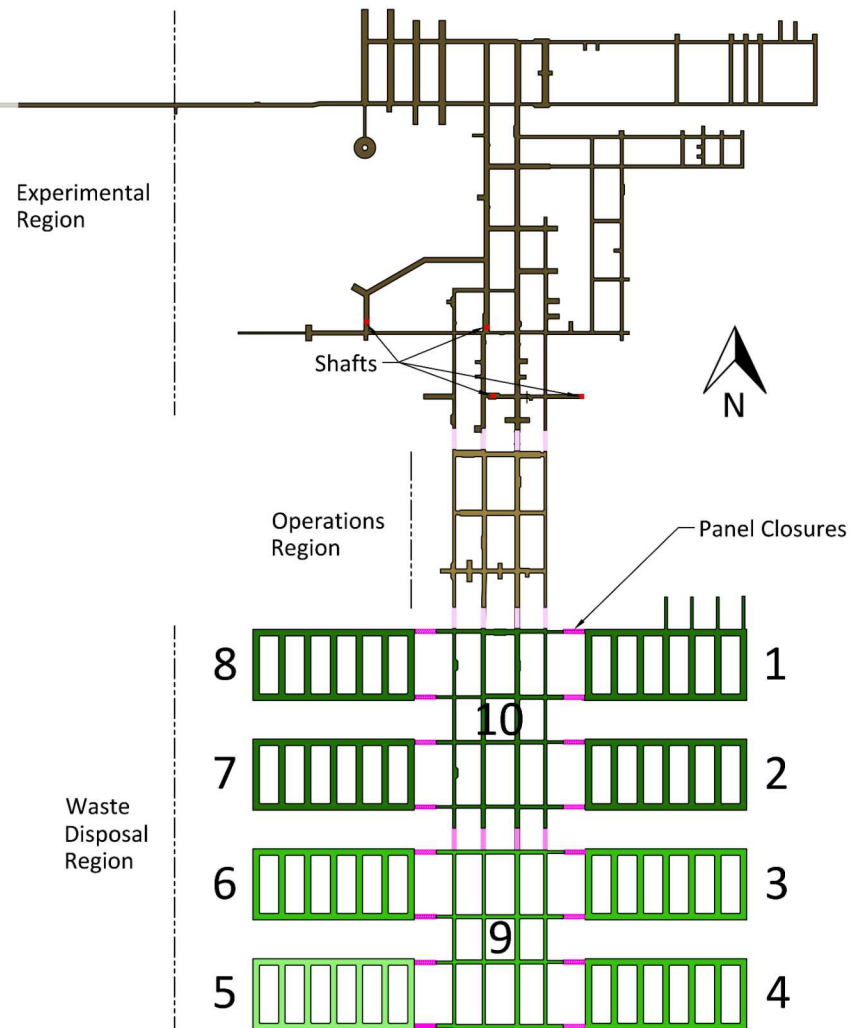


Abandonment of South End of Mine

- Fire and release events in 2014
- Access to south end was limited
 - Ground control maintenance deficiencies resulted in back instability and eventual roof falls
- Worker safety issue identified
 - Most effective resolution was to abandon the south end that contains Panels 3, 4, 5, 6, and 9
 - Waste was already emplaced in south Panels 3, 4, 5, and 6, but not 9
 - Unable to install run-of-mine-salt panel closures (ROMPCS) in Panels 3, 4, 5, and 6



