US EPA ARCHIVE DOCUMENT

Panel Closure Redesign Planned Change Request

Review of Planned Change Request Submittal to the Environmental Protection Agency

10-18-2011

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EM Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

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URS

Panel Closure Redesign Planned Change Request Topics

- CCA Design and current status
- Concerns with Option D design
- Proposed new design: Run-of-Mine Panel Closure (ROMPC)
- Analysis
  - Operational Analysis
    - Structural Analysis
    - Air Flow Analysis
  - Long-Term Performance of the new design (PA)
- Conclusion

CCA Design and Current Status

- Final Certification Decision for 40 CFR 194 (EPA, 1998a) established Condition 1 under section §194.14(b) identifying Option D with Salado Mass Concrete (SMC) for panel seal design.
- Section 3.3.2 of the Compliance Certification Application (CCA)(DOE, 1996) states: *"The panel closure system was not designed or intended to support long-term repository performance."*
- Current Status
  - Panels 1 & 2: Block Wall
  - Panels 3 & 4: Ventilation/Monitoring Bulkheads
    - Hydrogen and Methane monitoring
  - Panel 5: Block Wall being installed

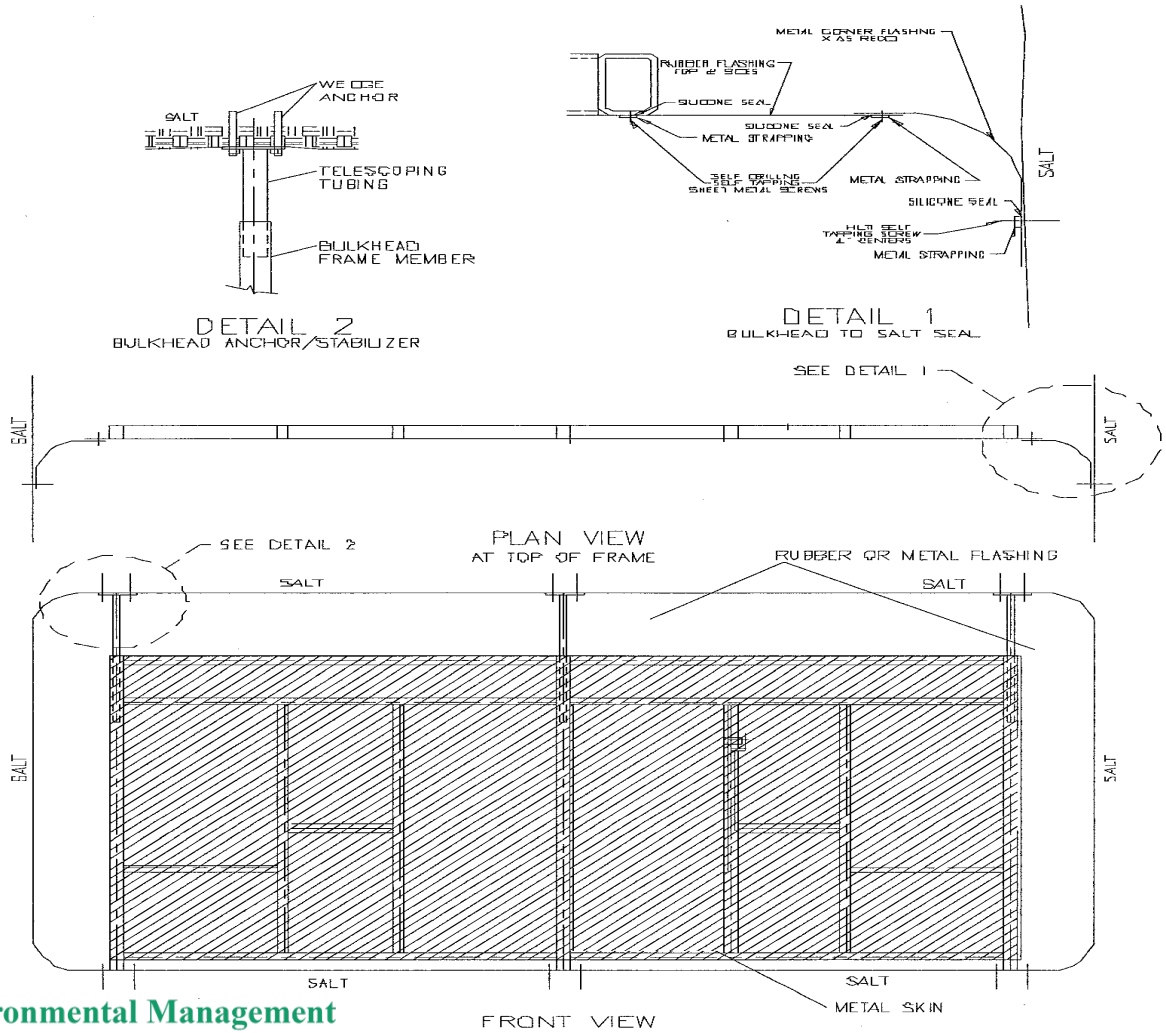
Concerns with Option D

- Cannot manufacture SMC to the specifications in the CCA while meeting the design requirements of the Option D design
- Option D design is very complex to implement
- Option D design is significantly more expensive than the proposed design
- Hydrogen and Methane monitoring data shows no need for explosion/isolation wall

Proposed New Design Run-of-Mine Panel Closure(ROMPC)

- One bulkhead at each end
  - Panels with existing block walls will have only one bulkhead
- 100 foot backfill of Run-of-Mine (ROM) salt between bulkheads
  - ROM salt will be compacted in layers to:
    - Increase air flow resistance
    - Expedite the effects of salt creep
    - Reduce time needed for ROM salt to consolidate to a condition approaching intact salt

