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Performance Assessment of the WIPP Run-of-Mine Salt Panel Closure System

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WIPP Performance Assessment

WIPP Regulatory Requirements



- Regulatory requirements guide the WIPP PA framework.
 - The WIPP must be designed to provide *reasonable expectation* that *cumulative releases* of radionuclides to the accessible environment for *10,000 years* after disposal from all *significant processes and events* shall be less than specified *releases limits*

WIPP Regulatory Requirements



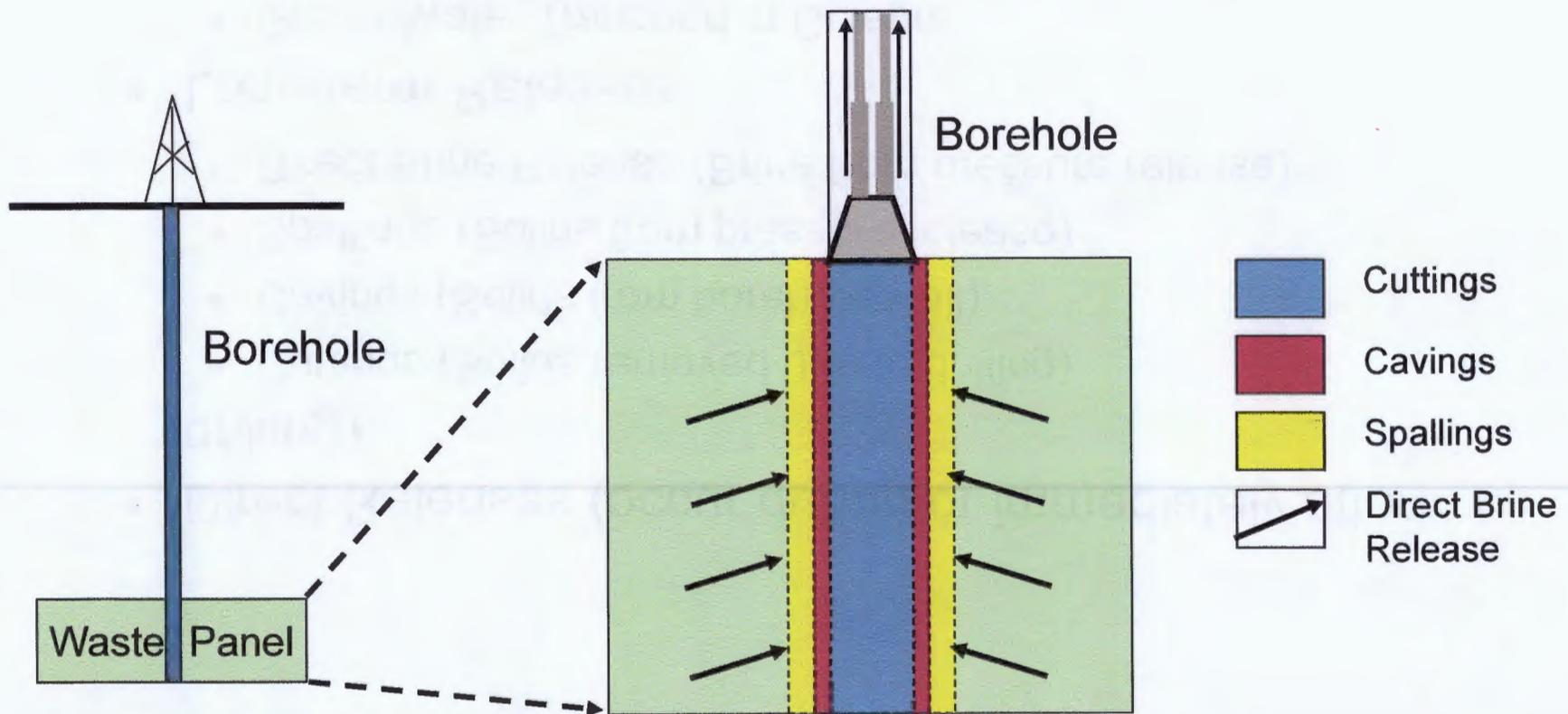
- Reasonable expectation: regulations acknowledge substantial uncertainties
- 10,000 years: PA must predict behavior for entire regulatory time period
- Significant processes and events: PA must include all of these, including the possibility of human intrusion

