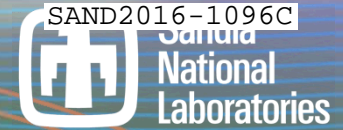




U.S. DEPARTMENT OF
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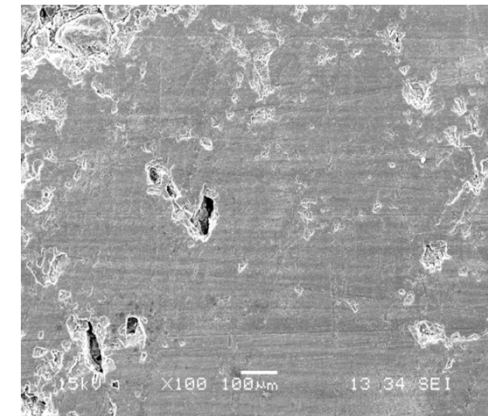
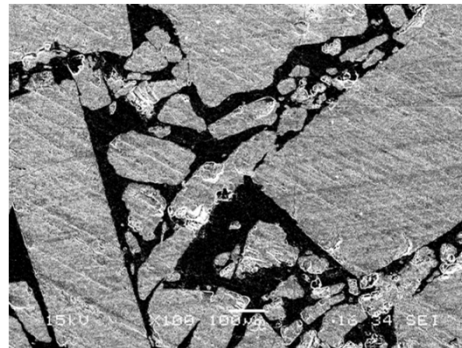
Reconsolidated Salt as a Geotechnical Barrier 16535

Casey Gadbury, Carlsbad Field Office/DOE
F.D. Hansen, Sandia National Laboratories

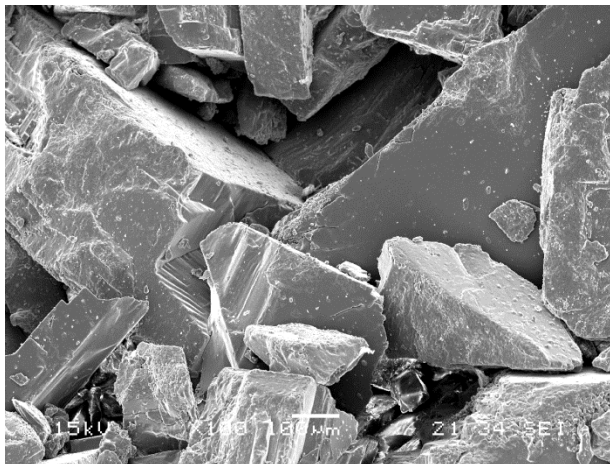
Waste Management 2016—Phoenix, AZ
March 6-10, 2016

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. All slides were extracted from SAND2014-4502P. **SAND NO. 2016-XXXXX.**

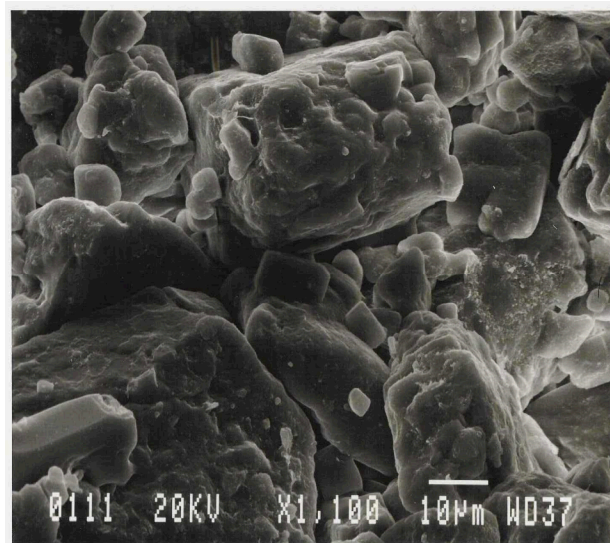
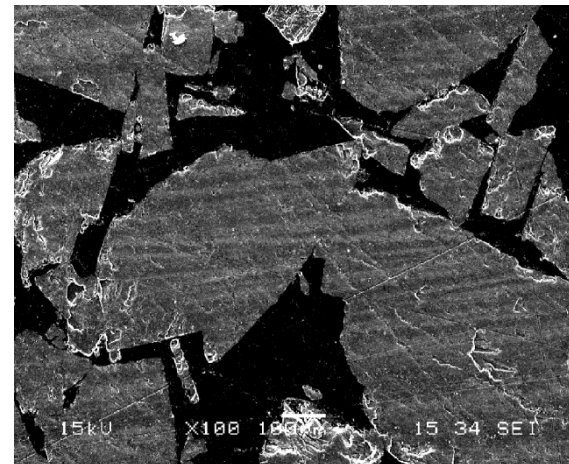
- Background of granular salt reconsolidation
- WIPP panel closure change to run-off mine salt
- Extension to future salt repositories



