2022) are shown in Table 1, and the updated location is shown in Figure 1.

Exceptional Service in the National Interest
Information Only

Table 1. Updated Location of Culebra Release Point 2

ANALYSIS	UTM (x)	UTM (y)	SECO (i)	SECO (j)
RPPCR	612828.31	3581621.38	52	81
CRA-2026	612929.61	3581621.38	54	81

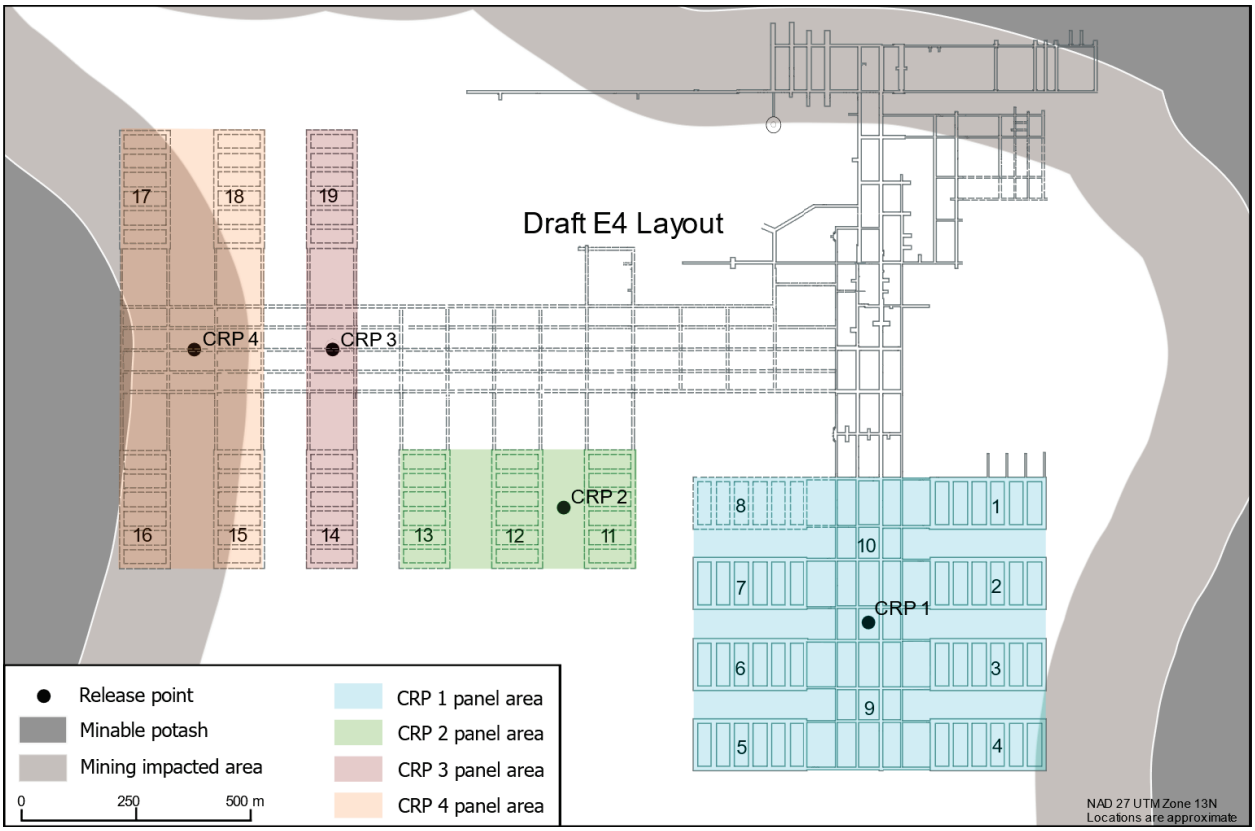

Figure 1. Location of Culebra Release Points

JUSTIFICATION FOR COORDINATING 19-PANEL RELEASE POINTS WITH 12-PANEL RELEASE POINTS

The small change in location of CRP 2 creates consistency among release points between the 19-panel and 12-panel repository representations. This consistency allows for the 12-panel interim state to serve as a subset of the 19-panel final state PA for more direct comparison of results. Particle track pathways from CRP 2 in its original location (RPPCR; Bethune 2023) and re-calculated location (CRA19_12P; Zeitler et al., 2025) are highly similar for partial and full mining scenarios. Average particle travel times to the land withdrawal boundary from CRP 2 in the

Information Only

RPPCR and CRA19_12P are systematically greater than the 10,000-year regulatory compliance period. Therefore, any changes in Culebra transport associated with the small location change are expected to be negligible. CRP Group 2 which includes Panels 11, 12, and 13 as defined by Bethune and Brunell (2022) will remain unchanged (Figure 1). CRP 1, CRP 3, and CRP 4 are unaffected by the CRP 2 location change. Flow fields calculated with MODFLOW6 (Brunell, 2022) are unaffected by release point locations.