Release Mechanisms

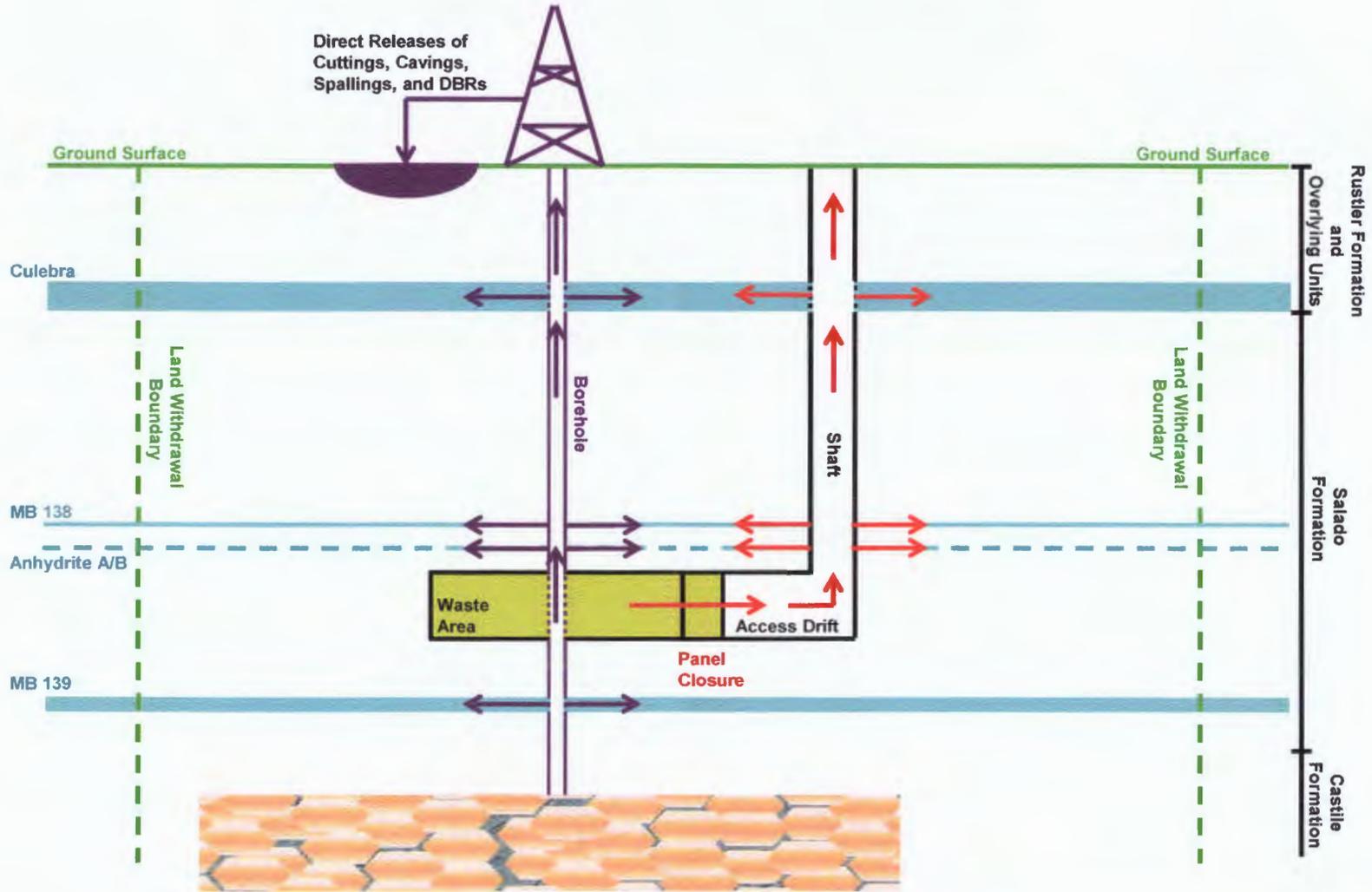
- Direct Releases (occur during or immediately after drilling)
 - Cuttings (Solids removed due to drilling)
 - Cavings (Solids from borehole wall)
 - Spallings (Solids from pressure release)
 - Direct Brine Release (Brine from pressure release)
- Long-term Releases
 - Groundwater Transport in Culebra