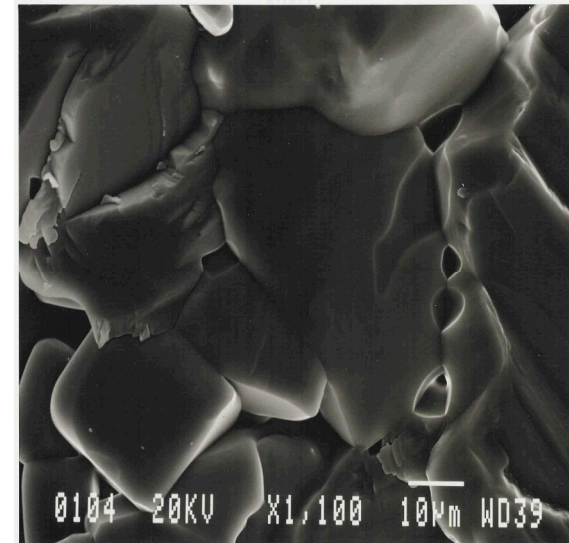
- Act as a long-term barrier against inflowing brine or water and eliminate release pathways via drifts and shafts
- Conduct heat generated by radioactive decay from the waste to the host rock
- Stabilize repository excavations
- Provide low permeability and/or diffusivity and/or long-term retardation
- Key questions involve how, when, and to what degree properties of reconsolidating granular salt approach or attain those of the native salt formation

