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from: Brad Day Brad Day Digitally signed by Brad Day Date: 2025.03.19 10:02:12 -06'00'
subject: BRAGFLO Grid Development for CRA-2026

Introduction and Summary

The memorandum provides the basis for revising the two-dimensional BRAGFLO computational grid for use in the CRA-2026 (CRA26) Performance Assessment (PA) calculations. Two grids are established herein, one that represents the interim state of the repository (IS) that considers 12 waste panels and one that represents the final state of the repository (FS) that considers 19 waste panels. The CRA26 grids are based on the Replacement Panels Planned Change Request (RPPCR) grid (King, 2023) and the CRA19_12P grid (Zeitler 2025). The CRA19_12P BRAGFLO grid differs from the RPPCR grid in the volumes of the West Operations and West Rest-of-Repository areas, which have been scaled down from the 19-panel representation to the 12-panel representation. The peer-reviewed APPA grid (Falta et al., 2021) was used in the RPPCR Salado flow analysis with modifications to adjust the shaft dimensions and to update the Castile brine reservoir model. The CRA26_IS and CRA26_FS grids are conceptually equivalent to the APPA/RPPCR/CRA19_12P grids.

The CRA26_IS and CRA26_FS grids are modified from the RPPCR baseline to capture repository features based on as-built excavation footprint dimensions within the existing repository, planned excavation footprint dimensions associated with expansion of the experimental area and number of waste panels, and the planned change for alternative panel closure locations for panels 1 and 2. Accommodation of the updated repository excavation dimensions is accomplished through use of the RPPCR grid Δx dimensions used as characteristic North/South flow dimensions and modification of the RPPCR grid Δz dimensions used to capture the area/volume within each repository region. Additionally, grid flaring is applied via Δx and Δz grid dimension modifications to accommodate new minimum distances from the repository excavations to the nearest land withdrawal boundary, conserve volume surrounding the repository, normalize the effects of inter-block relative permeability at interfaces between the repository excavations and the adjacent Salado, and to reduce the first (leftmost) and last (rightmost) grid cell widths that minimize the impact of Dirichlet pressure boundary conditions applied at the cell-centers. See King 2025 for additional detail regarding harmonic averaging associated with the inter-block relative permeability and Dirichlet boundary conditions.

Additional details of the CRA26_IS and CRA26_FS grid development are discussed in the following sections.

Repository Areas

Calculation of the repository footprint for specific areas is achieved through summation of defined cross-hatched areas using Autodesk AutoCAD™ 2020 (CAD) software and a to-scale electronic drawing of the WIPP repository that incorporates both as-built existing and planned repository excavations to include planned future waste panels (11 thru 12 or 11 thru 19) and SDI experimental area excavations (Zimmerly

2025). Further planned modifications are incorporated for the alternate location of panel closures for Panels 1 and 2 (Knerr 2020).

With the above changes considered, the CRA26_IS and CRA26_FS repository configurations are incorporated into a new drawing (filename: "CRA26_repository_areas.dwg") as illustrated in Figure 1 and Figure 2, respectively. Table 1 provides the associated repository area descriptions and CAD-measured areas. Note that the nominal representation of shafts in the CAD drawing are superseded by the previously established area representing the consolidation of 5 shafts (Zeitler 2019). Only the WDR, WRR, and the PCS (between the WDR and WRR) differ in the CRA26_IS and CRA26_FS excavated repository footprints. The use of the CAD footprint area measurement methodology results in a 7.1 and 8.2% difference (increase) in total repository footprint area with respect to the 12-panel and 19-panel grids employed for the RPPCR calculations.

In addition to the consolidated areas measurements used in the grid development, the CAD data is similarly employed to calculate the individual panel areas which are summarized in Table 2 along with the ratio of the individual panel area to the total panel area for each repository configuration. A Microsoft Excel™ spreadsheet (filename: "CRA26_grid_calculations.xlsx") provides further calculational details in the "Areas" worksheet for each repository configuration. Validation of AutoCAD 2020 is presented in Attachment A.

Repository Volumes

The repository footprint areas determined above are extended to establish repository volumes by multiplying the areas by a nominal repository excavation height of 13 ft. The resultant repository volumes, grouped by Area description, are provided in Table 3. Consistent with the revised repository footprint area calculations, the total excavated repository is increased by the same proportion in comparison to the 12-panel and 19-panel grids employed for the RPPCR calculations. The volume calculations are performed in the Microsoft Excel™ spreadsheet (filename: "CRA26_grid_calculations.xlsx") in the "Areas" worksheet for each repository configuration.

Excavated Area Grid Dimensions

The CRA26_IS and CRA26_FS grids utilize previously established grids from the perspective of a) number of cells, b) overall characteristic flow distances and discretization (Δx), and stratigraphic depths and discretization (Δy). Accommodation of the revised excavation footprint areas and volumes is accomplished through modification of the Δz dimensions to produce equivalent volumes for each repository area within the grid cells illustrated in Figure 3 and Figure 4 for the CRA26_IS and CRA26_FS grids, respectively. The only exception to the Δz scaling approach is to honor the previously established area / volume of the borehole and shaft features with those cell dimensions unchanged from the RPPCR. Cell Δz dimensions within the locally flared (Stein 2002) WAS area are scaled, exclusive of the borehole cells, to ensure overall WAS area volume is equal to the newly calculated WAS area volume. The excavated grid dimension calculations are performed in the Microsoft Excel™ spreadsheet (filename: "CRA26_grid_calculations.xlsx") in the "Areas" worksheet for each repository configuration.

Regional Salado Grid Flaring

As presented and discussed in Stein 2002, grid flaring is a method to represent 3-D volumes in a 2-D grid. This methodology is generally applied to the CRA26_IS and CRA26_FS grids with the following modifications in comparison to the RPPCR grid:

1. The Δx grid dimension for the column of cells to the adjacent-right of the rightmost repository excavation (i index = 55) is set equal to the preceding cell column (i index = 54) Δx grid dimension. This approach was employed in the RPPCR grid for the column of cells to the adjacent left of the

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leftmost repository excavation (i index = 22) which was set equal to next cell column (i index = 23) Δx grid dimension. Extending this approach to the WRR ensures parity for the WAS and WRR areas with respect to the harmonic averaging that is applied to inter-block relative permeability at the interface between excavated waste areas and the adjacent intact Salado. The grid flaring methodology is illustrated in Figure 5 and Figure 6 for the CRA26_IS and CRA26_FS grids, respectively. As identified in Figure 5 and Figure 6, the calculation of the D_{ew}, D_n, and D_s flaring parameters is performed based on all cells representing the excavated repository areas plus one grid cell on either side of the excavations. An initial set of flaring multipliers were selected independently on the South and North grid cells outside of the excavation plus one grid cell span to control the changing Δx dimensions up to the corresponding LWB dimension. An additional set of South and North flaring multipliers were selected independently to control the Δx dimensions outside the LWB which results in a South and North grid extent beyond the corresponding LWB equal to 10,000 m. The flared grid dimensions for CRA26_IS and CRA26_FS are also summarized in Table 4 and Table 5 with further calculational details available in the Microsoft Excel™ spreadsheet (filename: "CRA26_grid_calculations.xlsx") in the "Grid Flaring" worksheet for each grid. Note that the dimensions shown in Figure 5 and Figure 6 are unofficial due to being rounded to the nearest meter for convenience and to reduce clutter.