Direct Releases

Direct Releases Dominate Total Releases

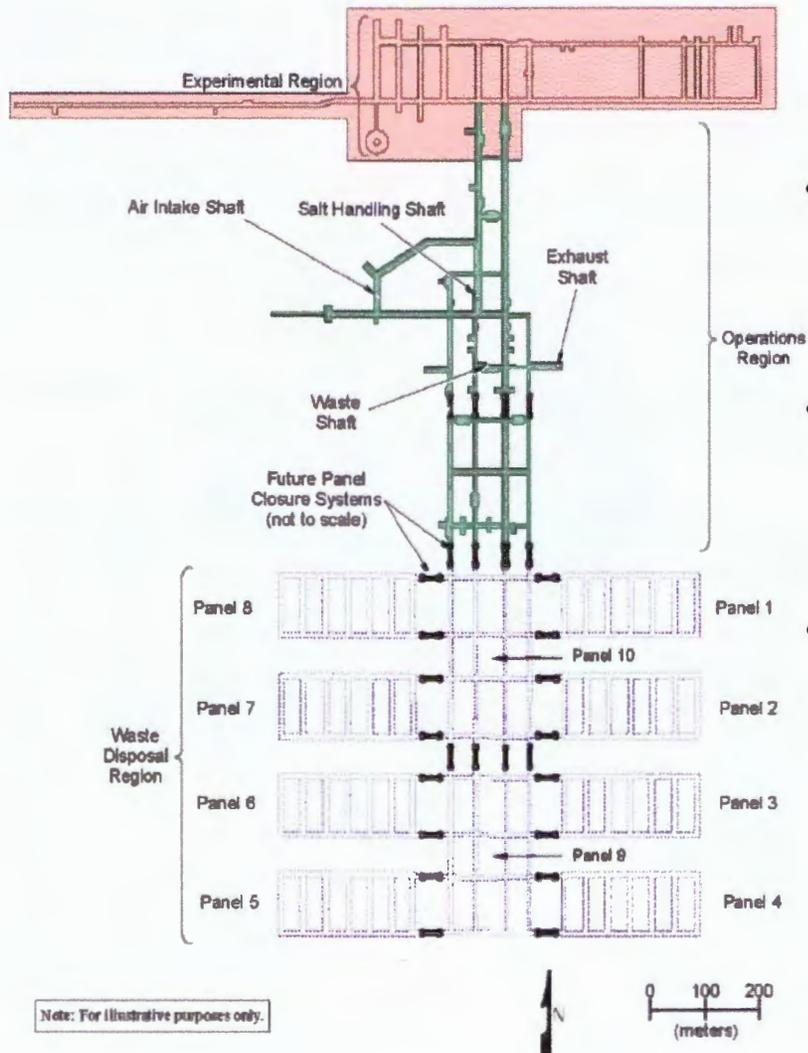


Release Pathways



WIPP Panel Closures in PA

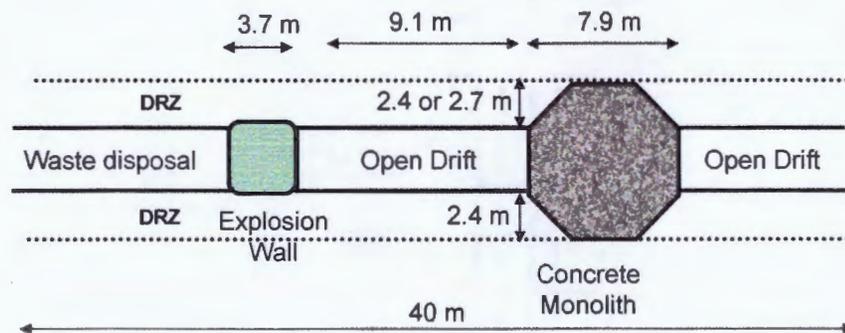
WIPP Panel Closures



- WIPP panel closures have been represented in PA since the original 1996 Compliance Certification Application.
- The function of panel closures is to protect workers during the operational period of the repository.
- Panel closures are included in PA because they are part of the disposal system, not because they inhibit releases. *The panel closure system was not designed or intended to support long-term repository performance.*