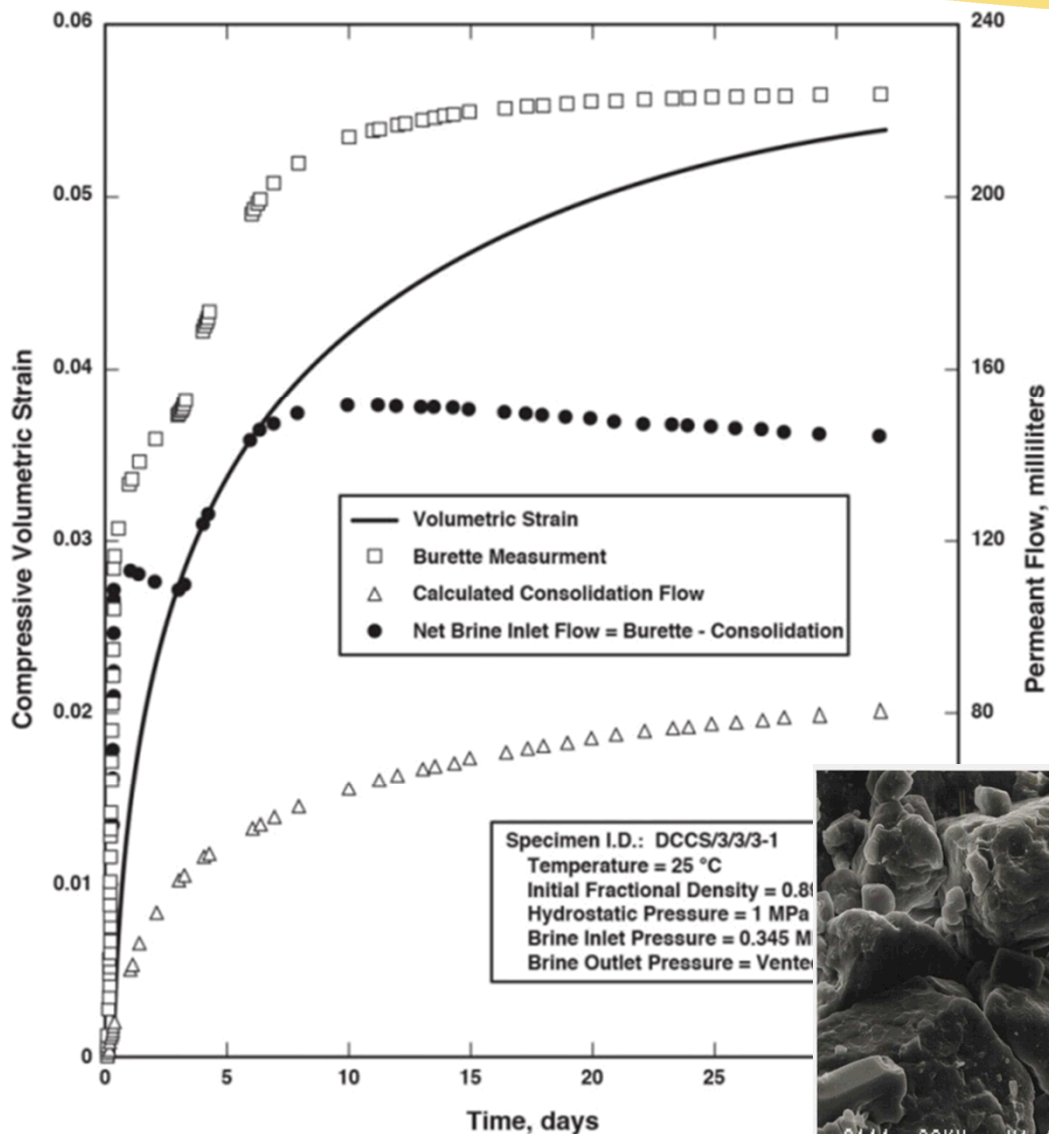


BAMBUS

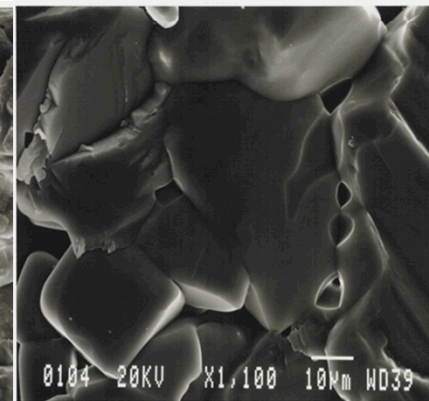
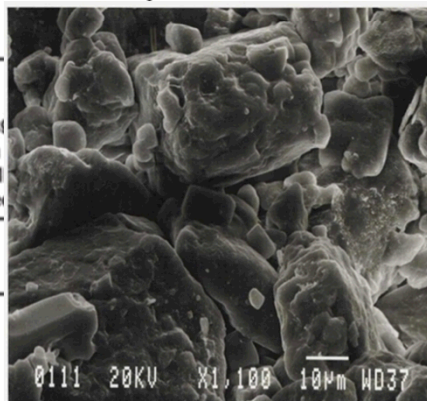