2. The cumulative distance in the grid from the repository to the WIPP Land Withdrawal Boundary (LWB) is taken as the nearest physical distance from any actual or planned repository excavation to the projected LWB boundary in each direction. Due to the North-South modeling of the repository which is actually L-shaped with the WRR extending towards West and WAS extending toward the South, the following cumulative distances are employed based on a GIS assessment shown in Figure 7 and Figure 8 for the CRA26_IS and CRA26_FS repository layouts, respectively.
    a. CRA26_IS
        i. South: Distance from edge of Panel 5 to the South LWB = 2429 m
        ii. North: Distance from edge of drifts west of Panel 12 to the West LWB = 2134 m
    b. CRA26_FS
        i. South: Distance from edge of Panel 5 to the South LWB = 2429 m
        ii. North: Distance from edge of Panel 16 to the West LWB = 1421 m

    The QGIS 3.34 software was employed to facilitate the GIS assessment to locate the repository footprint within the LWB based on the location of the Salt shaft at coordinate NAD27 N 32 deg. 22' 21.35" W 103 deg. 47' 33.93" (Attachment B). The LWB data was obtained from the Cadastral PLSS Standardized Data Geodatabase 2021 (https://rgis.unm.edu/rgis6/). All data was coordinate transformed to the Projected Transverse Mercator coordinate reference system NAD83/New Mexico East – EPSG:32112 and overlain on the Google Earth base map shown in Figure 7 and Figure 8. Distances were measured via QGIS to the nearest meter using Cartesian measurements on the projected map (filename: "CRA26_gis.qgz"). Validation of QGIS 3.34 is presented in Attachment C.

Source Data File Listing

The electronic data files used to generate the data referenced herein are controlled and stored on the WIPP PA cluster at /data/cvs/CVSLIB/WIPP_EXTERNAL/ap214/CRA26_grid with the following filenames and descriptions:

1. CRA26_repository_areas.dwg – AutoCAD drawing file with both the CRA26_IS and CRA26_FS repository layouts and associated hatched areas
2. CRA26_repository_gridscale.dwg – AutoCAD drawing with the 2-D flared representation of the CRA26_IS and CRA26_FS grids

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3. CRA26_grid_calculations.xlsx – Excel spreadsheet with the CRA26_IS and CRA26_FS area and volume calculations and associated flared grid cell dimensions
4. CRA26_gis.gqz – QGIS gis layout with the CRA26_IS and CRA26_FS repository layout with respect to the WIPP LWB (referenced supporting data files are also included as [19p_repository_areas_meters_relocated.gpkg, 12p_repository_areas_meters_relocatedred.gpkg, LWB.gpkg, and SaltShaft.kml]

Table 1 – Repository Area Descriptions and CAD Drawing Area Measurements

Name	Description	CRA26_IS Area (ft^2)	CRA26_FS Area (ft^2)
WAS	Waste in Panel 5	127,054	127,054
APC	Abandoned Panel Closure located between WAS and SRR	3,400	3,400
SRR	South Rest-of-Repository combining Panels 3, 4, 6, and 9	502,021	502,021
PCS	Panel Closure System located between SRR and NRR	7,800	7,800
NRR	North Rest-of-Repository combining Panels 1, 2, 7, 8, and 10	622,954	622,954
PCS	Panel Closure System located between NRR and SOP	14,107	14,107
SOP	South Operations	150,170	150,170
EXP	Experimental	556,125	556,125
SHAFT①	Shaft combining Salt, Intake, Exhaust, Waste, and #5 shafts	1,648	1,648
WOP	West Operations	239,909	239,909
WDR	West Drifts	160,248	468,131
PCS	Panel Closure System located between WDR and WRR	6,800	30,600
WRR	West Rest-of-Repository combining Panels 11 and 12 for CRA26_IS and Panels 11 thru 19 for FS	267,780	1,205,010

Notes:

① Shaft dimensions and associated effective area of combined shafts from Zeitler 2019.

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Table 2 – Panel CAD Drawing Area Measurements and Ratios

Panel	Area (ft^2)	CRA26_IS Area Ratio	CRA26_FS Area Ratio
1	140,559.50	0.092278518	0.057127804
2	130,182.01	0.085465608	0.052910066
3	127,056.01	0.083413362	0.051639561
4	127,056.01	0.083413362	0.051639561
5	127,053.54	0.083411743	0.051638559
6	127,055.91	0.083413294	0.051639519
7	127,056.01	0.083413362	0.051639561
8	127,048.01	0.083408110	0.051636310
9①	124,253.51	0.081573496	0.050500537
10	98,108.79	0.064409262	0.039874499
11	133,890.01	0.087899942	0.054417114
12	133,890.01	0.087899942	0.054417114
13	133,890.01	-	0.054417114
14	133,890.01	-	0.054417114
15	133,890.01	-	0.054417114
16	133,890.01	-	0.054417114
17	133,890.01	-	0.054417114
18	133,890.01	-	0.054417114
19	133,890.01	-	0.054417114
Total – CRA26_IS	1,523,209.30	-	-
Total – CRA26_FS	2,460,439.36	-	-

Notes:

① Area measurements are inclusive of the APC area as defined in Figures 1 and 2.

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Table 3 – Repository Volumes

Name	Description	CRA26_IS Volume (ft^3)	CRA26_FS Volume (ft^3)
WAS	Waste in Panel 5	1,651,702	1,651,702
APC	Abandoned Panel Closure located between WAS and SRR	44,200	44,200
SRR	South Rest-of-Repository combining Panels 3, 4, 6, and 9	6,526,273	6,526,273
PCS	Panel Closure System located between SRR and NRR	101,400	101,400
NRR	North Rest-of-Repository combining Panels 1, 2, 7, 8, and 10	8,098,402	8,098,402
PCS	Panel Closure System located between NRR and SOP	183,391	183,391
SOP	South Operations	1,952,210	1,952,210
EXP	Experimental	7,229,625	7,229,625
SHAFT①	Shaft combining Salt, Intake, Exhaust, Waste, and #5 shafts	21,418	21,418
WOP	West Operations	3,118,817	3,118,817
WDR	West Drifts	2,083,224	6,085,703
PCS	Panel Closure System located between WDR and WRR	88,400	397,800
WRR	West Rest-of-Repository combining Panels 11 and 12 for CRA26_IS and Panels 11 thru 19 for CRA26_FS	3,481,140	15,665,130

Notes:

① Shaft dimensions and associated effective area of combined shafts from Zeitler 2019.