Approved Design

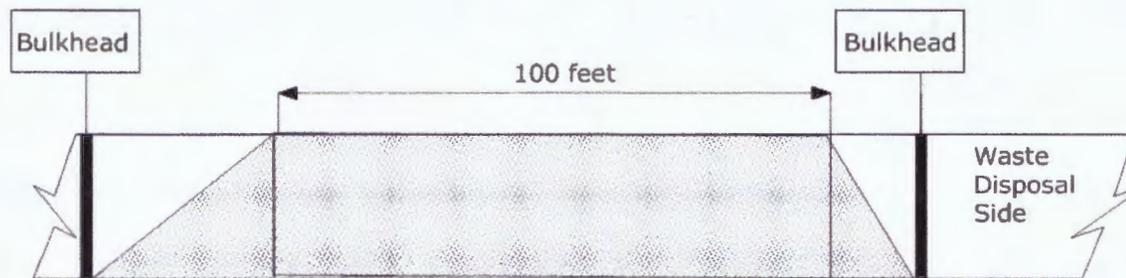
The “Option D” Panel Closure



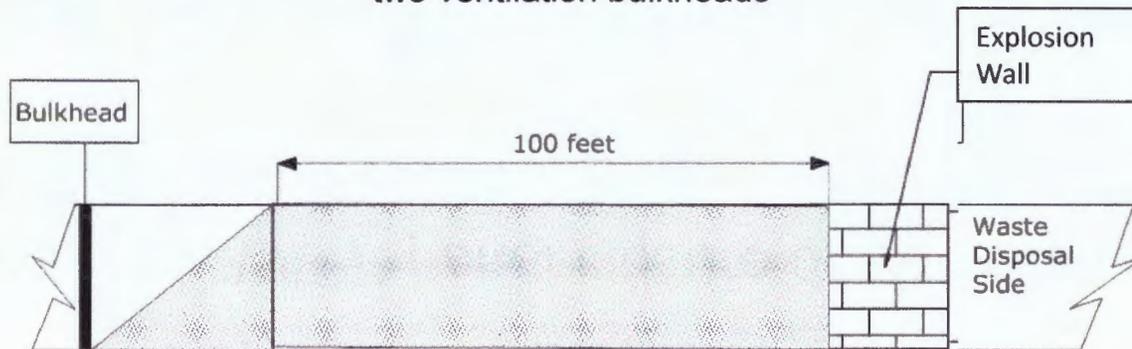
- The “Option D” design was designated as the approved panel closure in the 1998 rulemaking that certified the repository for waste disposal.
- The “Option D” design is exceedingly difficult to implement and is prohibitively expensive.
- A simpler panel closure design can meet operational requirements while being cost-effective and easier to implement.

Panel Closure Re-Design

The Run-of-Mine Panel Closure System (ROMPCS)



Panel closure with 100 feet of ROM salt between two ventilation bulkheads



Panel closure with 100 feet of ROM salt between a ventilation bulkhead & explosion wall

Changing the Approved WIPP Panel Closure Design



- Changing the WIPP panel closure design from Option D to the ROMPCS invokes a federal rulemaking process.
- The DOE has submitted a Planned Change Request to the EPA to formally request a change to the approved design.
- A PA that demonstrates regulatory compliance impacts associated with the new design is included as part of the Planned Change Request. The PA is named PCS-2012.

PCS-2012 PA Approach and Results

Baseline Comparison

The current WIPP PA baseline was established by the 2009 Performance Assessment Baseline Calculation (PABC-2009)

- Option D panel closures were implemented in the PABC-2009
- The PCS-2012 PA incorporates the ROMPCS into the PABC-2009 baseline.
- ROMPCS compliance impacts are assessed via a direct comparison of PABC-2009 and PCS-2012 results.

ROMPCS Processes

The representation of the ROMPCS in the PCS-2012 PA accounts for several physical processes.

- Creep closure of the surrounding salt rock results in consolidation of ROM salt placed in panel entries.
- ROM salt comprising the closures will approach a condition similar to intact salt.
- Imposed back stress on the surrounding rock will result in eventual healing of the surrounding salt rock.

ROMPCS Parameters

ROMPCS parameters and timings were developed over a period of 1 ½ years.

