



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

SAND2018-5310PE

Spent Fuel and Waste Science and Technology: Disposal Research Highlights

(Argillite R&D, Crystalline R&D, EBS R&D, OWL)

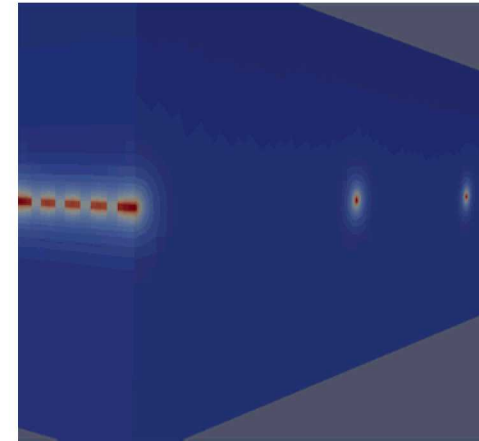
Kevin McMahon
SFWST R&D working group meeting
Las Vegas, Nevada
May 22, 2018



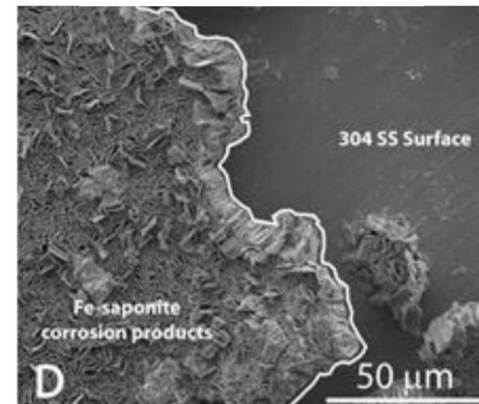
Selected Highlights in Disposal Research

■ Argillite Disposal R&D

- Geoscience Symposium 2018 – Presented topics on the effects of heat generating waste including:
 - Reactive-transport modeling (THC) with decay heat effects
 - Thermodynamic modeling of barrier material interactions (clay, cement, metal)
 - Clay interaction experiments/modeling
 - High temperature mineral phase stability, clay – metal interactions
 - Low-T RN sorption/diffusion in bentonite & modeling
- High temperature thermal-hydrological-mechanical-chemical (THMC) modeling
- Spent fuel matrix degradation model development



Clay-Metal Interactions



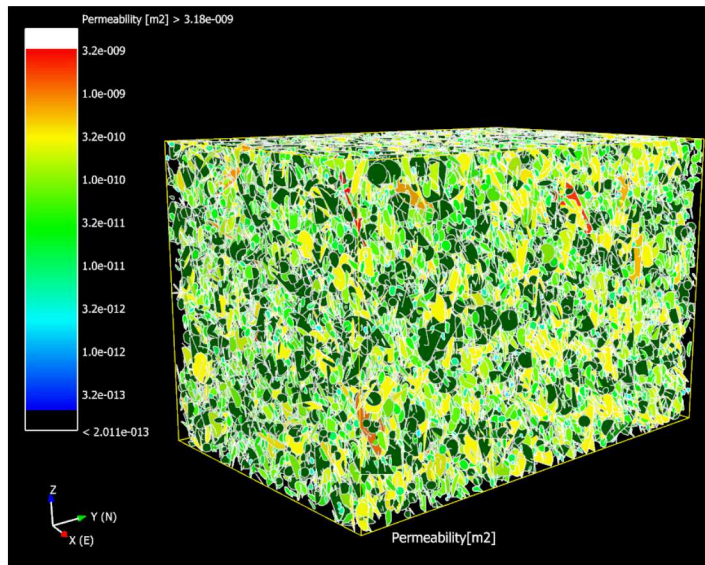
Steel Corrosion



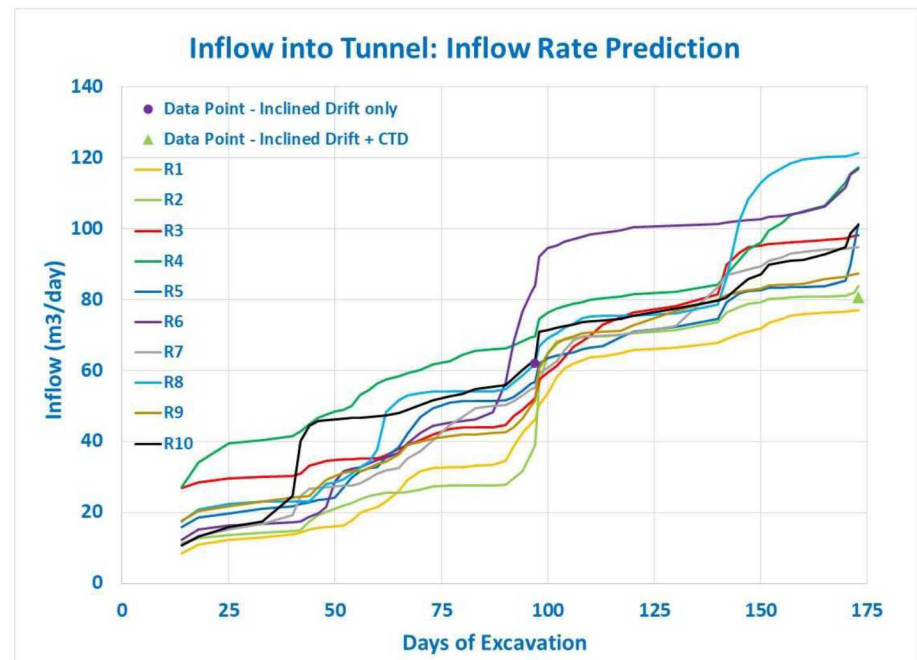
Selected Highlights in Disposal Research