REFERENCES

Bethune, J. 2022. Design Document and User's Manual for SECOTP2D Version 1.44. Document Version 1.44. ERMS 573879. Carlsbad, NM: Sandia National Laboratories.

Bethune, J. and S. Brunell. 2022. Determination of Culebra Relase Point Number and Location in a Repository with New Panels. ERMS 576493. Carlsbad, NM: Sandia National Laboratories.

Bethune, J. 2023. Analysis Report for Culebra Flow and Transport in the Replacement Panels Planned Change Request (RPPCR). ERMS 579725. Carlsbad, NM: Sandia National Laboratories.

Brunell, S. 2022. Addendum to the User's Manual for MODFLOW6 Version 6.2.2. Document Version 6.2.2. ERMS 576747. Carlsbad, NM: Sandia National Laboratories.

Brunell, S., J. Bethune, P. Docherty, D. Kicker, S. Kim, J. Long, and T. Zeitler. 2024. Summary Report for the 2023 Replacement Panels Planned Change Request Performance Assessment. Rev. 1. ERMS 581044. Carlsbad, NM: Sandia National Laboratories.

EPA. 2025. Performance Assessment Calculations Needed for 2026 Waste Isolation Pilot Plant Compliance Recertification Application (CRA-2026). EIMS-0004415969. Washington, D.C.: U.S. Environmental Protection Agency, Office of Radiation and Indoor Air.

Hansen, C., et al. 2025. Analysis Plan for the 2026 WIPP Compliance Recertification Application Performance Assessment. AP-214. Carlsbad, NM: Sandia National Laboratories.

Zeitler, T.R., J. Bethune, S. Brunell, P. Docherty, S. Kim, S. King, and J. Wilgus. 2025. Analysis Report for a 12-Panel PA Sensitivity Study. SAND2025-00507R. Carlsbad, NM: Sandia National Laboratories.

Information Only

APPENDIX A CULEBRA RELEASE POINT COORDINATES

Bethune and Brunell (2022) provide an overview of how CRP centroids were calculated which is documented in their associated spreadsheet archived at /data/cvs/CVSLIB/WIPP_EXTERNAL/ap193.

CRP centroid locations require panel location information. The corner of each panel was manually selected and documented in the Corner Coords tab of the spreadsheet. Each CRP point centroid considers a set of corner locations based on panels included in the panel area. The manual location selection led to slight differences in y-coordinates of corners between panels that should otherwise be consistent (e.g. panels 11, 12, and 13). This results in a slight variation in y-coordinate centroid location when excluding panel 13 in re-calculation of CRP 2. For consistency, we opted to use the same y-coordinate used for the RPPCR.

The slight variation in y-coordinate does not change SECO coordinates. The difference in y-coordinate of the CRP 2 locations only impacts the DTRKMF calculation. Therefore, the y-coordinate in Table 1 could be used as a baseline to update variable y-coordinates in Corner Coords tab where appropriate. This would ensure location consistency moving forward. A similar approach could be extended to ensure location consistency among panels in other panel areas.

APPENDIX B COORDINATE TRANSFORMATION

The coordinates in Table 1 (x, y) can be transformed into local cell coordinates in the MODFLOW6 coordinate system (x_m, y_m) with equations:

$$x_m = (x - x_0)/100$$
$$y_m = -1*(y - y_0)/100$$

The MODFLOW6 coordinate system has its origin (x_0, y_0) at the top left of the domain at UTM coordinate (601700, 3597100). Each MODFLOW6 grid cell is 100×100 meters. For the RPPCR this resulted in x_m=111.28 and y_m=154.79. Using the updated CRA-2026 location results in x_m =112.30 and y_m =154.79, which was updated accordingly in MODFLOW6 input files.

Information Only