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Table 4 –CRA26_IS Grid Cell Dimensions

i Index	Δx (m)	Δz (m)		j Index	Δy (m)
1	434.59	51162.17		1	125.83
2	6461.55	37369.89		2	52.27
3	2291.33	19864.13		3	66.72
4	812.53	13656.41		4	66.72
5	288.13	11455.09		5	65.72
6	268.46	10341.91		6	1.00
7	239.70	9325.59		7	0.85
8	214.02	8418.15		8	0.69
9	191.09	7607.93		9	0.69
10	170.62	6884.51		10	1.32
11	152.34	6238.59		11	1.32
12	136.02	5661.87		12	1.32
13	121.45	5146.93		13	2.62
14	108.44	4687.15		14	0.27
15	96.82	4276.63		15	4.53
16	86.45	3910.09		16	4.53
17	77.19	3582.81		17	0.18
18	68.92	3290.59		18	54.73
19	61.54	3029.67		19	54.73
20	54.95	2796.69		20	54.73
21	49.06	2588.67		21	54.73
22	43.80	127.86		22	54.73
23	43.80	127.86		23	54.73
24	10.00	29.18		24	54.73
25	2.00	4.86		25	36.00
26	0.27575	0.27575		26	7.70
27	2.00	4.86		27	24.80
28	10.00	29.18		28	8.50
29	43.80	127.86		29	17.30
30	15.24	10.36		30	106.00
31	15.24	10.36		31	43.30
32	140.20	166.33		32	15.66
33	140.20	166.33		33	0.10
34	15.24	23.77			
35	15.24	23.77			
36	140.20	206.40			
37	140.20	206.40			
38	30.48	21.50			
39	30.48	21.50			
40	98.70	47.12			
41	98.70	47.12			
42	98.70	47.12			
43	51.68	499.86			
44	51.68	499.86			
45	12.6933	12.0586			

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i Index	Δx (m)	Δz (m)		j Index	Δy (m)
46	147.31	50.43			
47	147.31	50.43			
48	147.31	50.43			
49	50.00	148.88			
50	50.00	148.88			
51	15.24	20.73			
52	15.24	20.73			
53	140.20	88.72			
54	140.20	88.72			
55	140.20	88.72			
56	143.00	2518.95			
57	145.86	3096.67			
58	148.78	3685.95			
59	151.76	4287.03			
60	154.80	4900.15			
61	157.90	5525.55			
62	161.06	6163.47			
63	164.28	6814.15			
64	167.57	7477.85			
65	170.92	8154.83			
66	174.34	8845.35			
67	253.53	9701.09			
68	750.45	11709.05			
69	2221.33	17652.61			
70	6575.14	35245.55			
71	453.08	49301.99			

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Table 5 –CRA26_FS Grid Cell Dimensions

i Index	Δx (m)	Δz (m)		j Index	Δy (m)
1	434.59	51219.97		1	125.83
2	6461.55	37427.69		2	52.27
3	2291.33	19921.93		3	66.72
4	812.53	13714.21		4	66.72
5	288.13	11512.89		5	65.72
6	268.46	10399.71		6	1.00
7	239.70	9383.39		7	0.85
8	214.02	8475.95		8	0.69
9	191.09	7665.73		9	0.69
10	170.62	6942.31		10	1.32
11	152.34	6296.39		11	1.32
12	136.02	5719.67		12	1.32
13	121.45	5204.73		13	2.62
14	108.44	4744.95		14	0.27
15	96.82	4334.43		15	4.53
16	86.45	3967.89		16	4.53
17	77.19	3640.61		17	0.18
18	68.92	3348.39		18	54.73
19	61.54	3087.47		19	54.73
20	54.95	2854.49		20	54.73
21	49.06	2646.47		21	54.73
22	43.80	127.86		22	54.73
23	43.80	127.86		23	54.73
24	10.00	29.18		24	54.73
25	2.00	4.86		25	36.00
26	0.27575	0.27575		26	7.70
27	2.00	4.86		27	24.80
28	10.00	29.18		28	8.50
29	43.80	127.86		29	17.30
30	15.24	10.36		30	106.00
31	15.24	10.36		31	43.30
32	140.20	166.33		32	15.66
33	140.20	166.33		33	0.10
34	15.24	23.77			
35	15.24	23.77			
36	140.20	206.40			
37	140.20	206.40			
38	30.48	21.50			
39	30.48	21.50			
40	98.70	47.12			
41	98.70	47.12			
42	98.70	47.12			
43	51.68	499.86			
44	51.68	499.86			
45	12.6933	12.0586			

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i Index	Δx (m)	Δz (m)		j Index	Δy (m)
46	147.31	50.43			
47	147.31	50.43			
48	147.31	50.43			
49	140.20	155.10			
50	140.20	155.10			
51	15.24	93.27			
52	15.24	93.27			
53	140.20	399.25			
54	140.20	399.25			
55	140.20	399.25			
56	133.19	2917.93			
57	126.53	3437.37			
58	120.20	3930.83			
59	114.19	4399.61			
60	108.48	4844.95			
61	103.06	5268.03			
62	97.91	5669.97			
63	93.01	6051.81			
64	88.36	6414.55			
65	83.94	6759.15			
66	79.74	7086.51			
67	132.19	7510.37			
68	499.68	8774.11			
69	1888.79	13551.05			
70	7139.63	31607.89			
71	471.90	46830.95			

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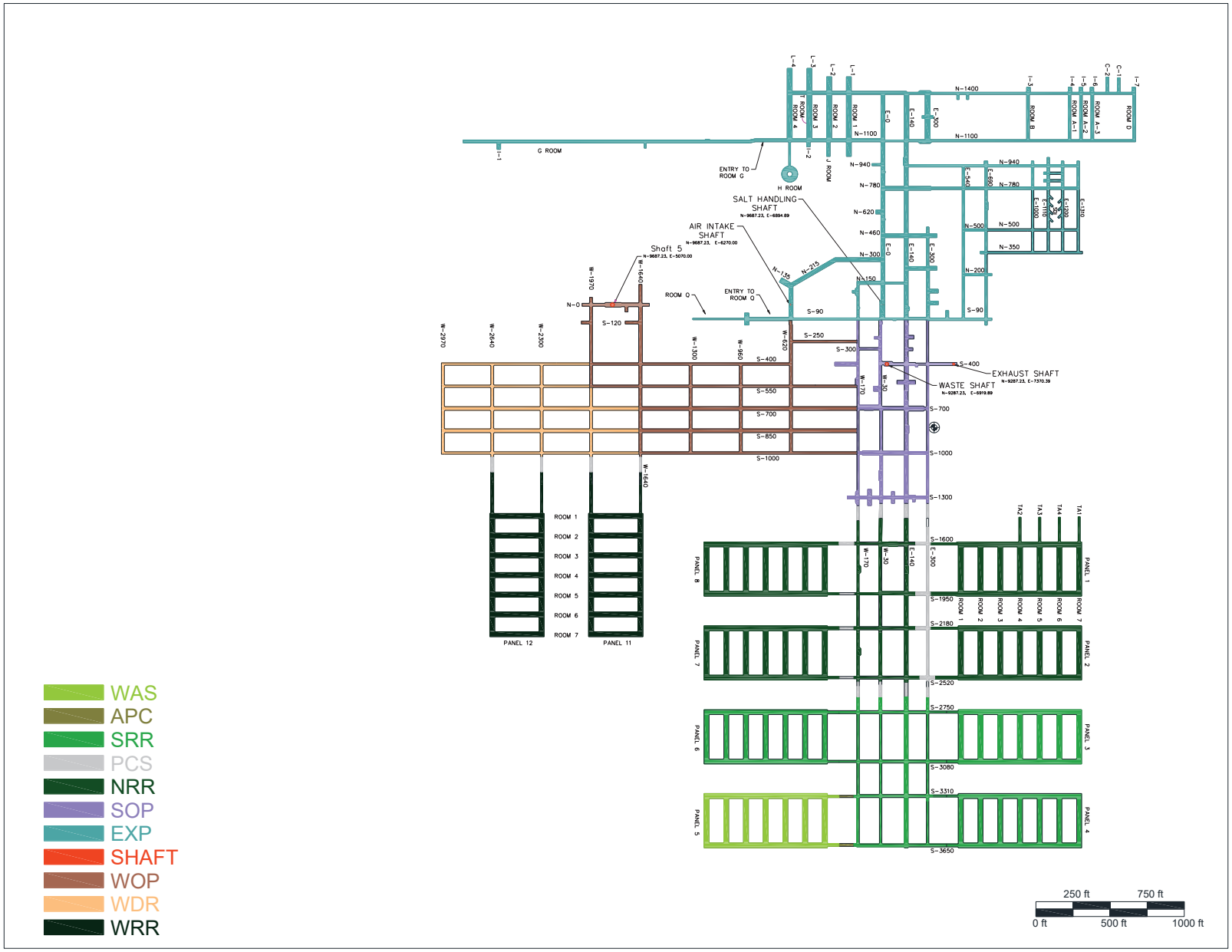