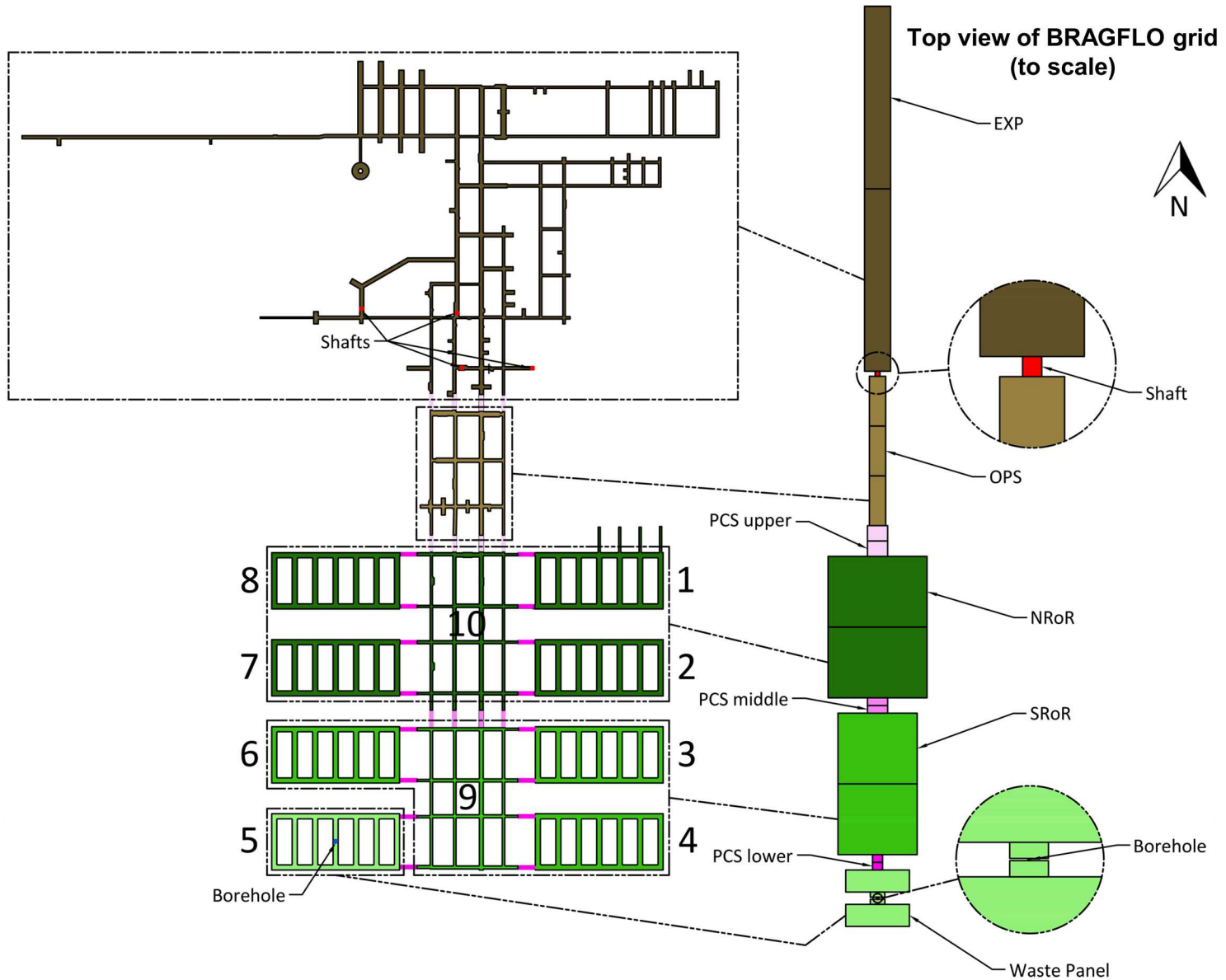
Impact to Long-Term Performance

- Long-term performance is typically not impacted by “operational” issues
 - Abandonment of south end is not just an operational issue
- PA has assumed emplacement of panel closures in all panels
 - Panel closures won't be emplaced in Panels 3, 4, 5, and 6
- PA has assumed emplacement of waste in all panels
 - Waste won't be emplaced in Panel 9

Objective and Challenges

- Need to demonstrate with a reasonable expectation that a conservative representation of the repository demonstrates that release limits are satisfied and design of the repository ensures compliance with EPA regulations and protection of the public and the environment
- Need to conservatively assess repository changes using existing abstractions, tools, and models (2-D) in compliance with current peer-reviewed conceptual models
 - Current model abstraction uses a lumped repository representation with a 2-D flared grid that relies on repository symmetry and the concept of radially-concentric flow
 - Current computational codes are aligned with the current (and long-standing) model abstraction