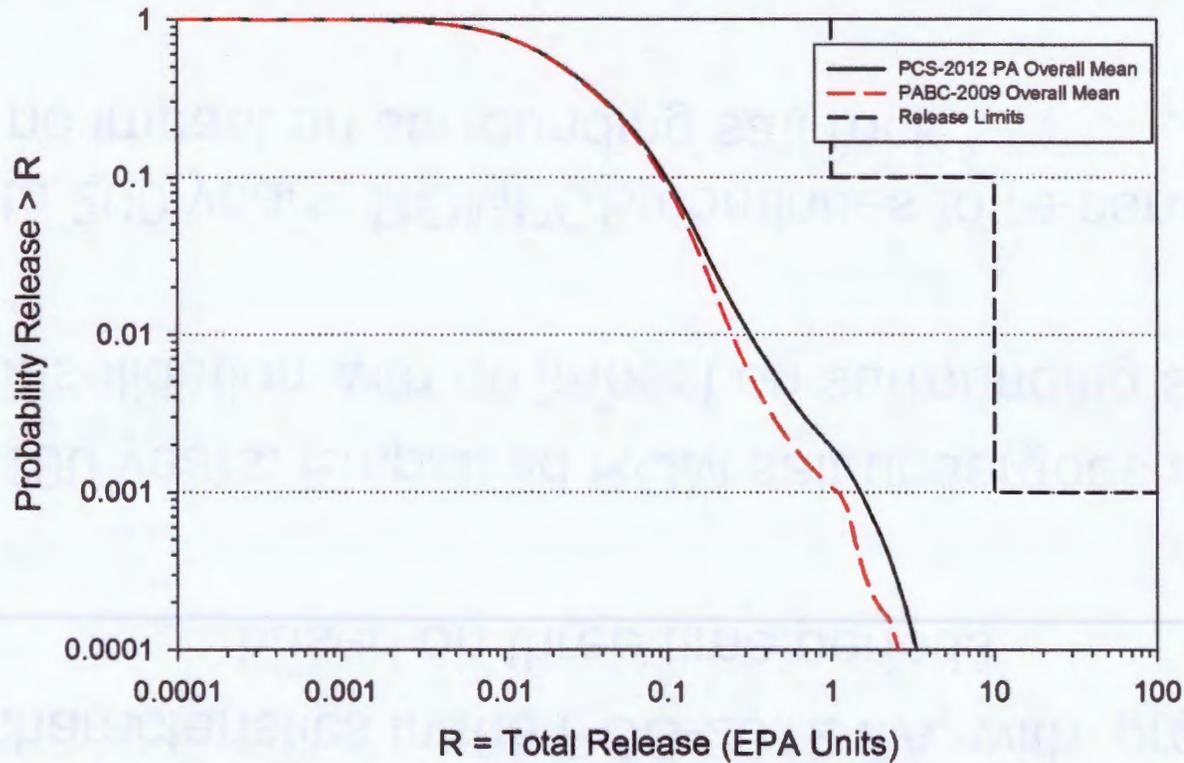
- ROMPCS represented as 100 feet of run-of-mine salt.
- Calculations and data analyses were performed to determine ROMPCS parameters and their temporal extent.
- Numerous technical exchanges were had with the EPA to discuss and refine ROMPCS parameters and timings prior to commencement of the PCS-2012 PA.

ROMPCS Evolution

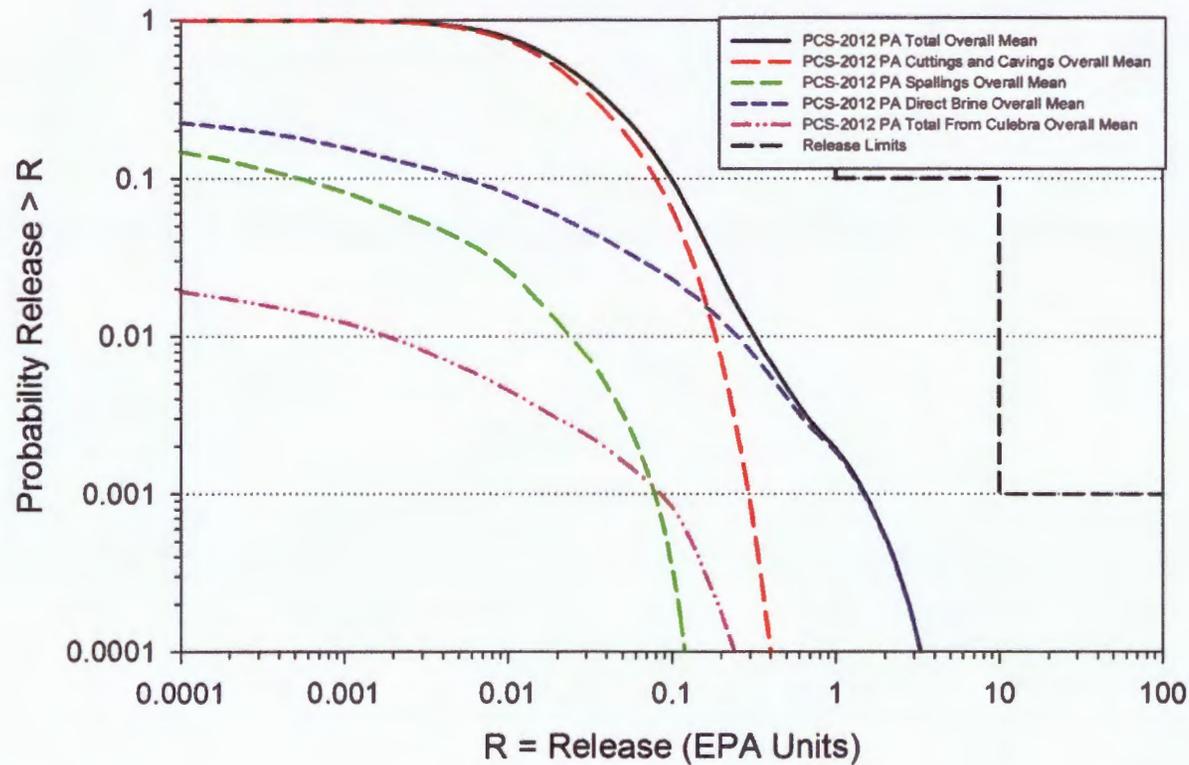
The ROMPCS is modeled as having short-term and long-term characteristics in the PCS-2012 PA, with properties based on three time periods