Figure 1 – CRA26_IS Repository Areas

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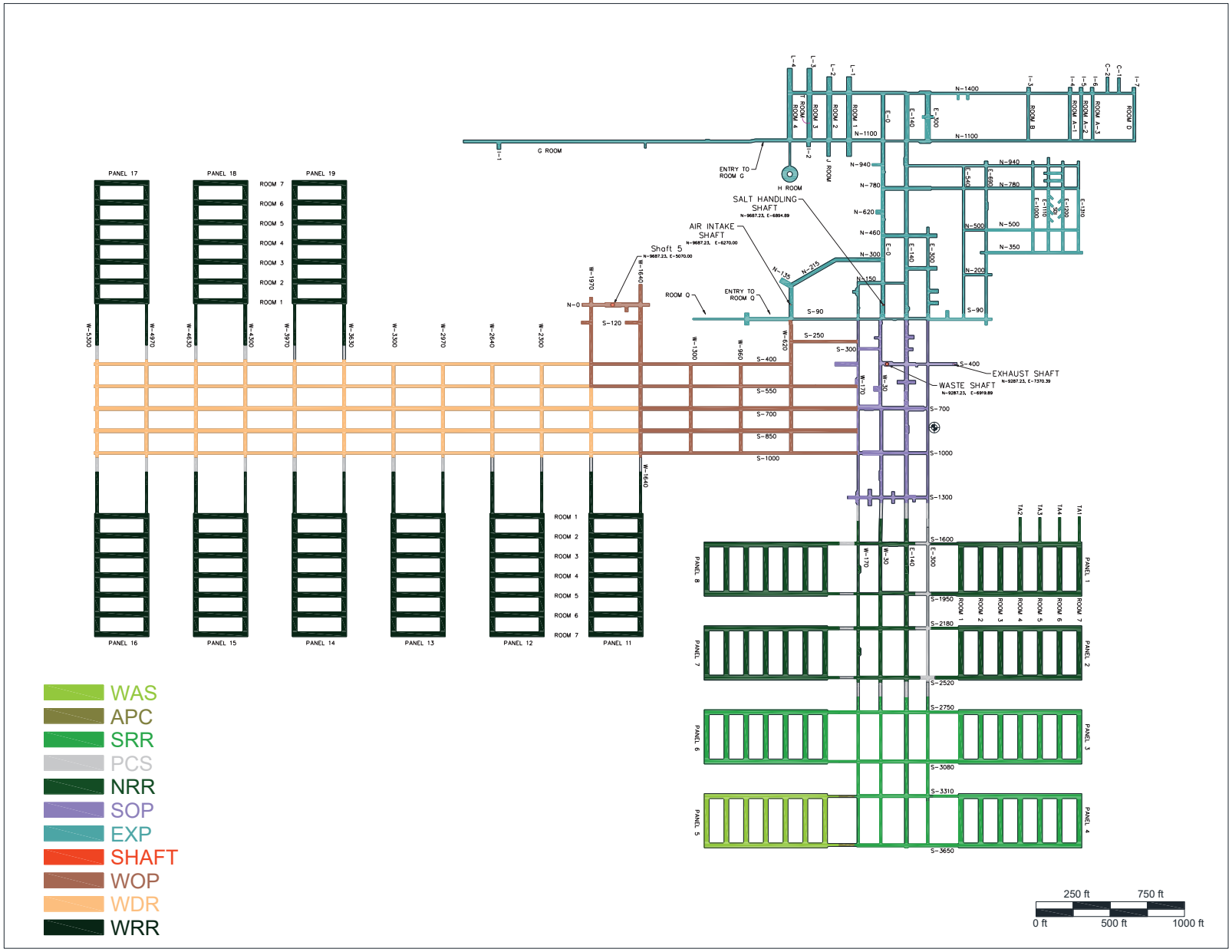


Figure 2 – CRA26_FS Repository Areas

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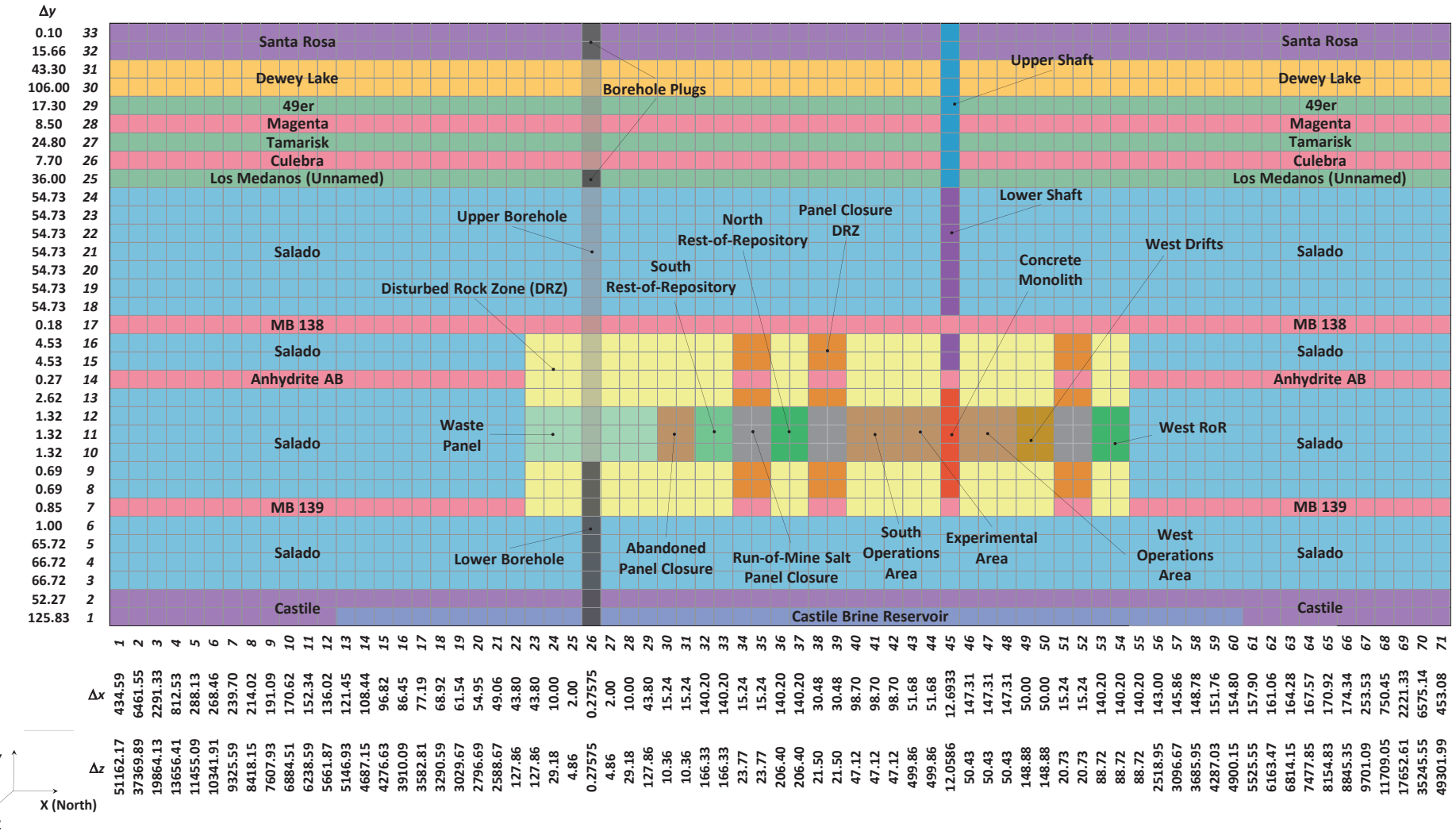