Current Model Abstraction

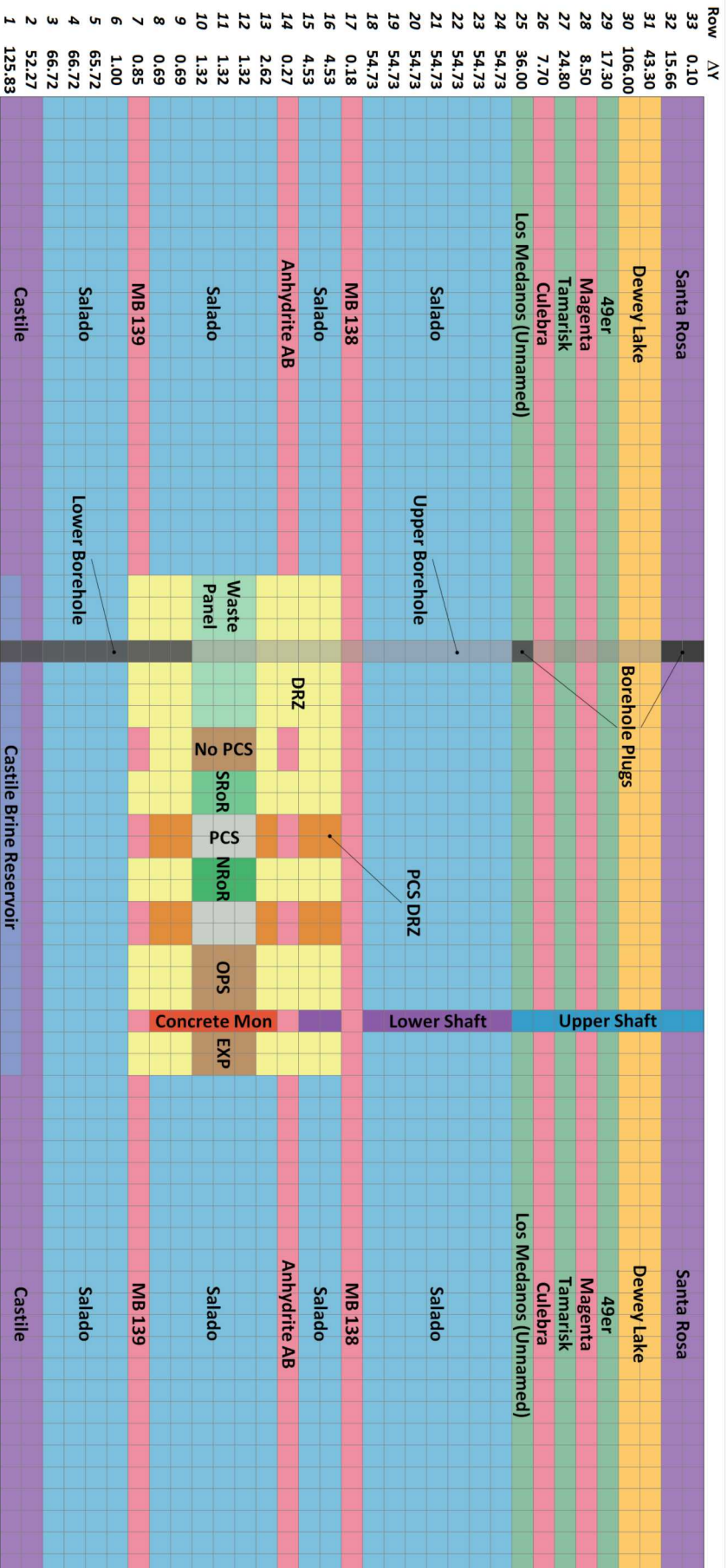


APCS Conceptualization

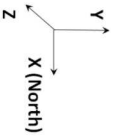
- Represent panel closure drifts between Panels 3, 4, 5, 6, and 9 as “open areas”
 - Conservatively facilitates enhanced communication during an E1 intrusion that results in increased brine saturation, gas generation, and brine/gas pressure in five panels rather than only in the intruded panel
- Model waste in Panel 9
 - Provides for a conservative determination of all releases that would alternatively be associated with a replacement panel containing waste in the north
- Treat existing panels in the north (with ROMPCS) the same as for the south (without ROMPCS) and not model a new replacement for Panel 9
 - Conservatively accounts for the increased probability of an intrusion into an empty panel with radionuclide-bearing brine
 - Necessary to comply with the current 2-D flared grid representation of the repository

Salado Flow Grid

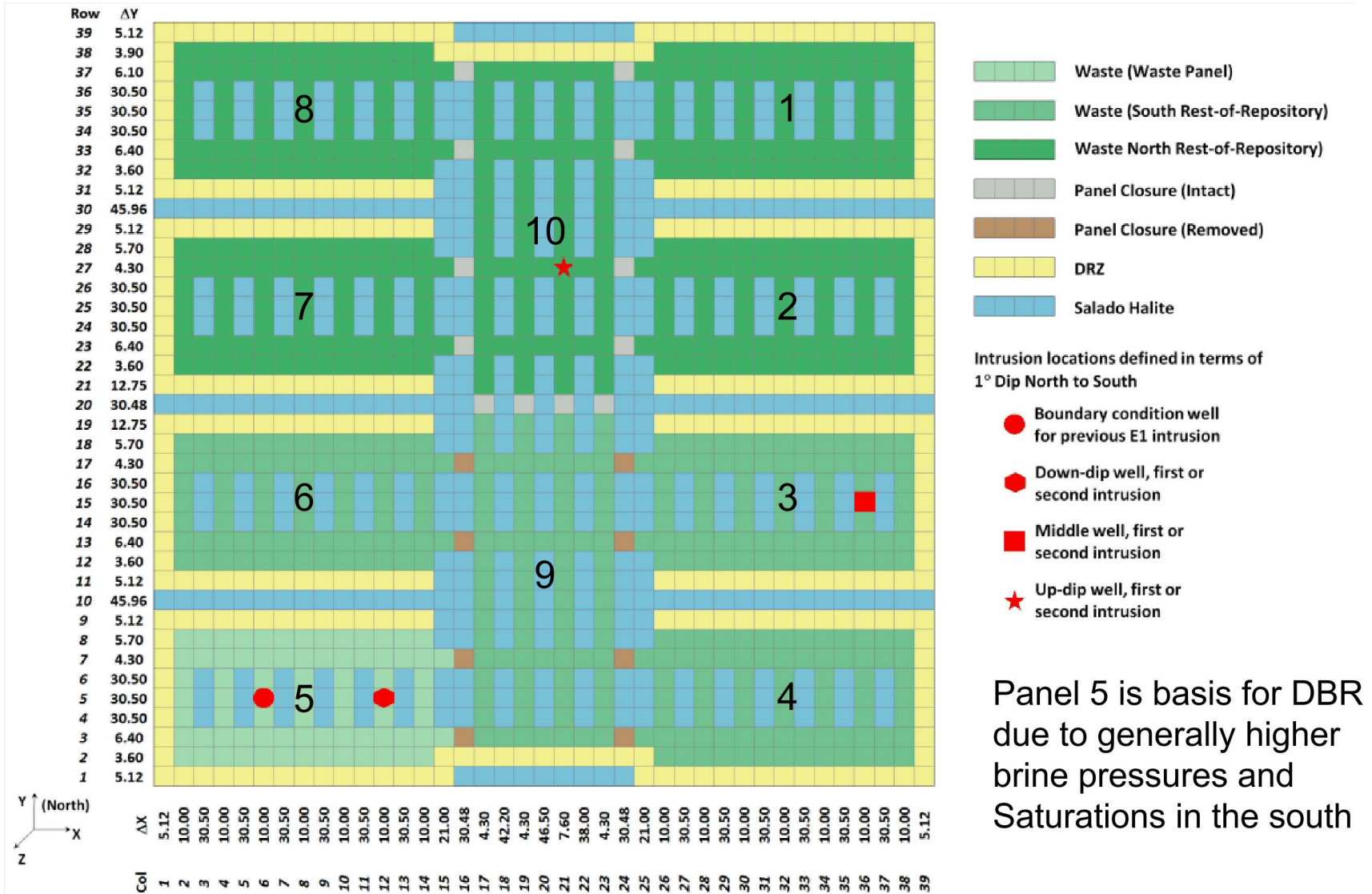
- Waste Panel – Panel 5
- South Rest-of-Repository – Panels 3, 4, 6, 9
- North Rest-of-Repository – Panels 1, 2, 7, 8, 10