- 0 to 100 years: Emplaced ROM salt undergoes some re-consolidation with no impact on surrounding salt rock.
- 100 to 200 years: ROMPCS continues to re-consolidate with no impact on surrounding salt rock.
- 200 to 10000 years: ROMPCS is re-consolidated and the surrounding salt rock is healed.

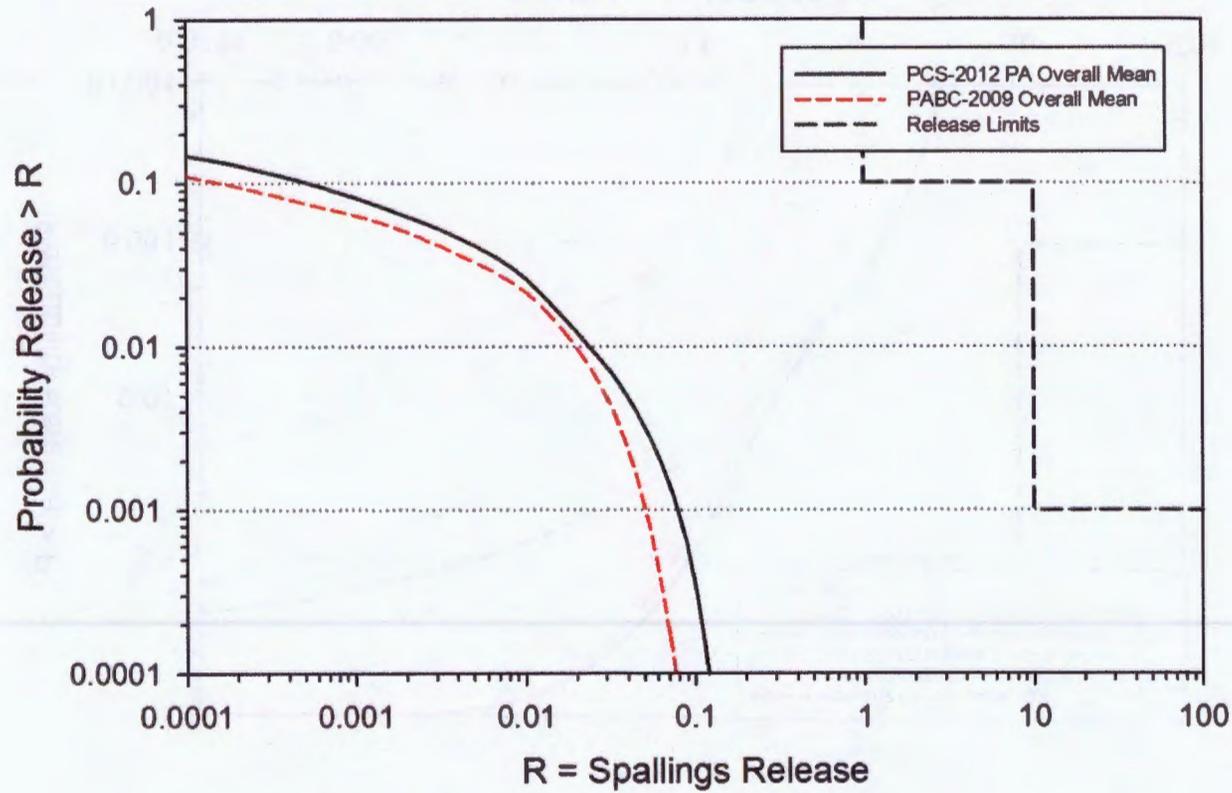
Results: Total Releases



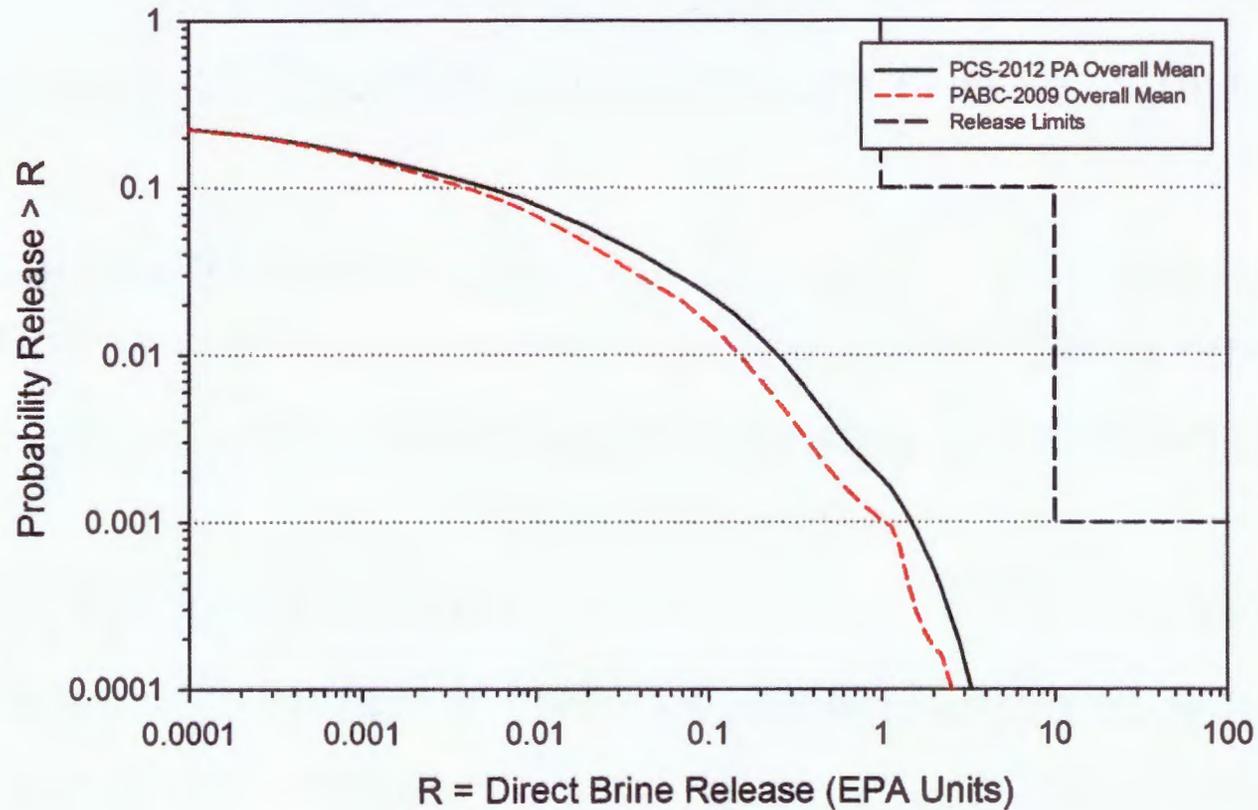
Results: Release Components



Results: Spallings Releases



Results: Direct Brine Releases



Summary

- The DOE has submitted a Planned Change Request to the EPA requesting a change to the approved WIPP panel closure system.
- A Performance Assessment has been completed that quantifies regulatory compliance impacts associated with the change.
- The WIPP remains below regulatory release limits with the revised panel closure system.