Figure 3 – CRA26_IS BRAGFLO Salado Flow Grid

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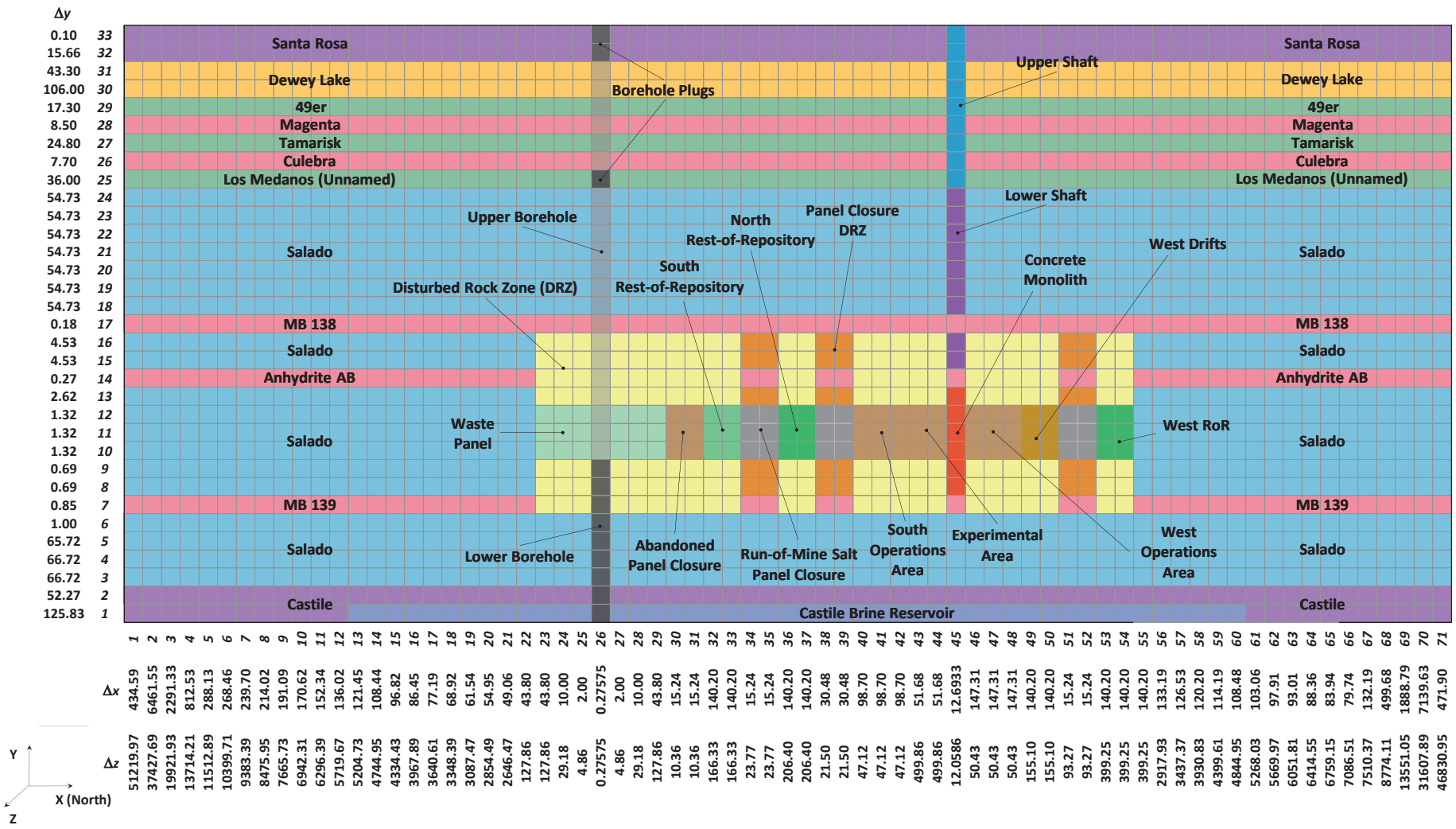