Row	AY	ΔY	ΔX	ΔZ
33	0.10			
32	15.66			
31	43.30			
30	106.00			
29	17.30			
28	8.50			
27	24.80			
26	7.70			
25	36.00			
24	54.73			
23	54.73			
22	54.73			
21	54.73			
20	54.73			
19	54.73			
18	54.73			
17	0.18			
16	4.53			
15	4.53			
14	0.27			
13	2.62			
12	1.32			
11	1.32			
10	1.32			
9	0.69			
8	0.69			
7	0.85			
6	1.00			
5	65.72			
4	66.72			
3	66.72			
2	52.27			
1	125.83			
1		66177.07	12203.83	
2		35515.71	3126.85	
3		24949.10	2156.45	
4		17661.78	1487.21	
5		12636.05	1025.66	
6		9170.02	707.35	
7		6701.95	526.68	
8		4922.12	363.23	
9		3694.66	250.50	
10		2848.13	172.76	
11		2264.31	119.15	
12		1861.68	82.17	
13		1584.01	56.67	
14		1392.51	39.08	
15		1260.44	26.95	
16		1169.36	18.59	
17		1106.54	12.82	
18		1063.22	8.84	
19		1033.34	6.10	
20		1012.74	4.20	
21		998.53	2.90	
22		988.73	2.00	
23		126.20	43.80	
24		28.80	10.00	
25		4.80	2.00	
26		0.27575	0.27575	
27		4.80	2.00	
28		28.80	10.00	
29		126.20	43.80	
30		20.00	15.24	
31		20.00	15.24	
32		156.904	140.20	
33		156.904	140.20	
34		40.00	15.24	
35		40.00	15.24	
36		196.13	140.20	
37		196.13	140.20	
38		40.00	30.48	
39		40.00	30.48	
40		32.18	98.70	
41		32.18	98.70	
42		32.18	98.70	
43		9.50	10.00	
44		51.67	361.65	
45		51.68	361.65	
46		2839.58	2.00	
47		2849.38	2.90	
48		2863.59	4.20	
49		2884.19	6.10	
50		2914.07	8.84	
51		2957.39	12.82	
52		3020.20	18.59	
53		3111.29	26.95	
54		3243.36	39.08	
55		3434.86	56.67	
56		3712.53	82.17	
57		4115.16	119.15	
58		4698.98	172.76	
59		5545.50	250.50	
60		6772.97	363.23	
61		8552.80	526.68	
62		11020.87	707.35	
63		14486.90	1025.66	
64		19512.63	1487.21	
65		26799.95	2156.45	
66		37366.56	3126.85	
67		52688.14	4533.94	
68		77095.80	7669.89	