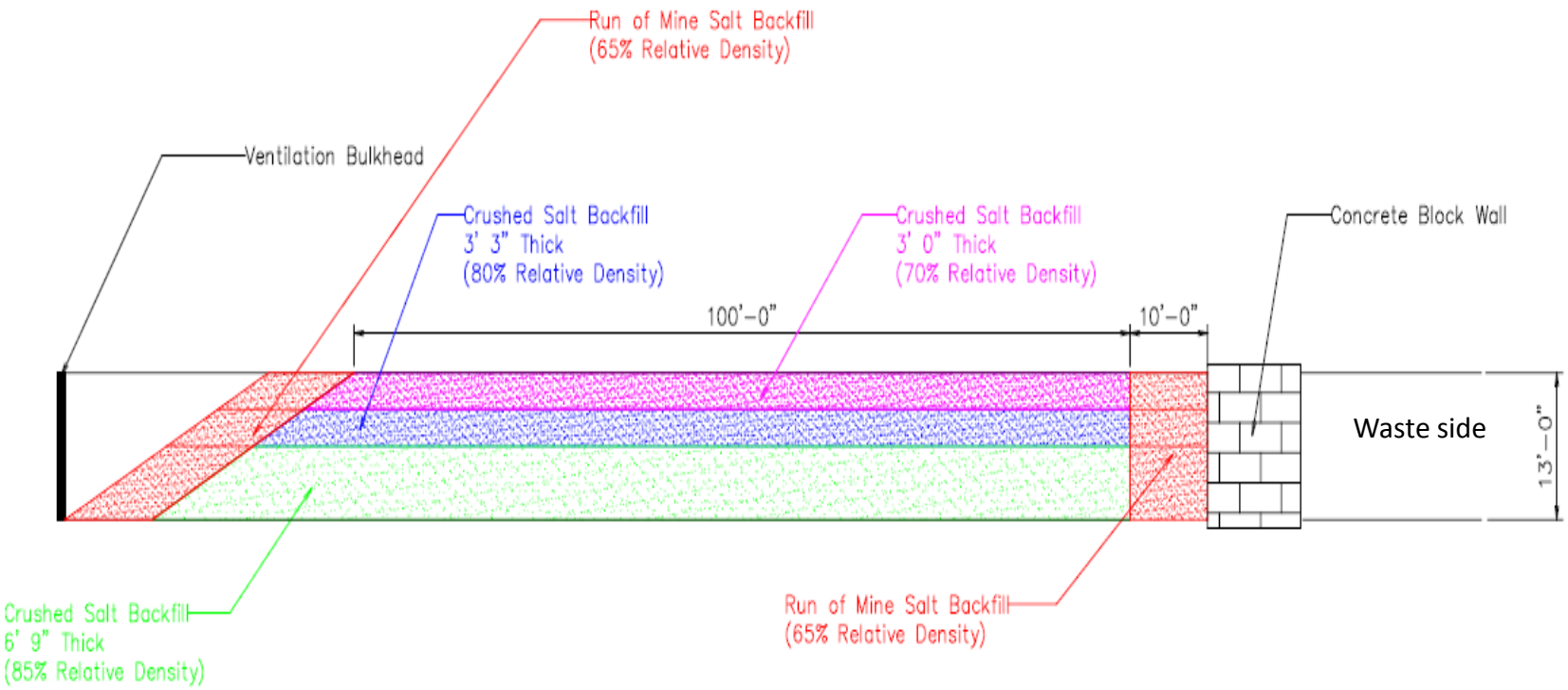
Typical Bulkhead Design



Not to Scale

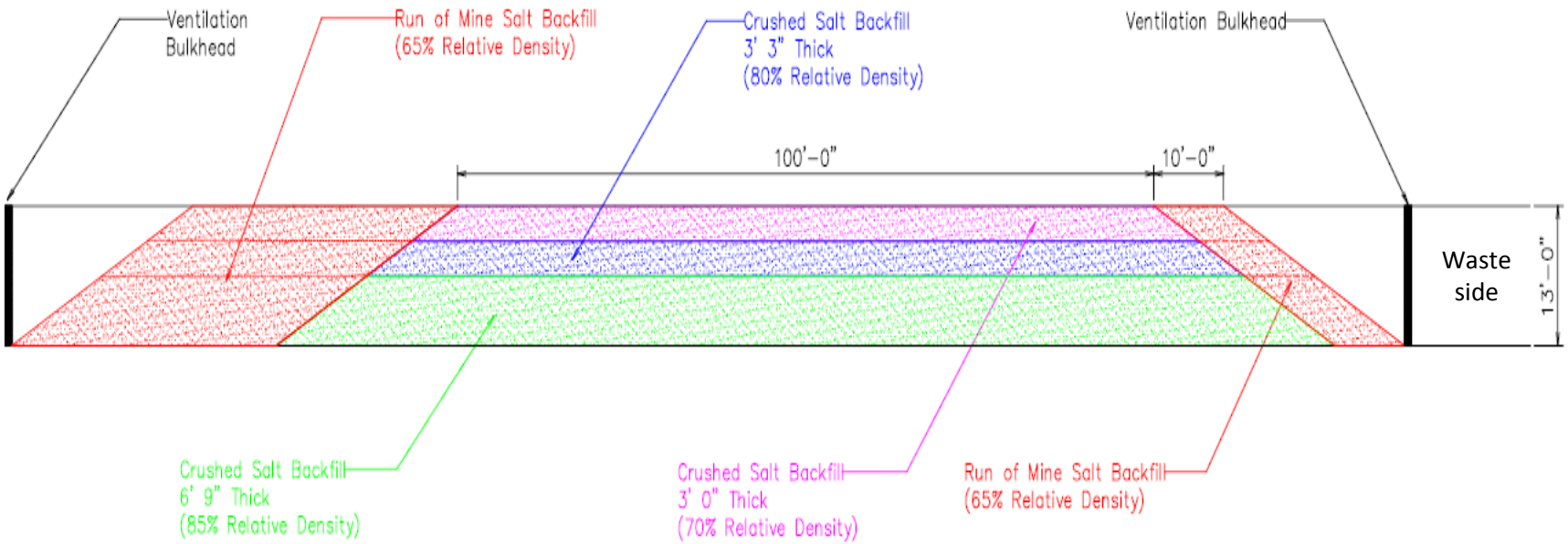
Typical Bulkhead (Photo)

Typical ROMPC with One Bulkhead and a Block Wall



1. Crushed Salt Layers 100' 0" minimum length and minimum thicknesses as indicated.
2. Salt Layers can be inclined as long as minimums maintained.
3. Lines through Run of Mine Salt Backfill show possible initial layering of backfill.