Figure 4 – CRA26_FS BRAGFLO Salado Flow Grid

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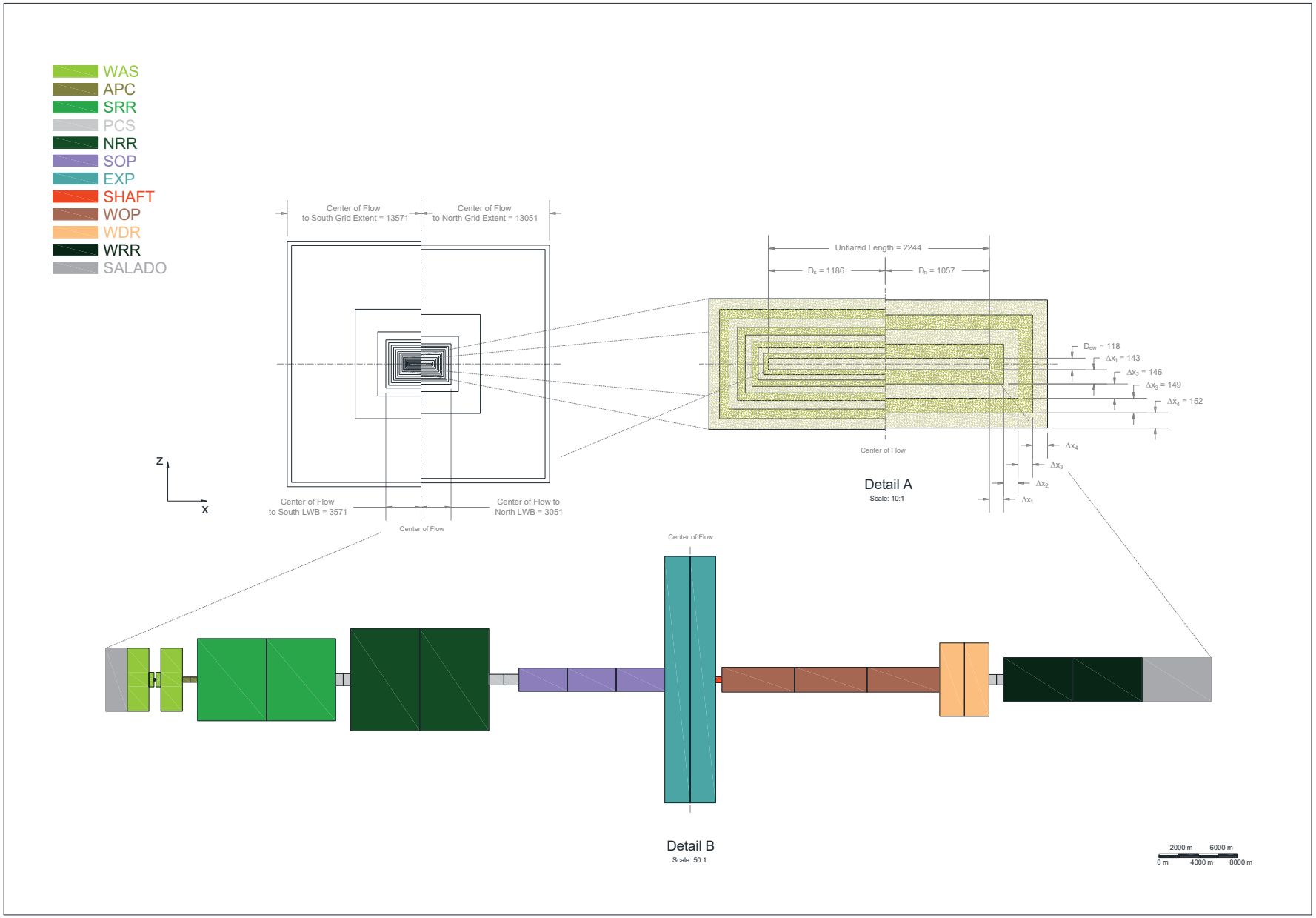


Figure 5 – CRA26_IS Grid Flaring

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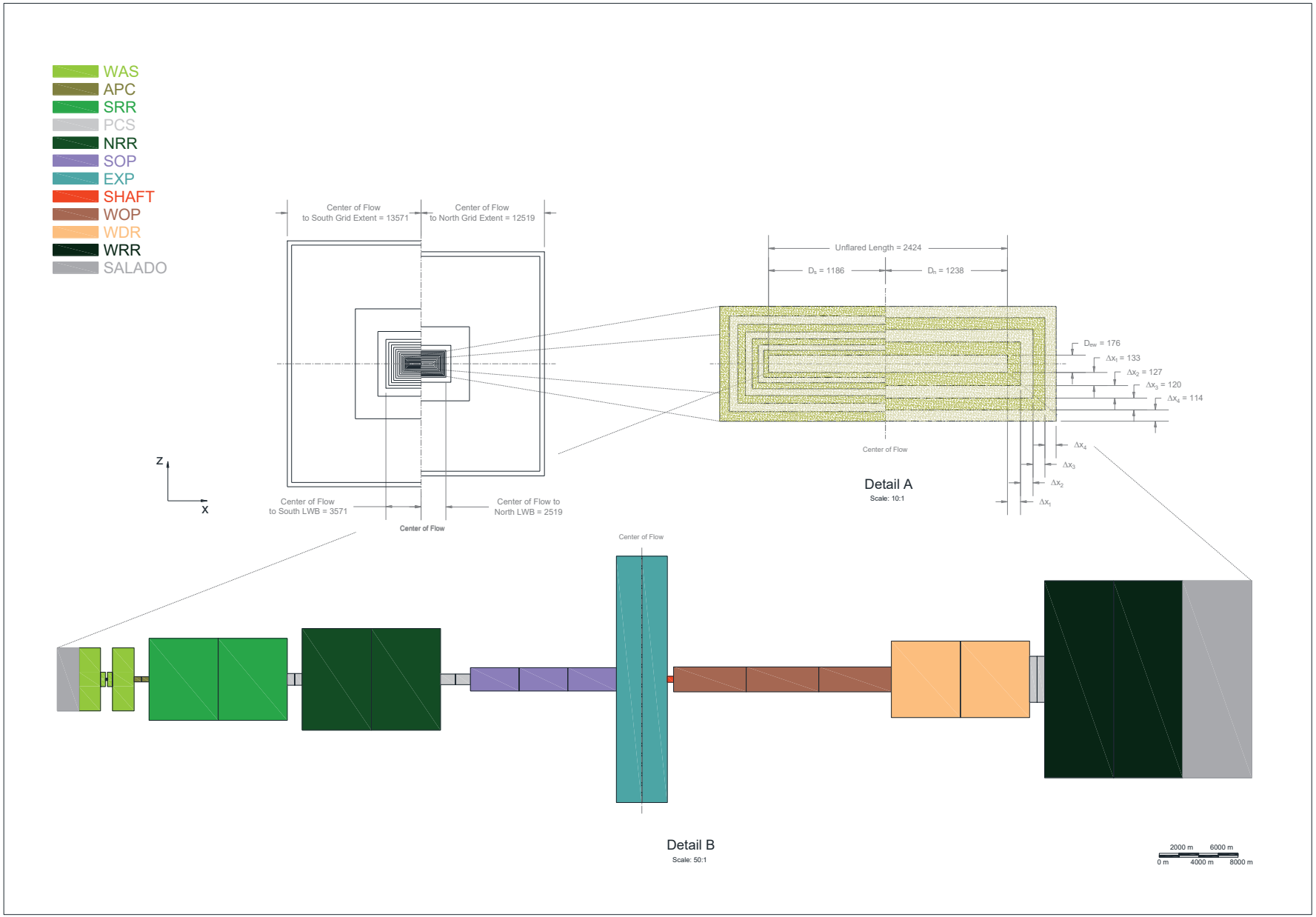