Direct Brine Release Grid



APCS Results – Salado Flow

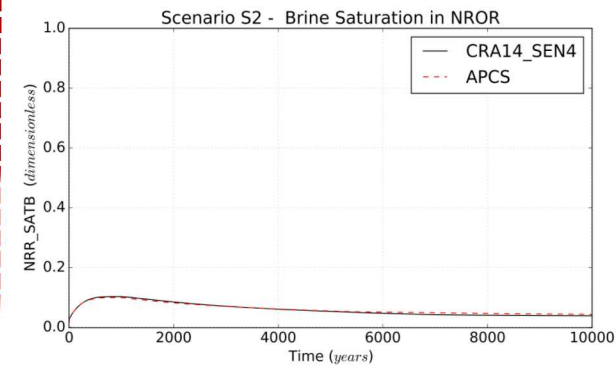
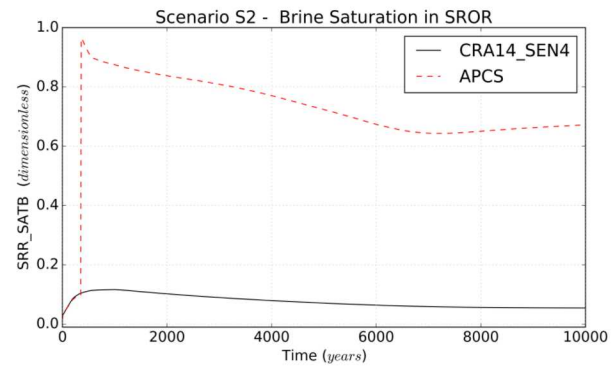
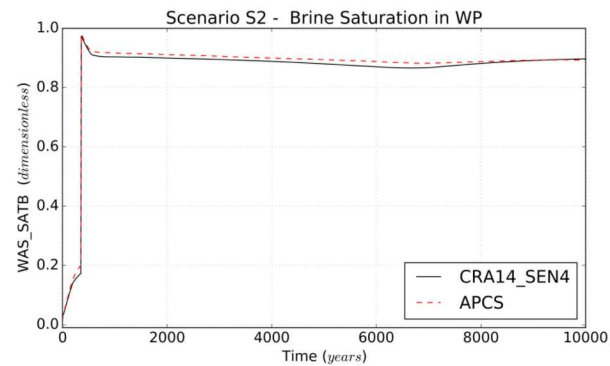
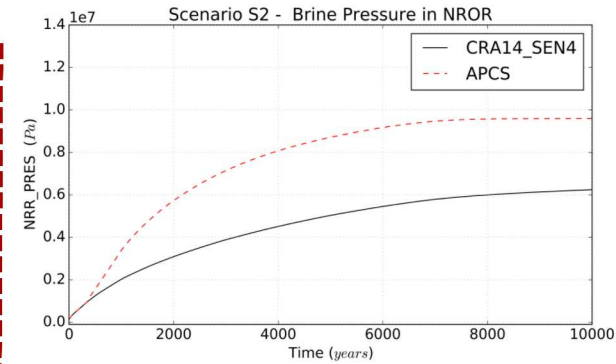
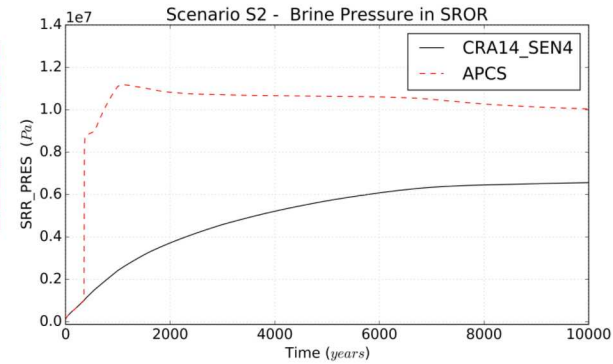
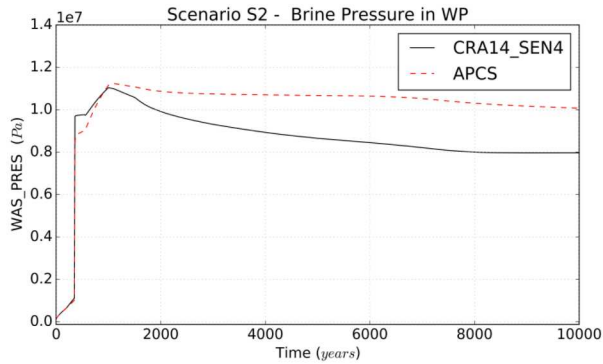
- Primary impact is from scenarios that model intersection of the intrusion borehole with a hypothetical Castile brine reservoir
- Results focused on the 350 yr intruded scenario – S2
 - Pressures in waste areas that have enhanced communication with the intruded Waste Panel (Panel 5) are significantly increased along with brine saturations
 - Waste areas not separated by a ROMPCS from the intruded Waste Panel are flooded with brine until pressures equilibrate as brine flows north

APCS Results – Salado Flow (cont.)