Typical ROMPC with Two Bulkheads

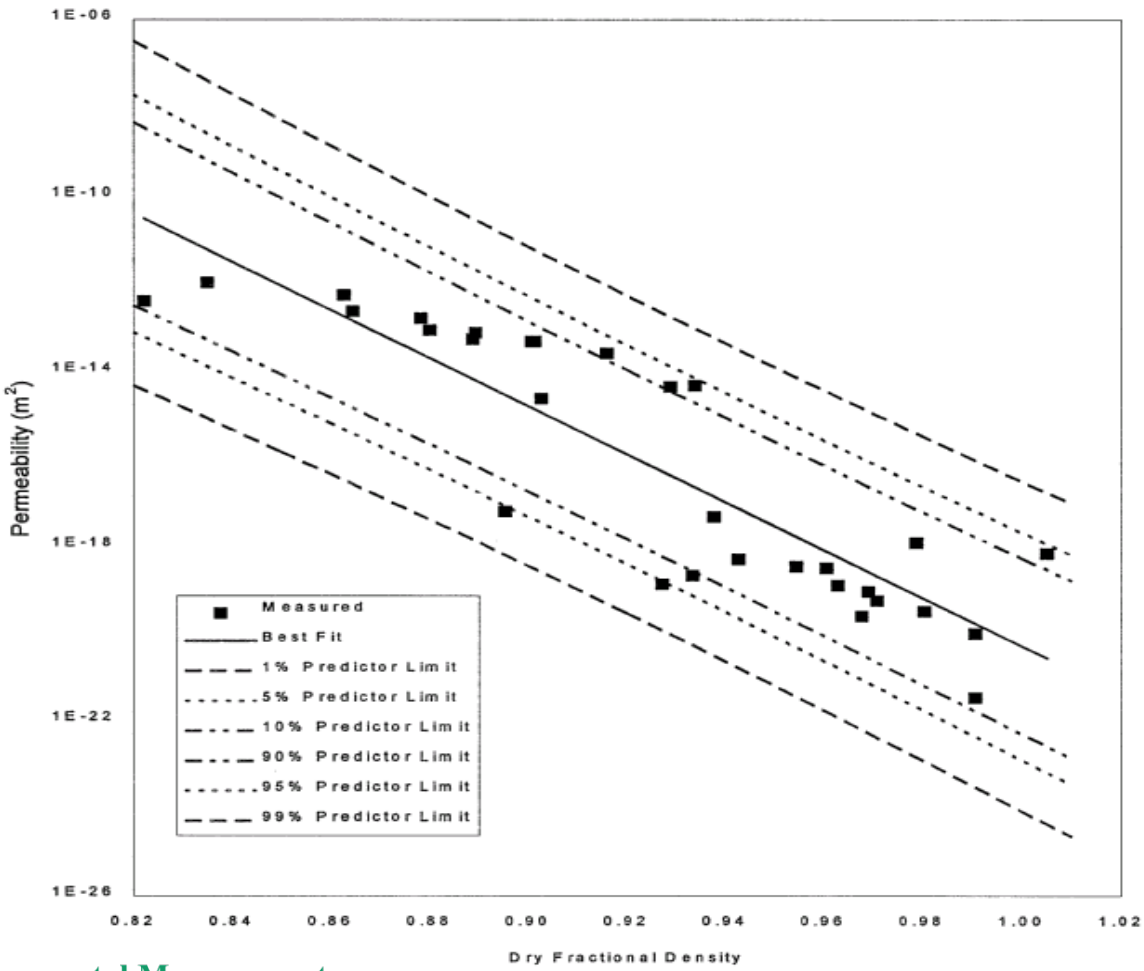


1. Crushed Salt Backfill Layers 100' 0" minimum length and minimum thicknesses as indicated..
2. Salt layers can be inclined as long as minimums maintained.
3. Lines through Run of Mine Salt show possible initial layering of backfill.

Analysis

- Operational Analysis
  - Structural Analysis
    - By use of compaction void space development is eliminated
    - Permeability
      - FLAC3D geo-mechanical modeling performed