Figure 6 – CRA26_FS Grid Flaring

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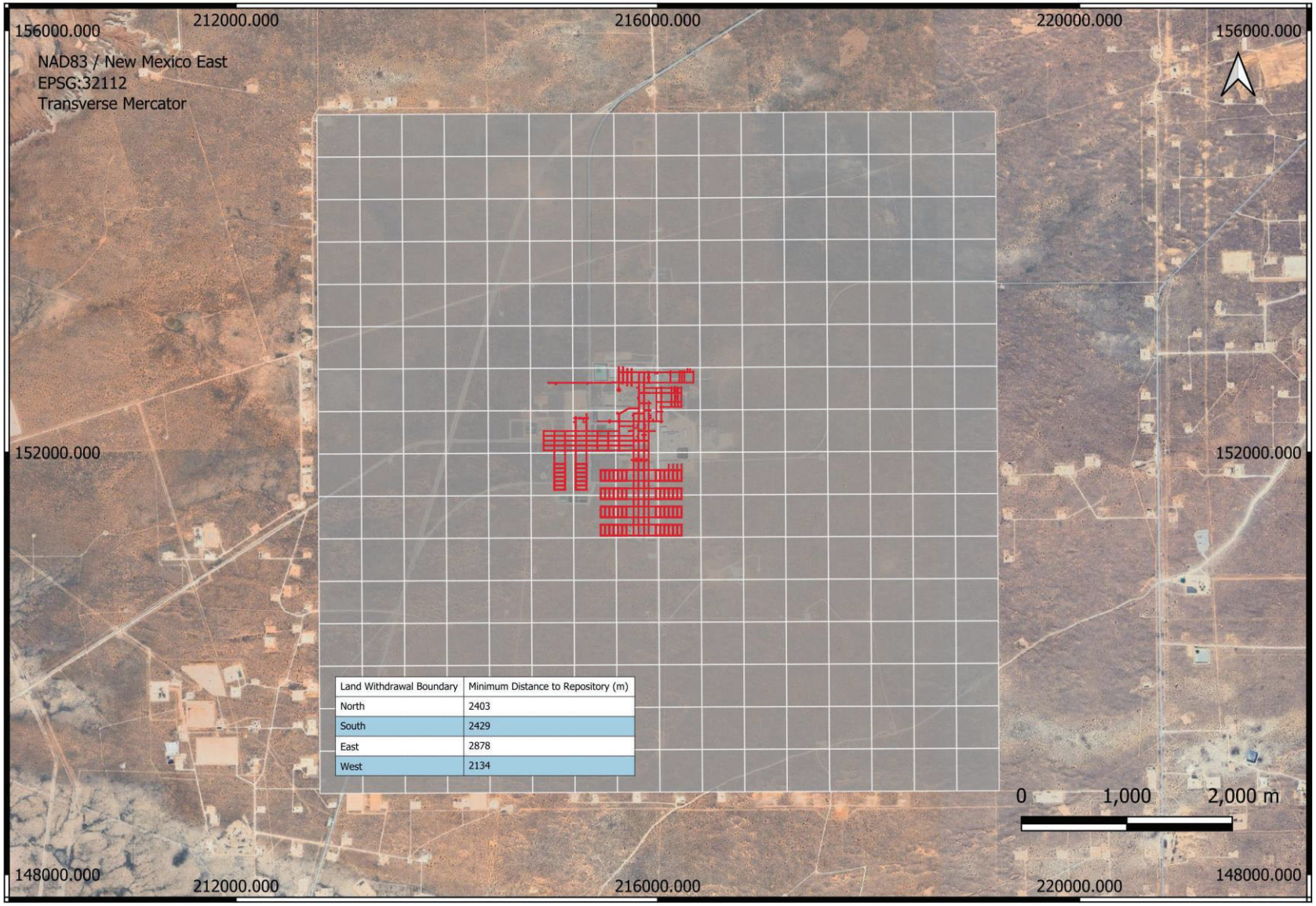


Figure 7 – CRA26_IS LWB Distances

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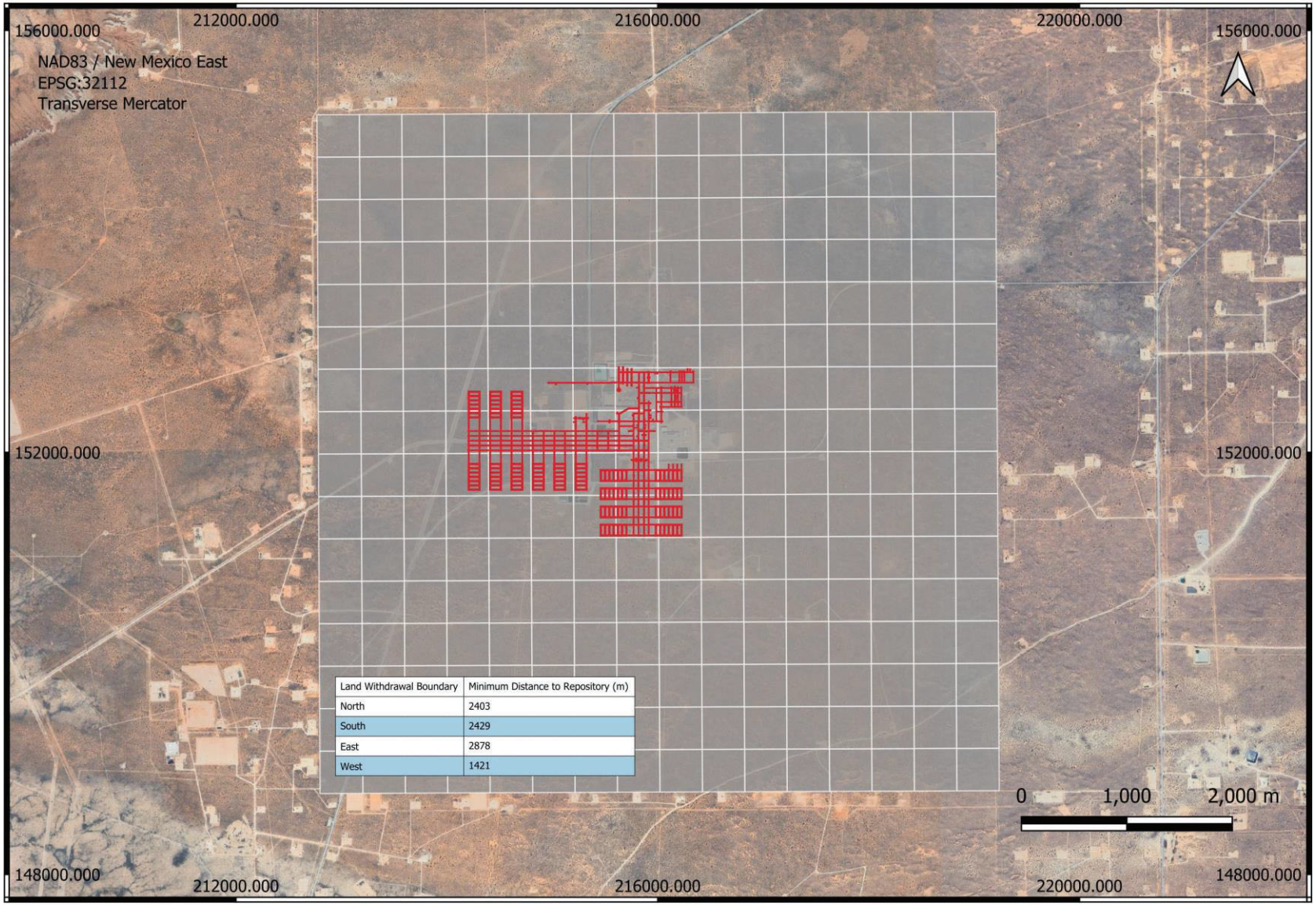


Figure 8 – CRA26_FS LWB Distances

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Attachment A

Validation of AutoCAD 2020

Panel 5 Area

A manual calculation of area is employed to validate the AutoCAD 2000 crosshatch area property. Dimensions regarding the subject area are illustrated below along with the results of the AutoCAD property info command that lists the reported area of the selected crosshatch.