WP
(Panel 5)

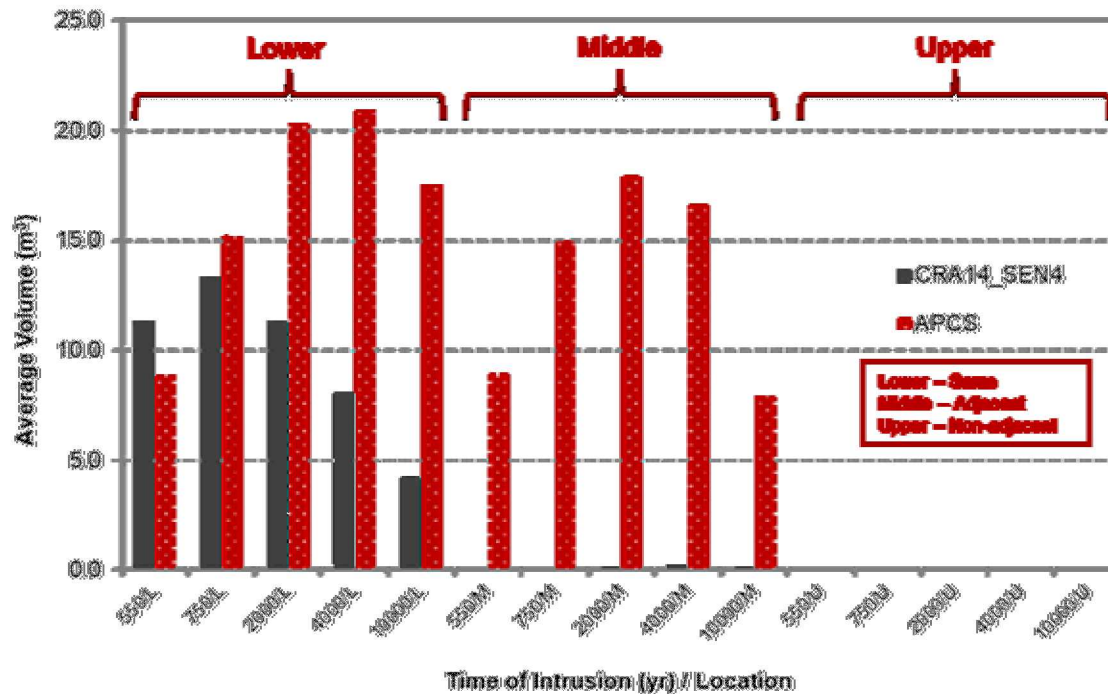
SROR
(Panels 3, 4, 6, 9)

NROR
(Panels 1, 2, 7, 8, 10)



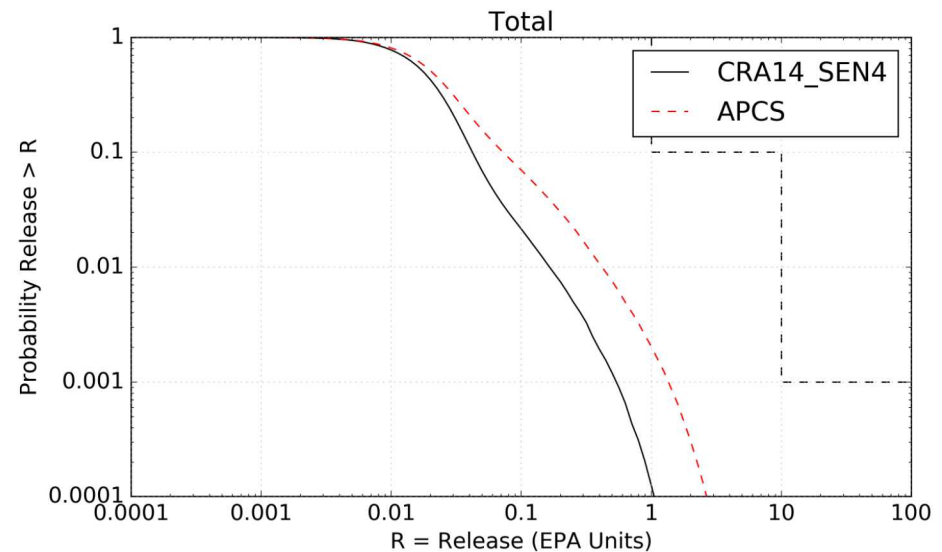
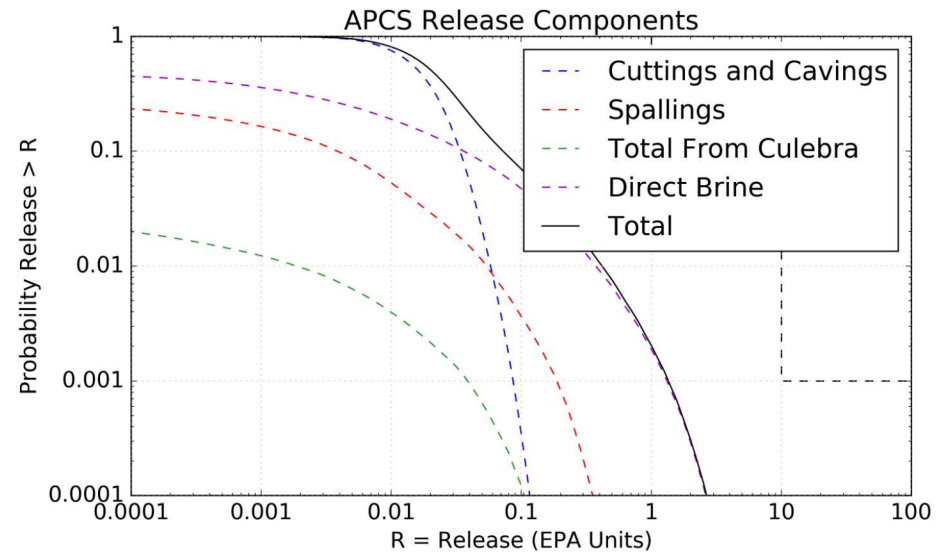
APCS Results – Direct Brine Release

