

Salt Disposal R&D Integration with GDSA

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Discuss R&D Priorities (1)

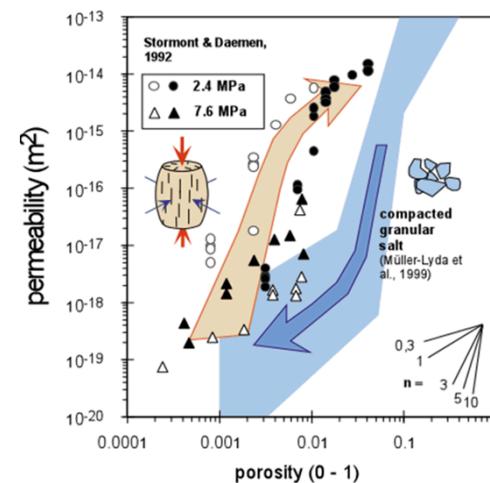
- Current experiments/testing address key FEPs?
 - Brine/gas release during heating (sans MBs & clay layers)
 - Backfill evolution (short term, important for IC)
- Salt process modeling support GDSA?
 - Possible “salt specific” improvements to PFLOTRAN
- What are known “gaps”?
 - TOUGH-FLAC → PFLOTRAN?
 - Operational (backfill & creep) → long-term PA?
 - Currently take no “credit” for waste packages in Salt
 - Dry salt (surrounding hot waste) is less corrosive
 - Better canister/overpack degradation model

Integration w/ GDSA (2)

- Indirect coupling
 - Strongly coupled THMC (e.g., TOUGH-FLAC)
 - Creep closure (large transient deformation; SIERRA)
- Strong/direct coupling
 - Complex fluid chemistry (i.e., Pitzer)
 - Salt constitutive models (e.g., vapor-pressure lowering)
 - Reactive backfill (e.g., heat pipe, decrepitation)
 - non-Darcy flow (i.e., threshold gradient)
- *Funding for model integration is low (field focus)*

Buffer/Backfill (3)

- Backfill (no buffer) in Salt:
 - “Run of Mine” salt (w/ anhydrite & clay)
 - RoM salt w/ bentonite amendments
- Salt reconsolidates to intact salt:
 - Tightly coupled THMC process
 - Constitutive laws: $k(\varphi)$, $\varphi(\sigma, T, \text{history})$
 - How to incorporate this into GDSA?
 - TOUGH-FLAC → PFLOTRAN initial conditions?
 - What time scales are relevant at km length scales?



In Situ Experiments, Lab & International (4)

- Experiments in Phases
 1. FY17-19: small-diameter borehole heater test (SDBHT)
 2. FY19-2?: intermediate-scale in situ test
 3. FY2?-?: large-scale heater test
- Laboratory
 - Salt backfill evolution
 - Acid gas generation
- International
 - US-German (+ Netherlands) Salt Workshop
 - WEIMOS (Geomechanical benchmarking)
 - KOSINA (Bedded/Domal salt comparison)

SOURCE	NEAR FIELD		FAR FIELD		RECEPTOR
ENGINEERED BARRIER SYSTEM (EBS)		GEOSPHERE			BIOSPHERE



Subsystems



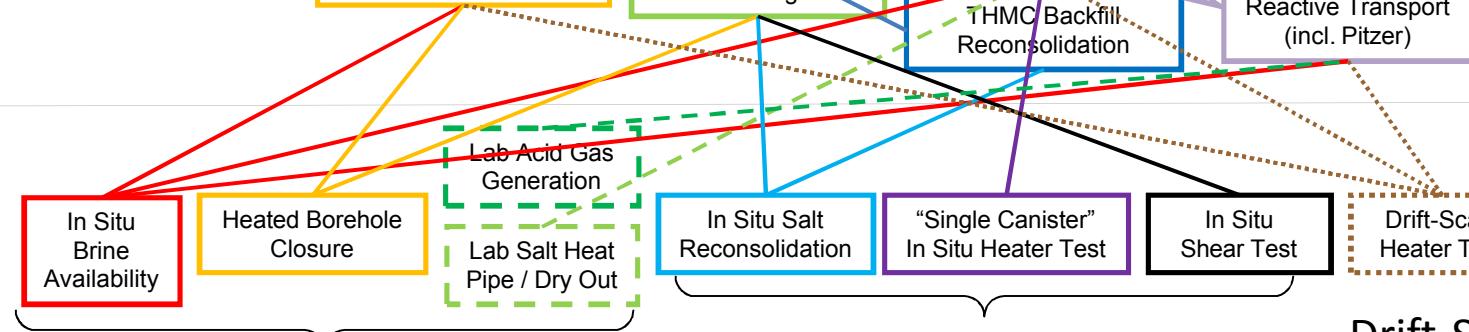
Processes



Models



Lab & Field Experiments



SDBHT (Phase 1)

In Situ Testing Options (Phase 2)

Drift-Scale (Phase 3)