WIPP SHAFT

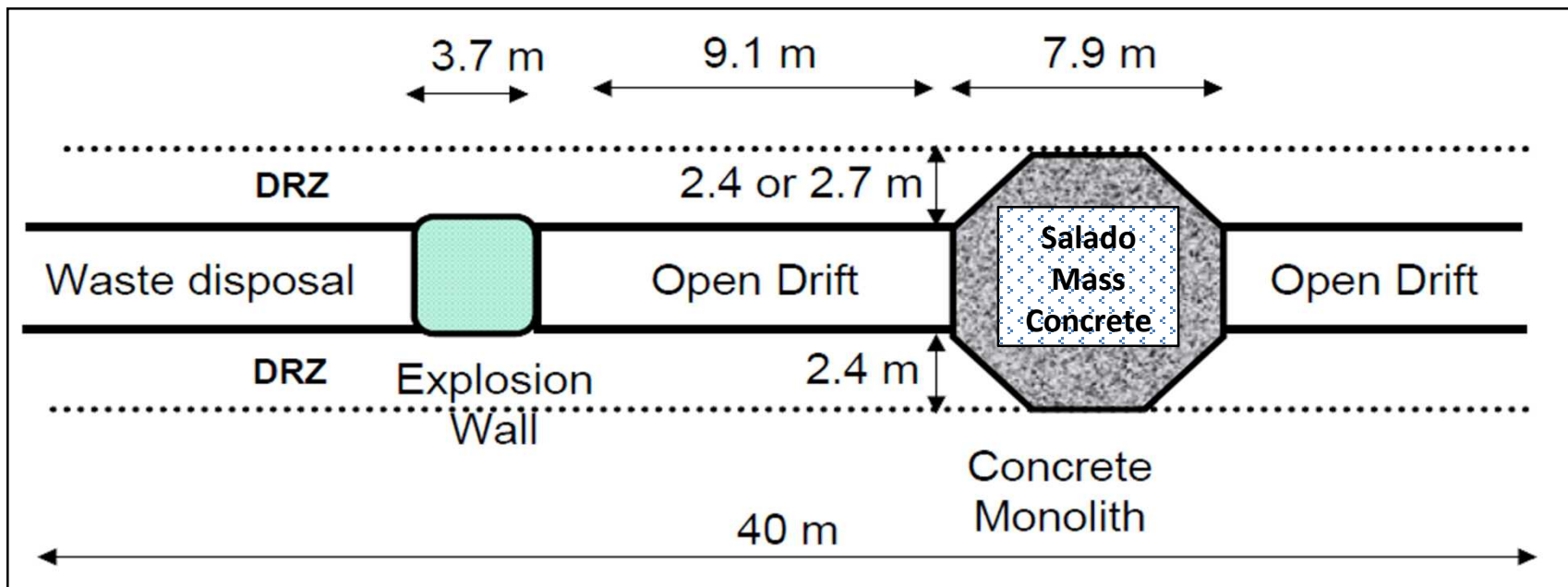




Evolution of substructure

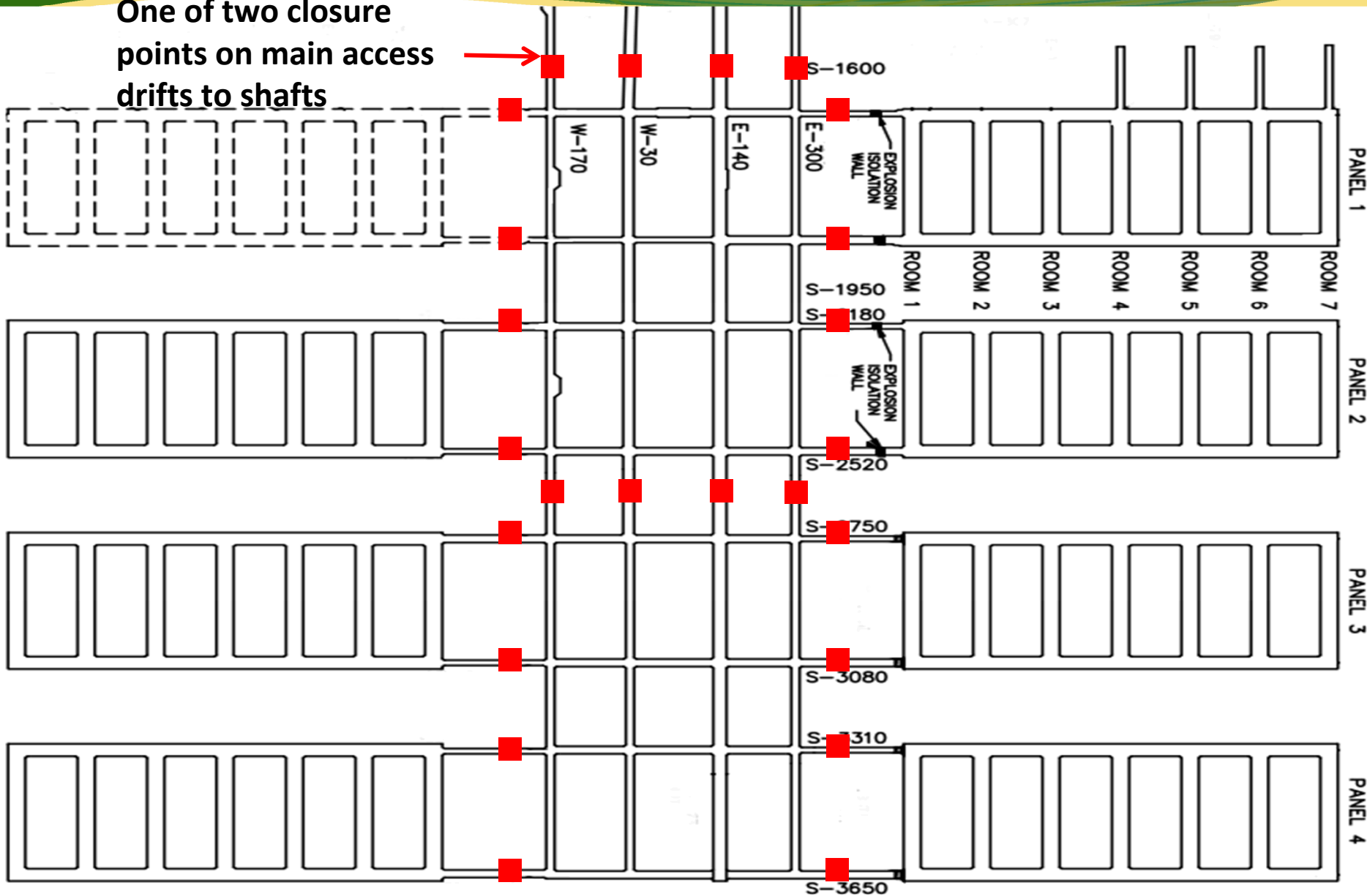


- Federal regulator (US Environmental Protection Agency--EPA) mandated a specific panel closure design (Condition 1 of the WIPP Certification under 40 CFR 194)
- State of New Mexico Environment Department (NMED) regulator adopted the EPA requirement as the disposal unit "closure"



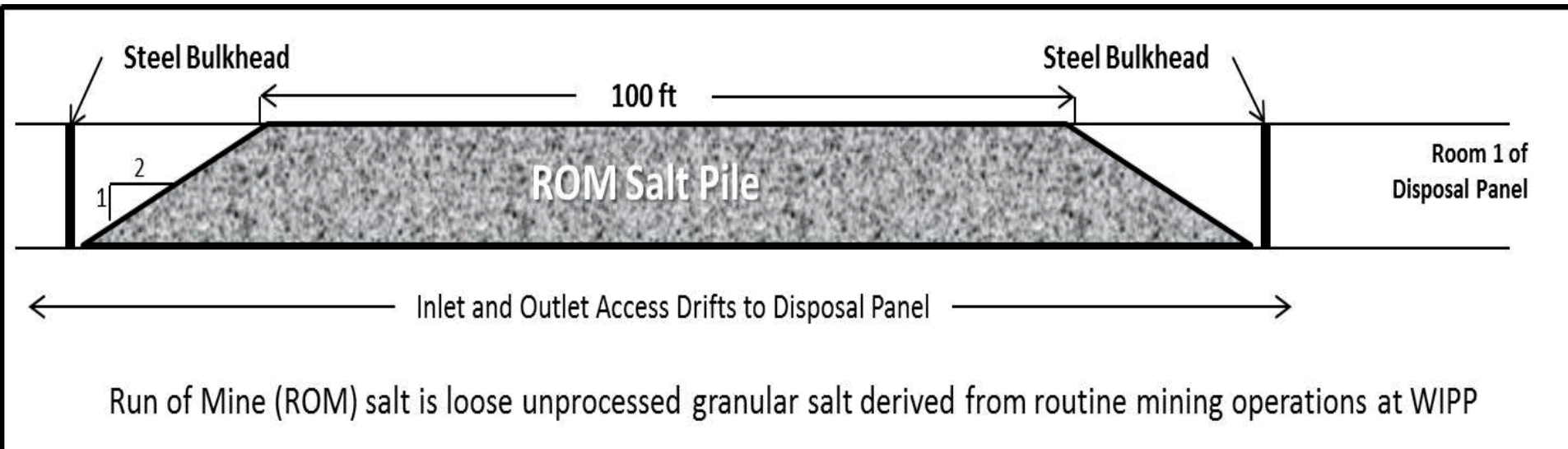
...and there are many of them (2 per panel +)

One of two closure points on main access drifts to shafts



Run-of-Mine (ROM) Salt Panel Closure

- One steel ventilation bulkhead at each end
- Bulkheads include flexible “seal” between steel frame and rock
- Panels with existing “explosion isolation” walls will have only one ventilation bulkhead at the entrance to the panel
- 30 meters of ROM salt between bulkheads (floor to crown)
- No compaction or other conditioning required