Air Flow
Permeability of Consolidated salt as a Function of Fractional Density



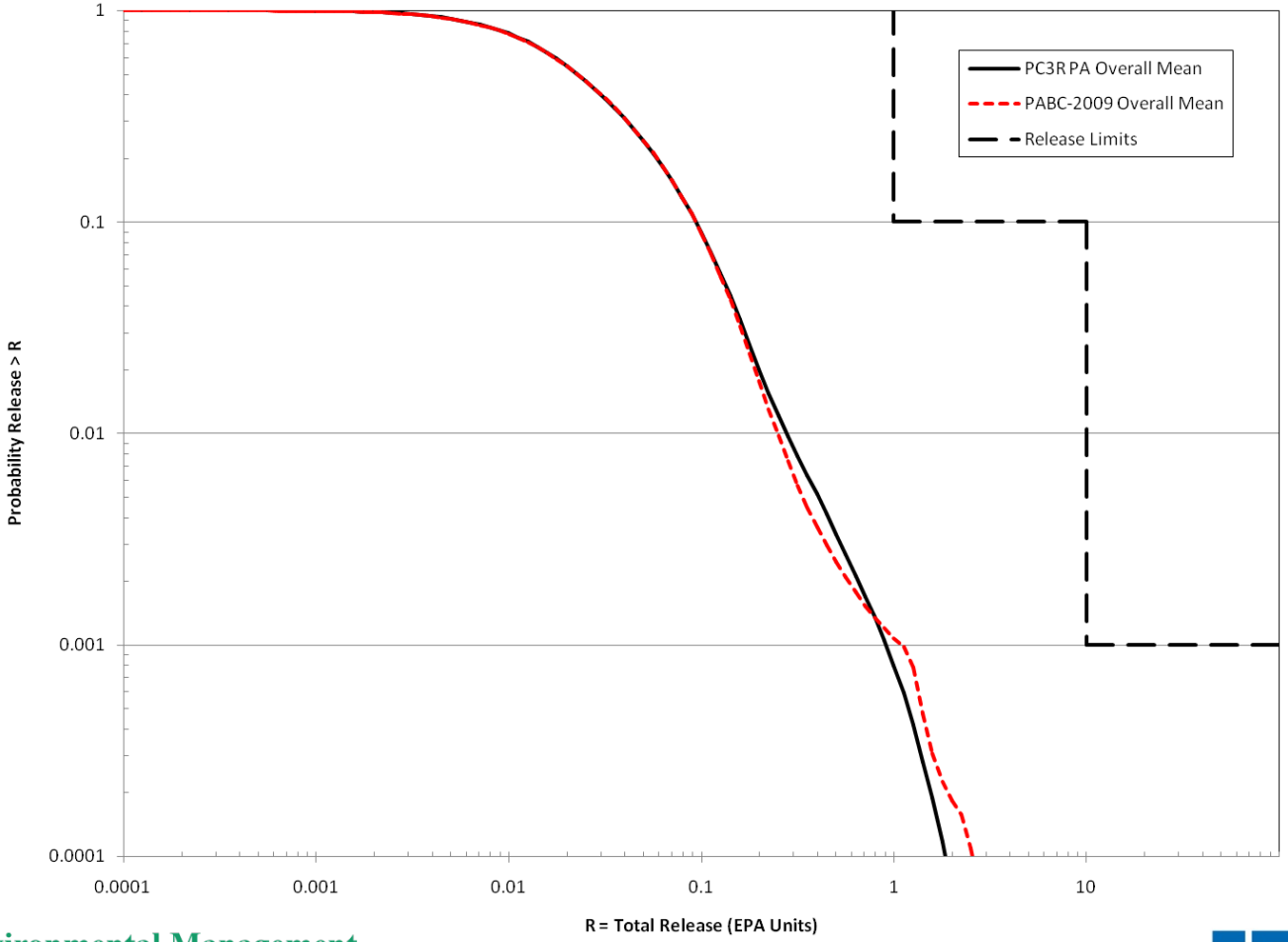
Long-Term Performance (PA)

PC3R PA and PABC-2009 Statistics on the Overall Mean for Total Normalized Releases in EPA Units at Probabilities of 0.1 and 0.001

Probability	Analysis	Mean Total Release	90th Percentile	Lower 95% CL	Upper 95% CL	Release Limit
0.1	PC3R PA	0.09	0.16	0.09	0.10	1
	PABC-2009	0.09	0.16	0.09	0.10	1
0.001	PC3R PA	0.89	1.00	0.34	1.41	10
	PABC-2009	1.10	1.00	0.37	1.77	10

Long-Term Performance (PA)

PC3R PA and PABC-2009 Overall Mean CCDFs for Total Normalized Releases



Conclusion

- The revised design described in this PCR will enhance constructability and reduce the impacts on repository operations. A change in the design specified in Condition 1 of the Certification Decision (EPA, 1998a) is also required because of the problems in manufacturing SMC to the specifications in the CCA while meeting the design requirements of the Option D design.
- An analysis of the results of earlier PAs suggests that this revised design will have essentially the same impact on long-term performance as the Option D design.