- Volume of contaminated brine releases increased substantially for Lower intrusions at later times, with Middle intrusions substantially increased over all intrusion times, and Upper intrusions marginally affected
- Quantity of DBR release for a given pressure is increased due to generally increased brine saturation



APCS Results – EPA Releases

- Upper Confidence Limits are increased for high-probability (1.8X) and low-probability (2.7X) Total Release
- Attributed primarily to increases in Direct Brine and Spallings releases

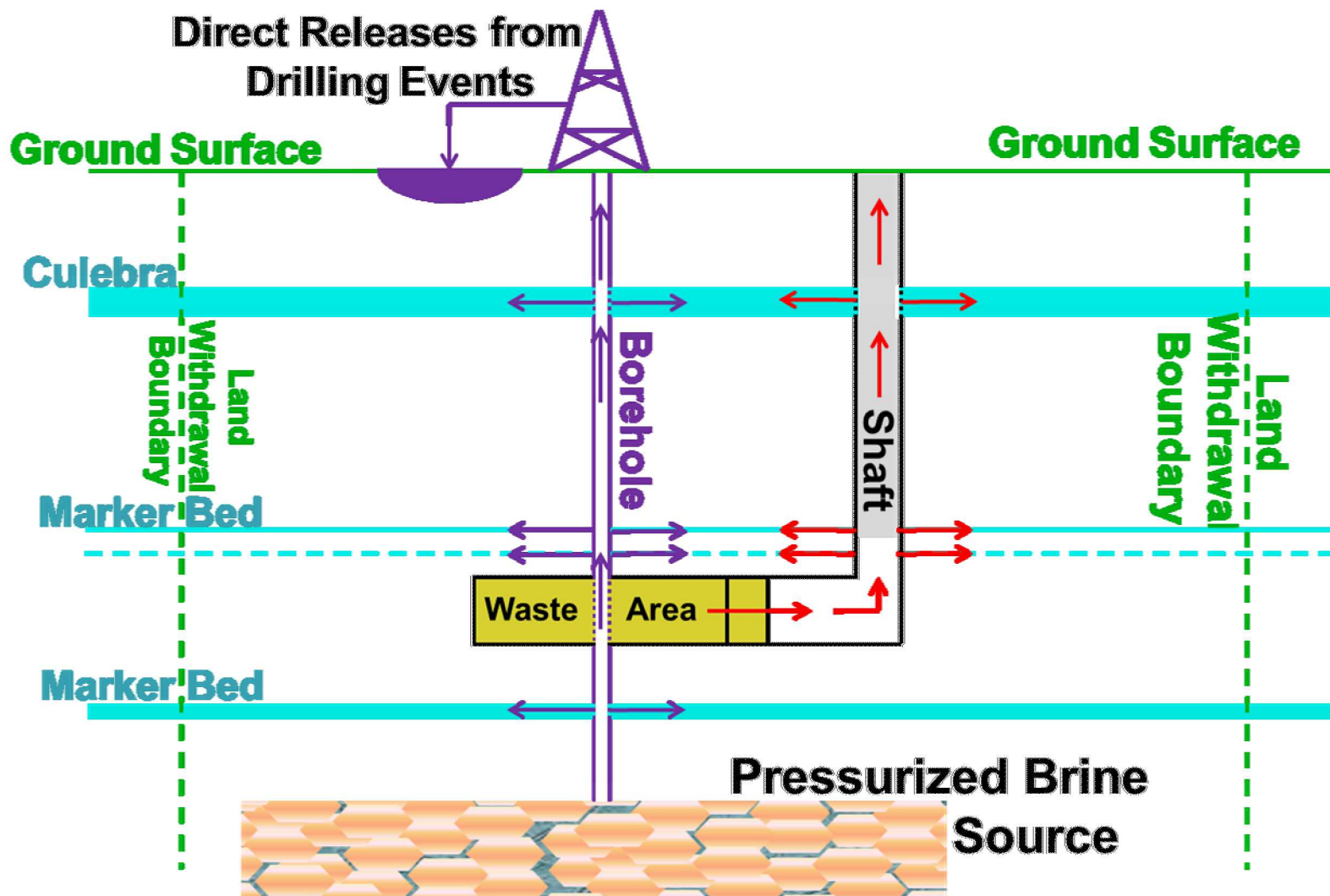


Conclusions

- The APCS analysis incorporates a conservative representation of the WIPP repository that addresses the operationally-motivated changes for no panel closures in Panels 3, 4, 5, and 6 and no waste in Panel 9 (that could be located in a new panel to the north)
- The APCS analysis results demonstrate with a reasonable expectation that a modified design of the repository would continue to ensure compliance with all regulatory release limits