To validate the AutoCAD area calculation, the Panel 5 dimensions are manually evaluated as follows:

$$A_{inlet_exit} = (14.00 + 20.00) * 79 = 2868.00\ ft^2$$

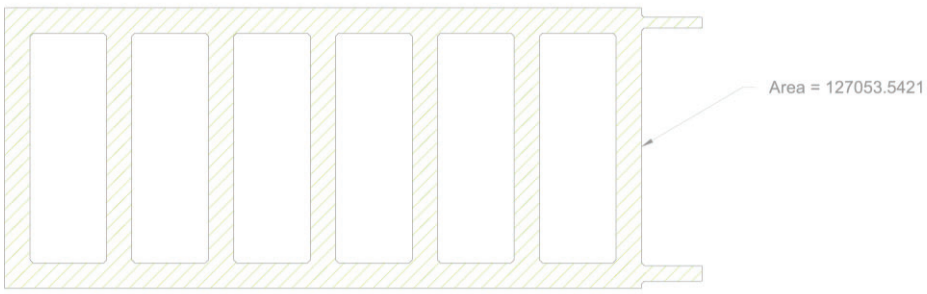
$$A_{rooms} = (300.00 * 33.00) * 7 + (831.00 * 33.00) * 2 = 124146.00\ ft^2$$

$$A_{corner_chamfers} = \frac{1}{2}(4.00 * 4.00) * 26 + \frac{1}{2}(3.60 * 3.73) + \frac{1}{2}(3.76 * 3.76) = 221.78\ ft^2$$

$$A_{panel5} = A_{inlet_exit} + A_{rooms} + A_{corner_chamfers} = 127053.78$$

The calculated AutoCAD crosshatch area is reported as 127053.5421 ft^2. Thus, the 0.00% difference when comparing the manual area calculation and the AutoCAD crosshatch area result validates the use of AutoCAD for the prescribed purpose.





Information Only

Attachment B

Email correspondence regarding location of Salt Handling Shaft, Planned Panel Closure Changes, and West Mains Repository Expansion.

From: Zimmerly, Ben (Ty) (CONTR) <Ty.Zimmerly@wipp.doe.gov>
Sent: Monday, February 17, 2025 8:01 AM
To: Day, Brad <baday@sandia.gov>; Day, Karen (CONTR) <Karen.Day@wipp.doe.gov>; Sjomeling, Dave (CONTR) <Dave.Sjomeling@wipp.doe.gov>
Subject: RE: [EXTERNAL] RE: Call Request

Brad,

Attached is a CAD version of the drawing for ECN14485 page 23 and 24. This drawing shows the West Mains and Panels added to the existing WIPP underground openings. Also attached is a PDF of the ECN. He ECN is still open.

Attached is a CAD drawing 3025-S which is a sketch that shows the dimensions of the West Mains entries and crosscuts.

A PDF of Figure M-34 is attached from the HWFP. This shows the locations of the ROMPCS for Panel s 1 through 10. But note that alternative locations for the Panel 1 and Panel 2 ROMPCS are necessary because poor ground conditions will prevent the installation in the access entries of Panel 1 and 2. See the attached e-mail for the alternative locations.

We do not have a drawing showing the location of the ROMPCS for Panels beyond Panel 12.

We have the center of the Salt Handling Shaft at NAD27 N 32 deg. 22’ 21.35” W 103 deg. 47’ 33.93”

Let me know is this information answers some of your questions and I will continue on the other information.

Ty

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Attachment C

Validation of QGIS 3.34

Salt Shaft Location

Use NOAA website (https://geodesy.noaa.gov/NCAT/) to obtain the state plane coordinates of the salt shaft based on provided NAD27 Latitude/Longitude data with no change in output reference frame.

Reference Frame:NAD27

Lat-Lon-Height		SPC		UTM/USNG		XYZ (m)	
Latitude	N32° 22' 21.35000" N322221.35000 32.3725972222	Zone	NM E-3001	Zone	13	X	N/A
Longitude	E256° 12' 26.07000" W1034733.93000 -103.7927583333	Northing	152,305.063 (m) 499,687.527 (usft) 499,688.526 (ift)	Northing (m)	3,582,188.241	Y	N/A
Ellipsoid Height ()	Not given	Easting	203,270.082 (m) 666,895.262 (usft) 666,896.596 (ift)	Easting (m)	613,572.945	Z	N/A
		Convergence (dms)	00 17 21.99	Convergence (dms)	00 38 47.23		
		Scale factor	0.99994099	Scale factor	0.99975906		
		Combined factor	N/A	Combined factor	N/A		
				USNG	13SFR1357382188		

Take SPC data from above and enter as a point (666895.262, 499687.527) usft on a new Shapefile Layer in QGIS using NAD 27 / New Mexico East coordinate reference system (EPSG:32012) with the same CRS specified as the default project coordinate reference system.

Visualize location of point on a Google Earth basemap which uses the WGS 84 / Pseudo Mercator coordinate reference system (EPSG:3857) to validate location coincident with physical shaft location.



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Change the project default reference coordinate reference system to NAD 83 / New Mexico East (EPSG:32112) and select the “Inverse of Popular Visualisation Pseudo-Mercator + Inverse of NAD83 to WGS 84 (30) + SPCS83 New Mexico East zone (meter)” transformation for the Google Earth base map and the “Inverse of New Mexico CS27 East zone + NAD27 to NAD83 (7) + SPCS83 New Mexico East zone (meter)” transformation for the salt shaft point.

Again, use the NOAA website (https://geodesy.noaa.gov/NCAT/) to obtain the state plane coordinates of the salt shaft with the NAD27 Latitude/Longitude input reference frame and the NAD83(2011) output reference frame.

Reference Frame:NAD83(2011)

Lat-Lon-Height		SPC		UTM/USNG		XYZ (m)	
Latitude	N32° 22' 21.79249" N322221.79249 32.3727201355	Zone	NM E-3001	Zone	13	X	N/A
Longitude	E256° 12' 24.29976" W1034735.70023 -103.7932500653	Northing	152,323.492 (m) 499,747.989 (usft) 499,748.989 (ift)	Northing (m)	3,582,390.288	Y	N/A
Ellipsoid Height ()	Not given	Easting	215,822.341 (m) 708,077.129 (usft) 708,078.546 (ift)	Easting (m)	613,524.082	Z	N/A
		Convergence (dms)	00 17 21.05	Convergence (dms)	00 38 46.29		
		Scale factor	0.99994093	Scale factor	0.99975892		
		Combined factor	N/A	Combined factor	N/A		
				USNG	13SFR1352482390		

Note the new SPC coordinates (215822.341, 152323.492) m. Compare the NOAA SPC coordinates to the QGIS coordinates by hovering over the salt shaft point (215822.6, 152323.4) to obtain the location in the CRS. The values compare well within a meter and provides a visual and numerical validation that the coordinate transformations in QGIS are equivalent to the NOAA reference.

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