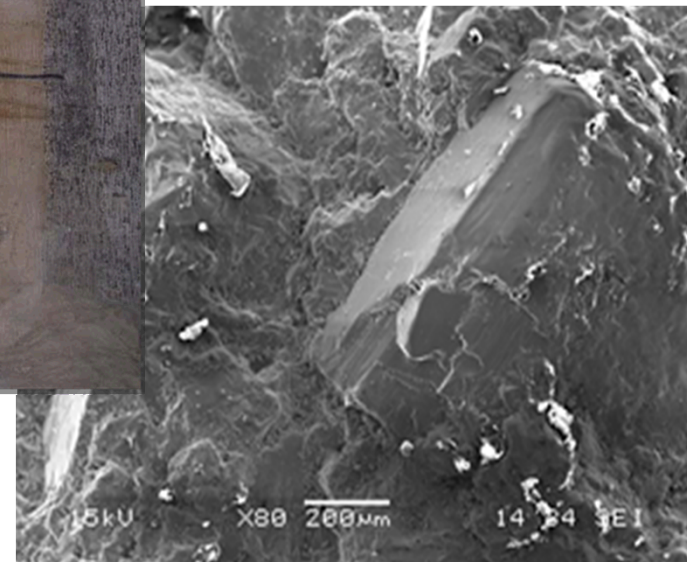
WIPP Construction Demonstration



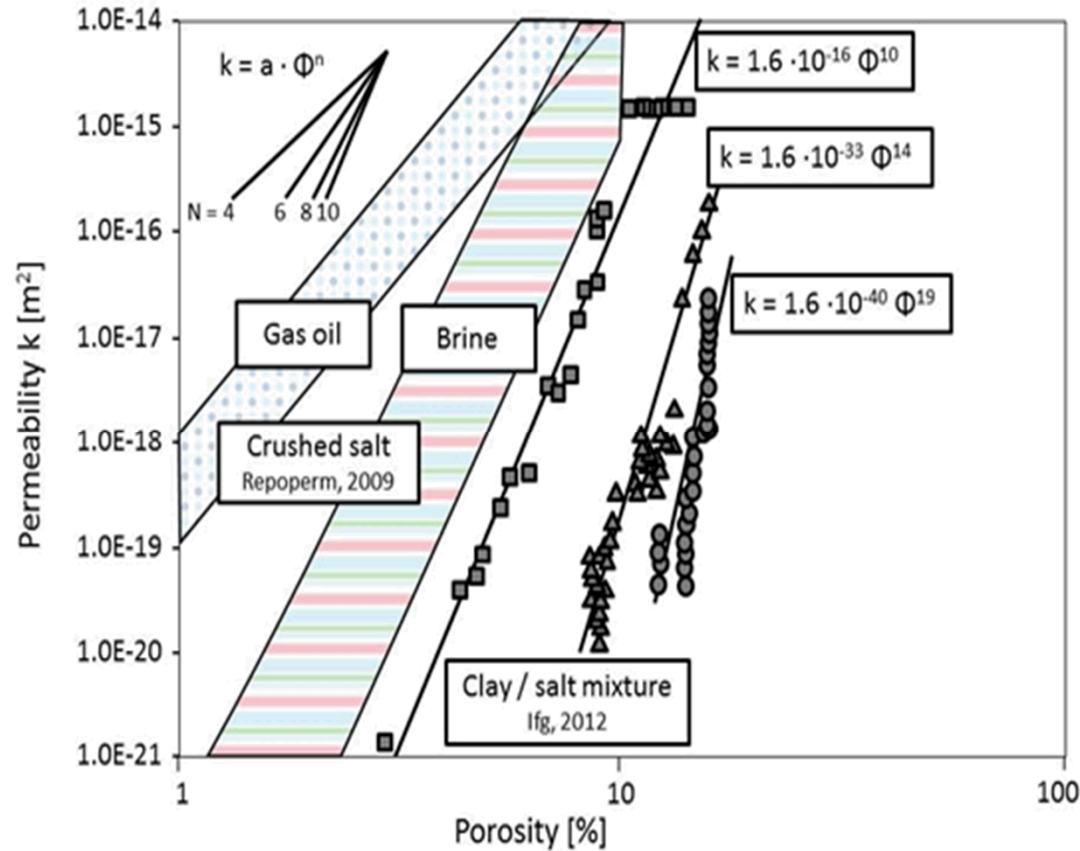
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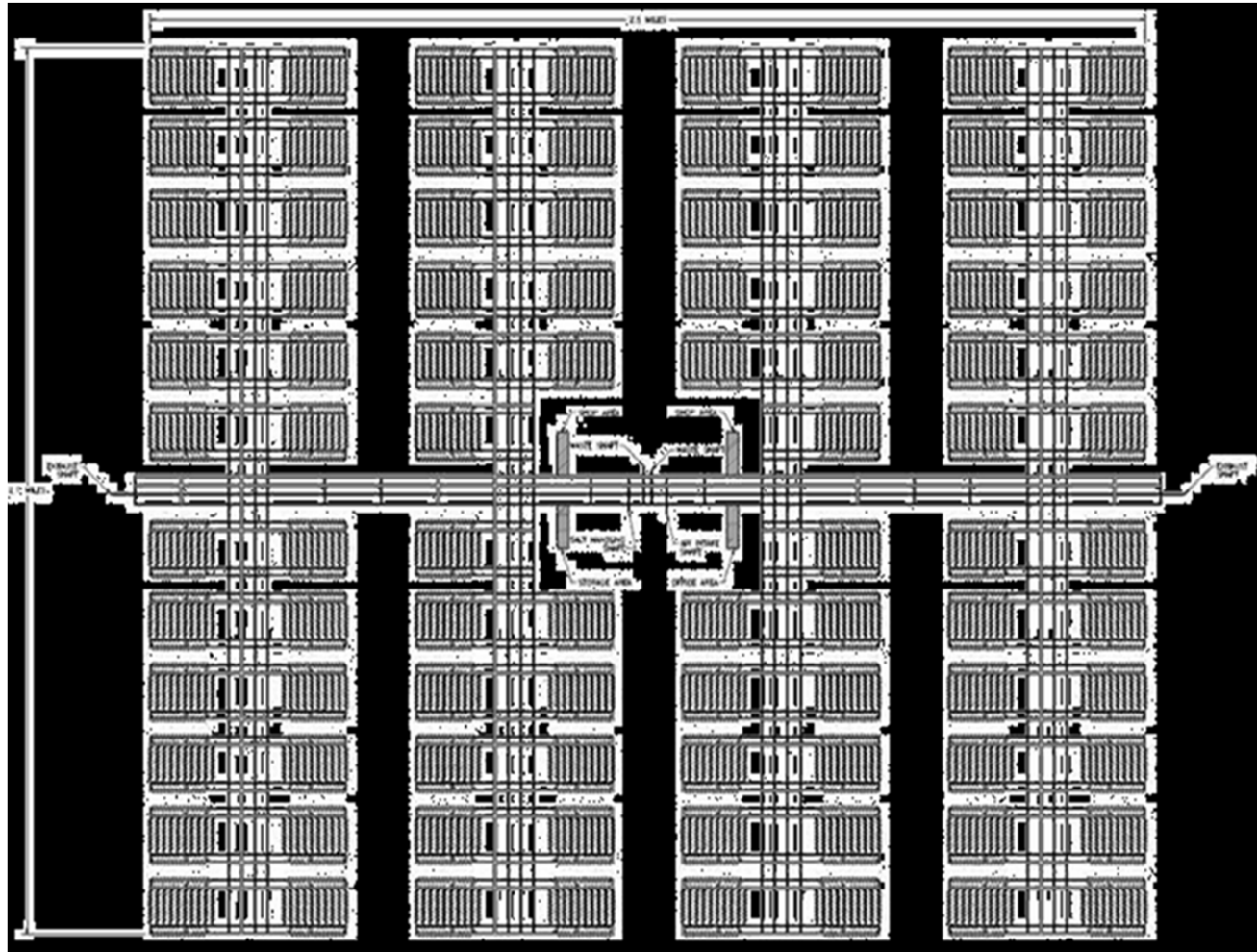
Sigmundshall



Permeability-Porosity Relationships



A 100-Year Salt Repository



Conclusion: Modular Build and Close

- Scientific, engineering and analogue experience demonstrate granular salt reconsolidates readily to a state similar to native salt
- Take advantage by sequential disposal, licensing and permanent closure
- Inherently safe-by-design
- Potential to solve our nation's nuclear waste disposal imperative