Backup Slides

Release Pathways

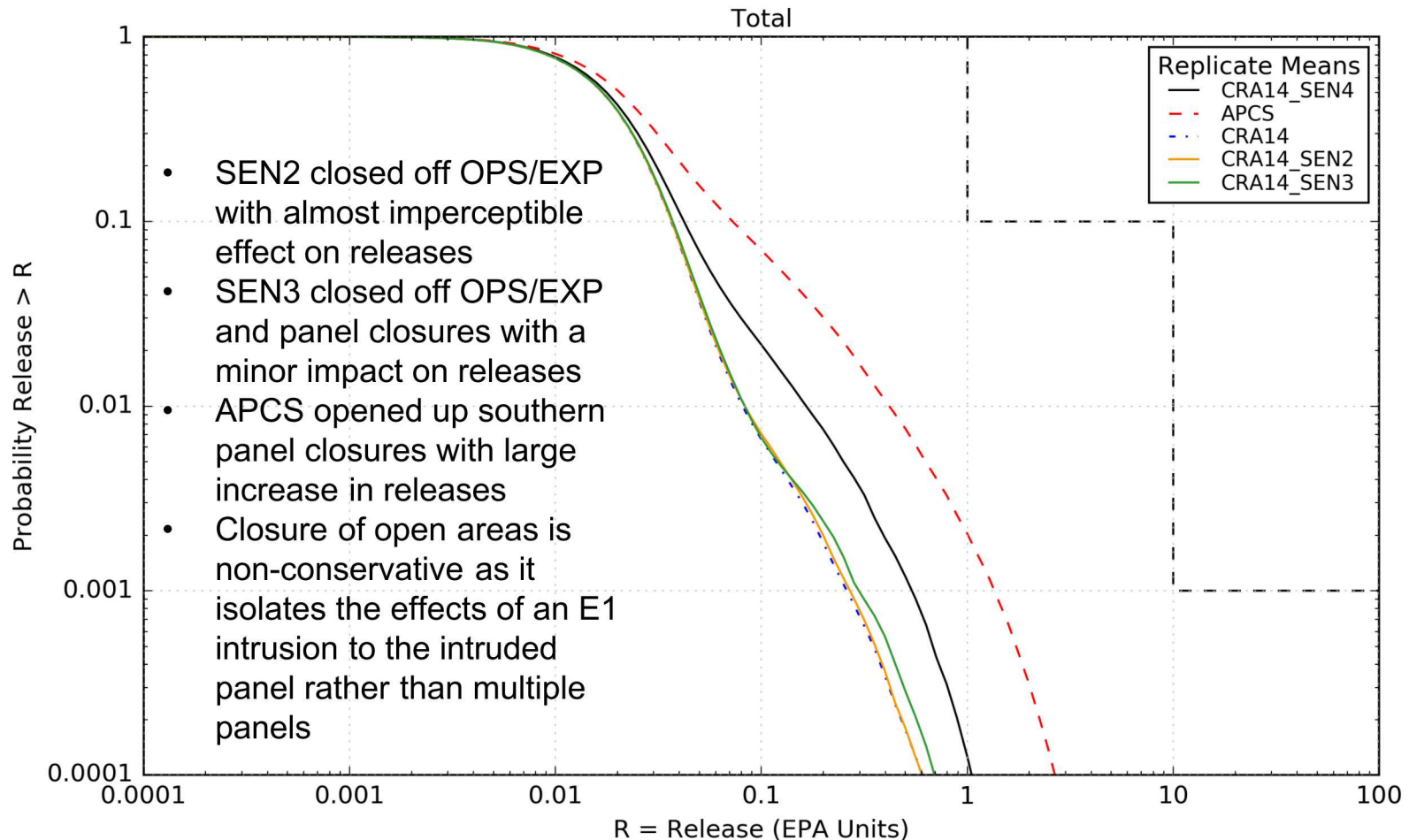


Material Property Summary

- CRA14_SEN4 & APCS
 - Average WAS_AREA POROSITY
 - CRA14_SEN4 – 12.6%
 - APCS – 12.9%

	OPS/EXP/PCS_NO		PCS_T3		PCS_DRZ		WAS_AREA		S_HALITE	
	POROS	PERM_X	POROS	PERM_X	POROS	PERM_X	POROS	PERM_X	POROS	PERM_X
MIN	18.0%	1.00E-11	0.1%	6.30E-22	0.4%	2.52E-21	5.3%	2.40E-13	0.1%	1.01E-24
AVG	18.0%	1.00E-11	2.4%	1.78E-19	2.1%	4.70E-19	12.6%-12.9%	2.40E-13	1.8%	1.45E-22
MAX	18.0%	1.00E-11	5.1%	2.95E-18	5.4%	6.69E-18	84.8%	2.40E-13	5.2%	9.90E-22

Total Release Comparison for SEN



Reconsolidation of OPS/EXP and enhanced consolidation of all PCS (SEN2/SEN3) is insignificant in comparison to southern PCS abandonment (APCS)