■ Crystalline Disposal R&D

- Developed a general modeling framework to synthesize field observations into a fracture network model for flow and transport predictions for fractured crystalline rocks
- The modeling framework was tested against field data obtained at the Japanese Mizunami site sorption/diffusion in bentonite & modeling
- New glass degradation model was developed, which provides a new perspective of long-term kinetics of glass dissolution
- Significant progress was made in understanding smectite-illite transformation as well as in the development of new generation buffer materials



Fracture network generated in FracMan from Mizunami data



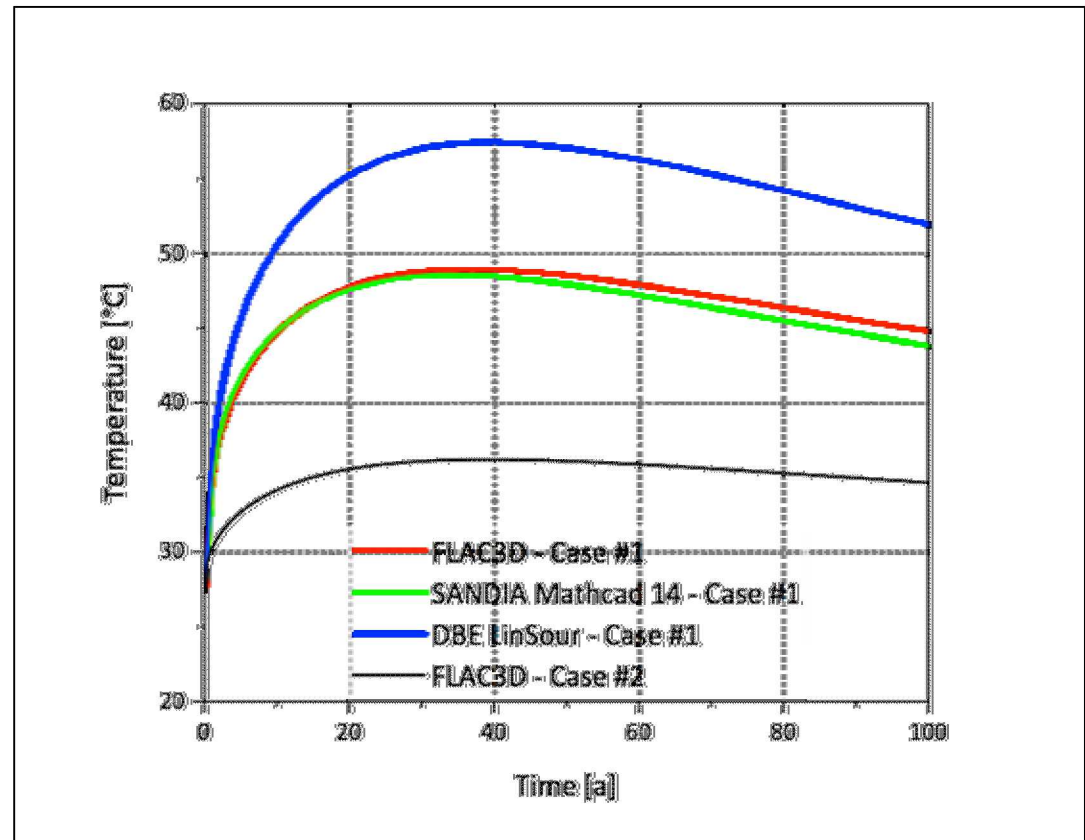
Ten PFLOTRAN model realizations of water inflow compared To data point measurements



Selected Highlights in Disposal Research

■ Engineered Barrier Systems (EBS) R&D

- WM2018 - Presented results from a benchmarking study conducted in collaboration with colleagues at DBE TEC in Germany that compared semi-analytical and numerical approaches to calculating thermal response in a nuclear waste repository

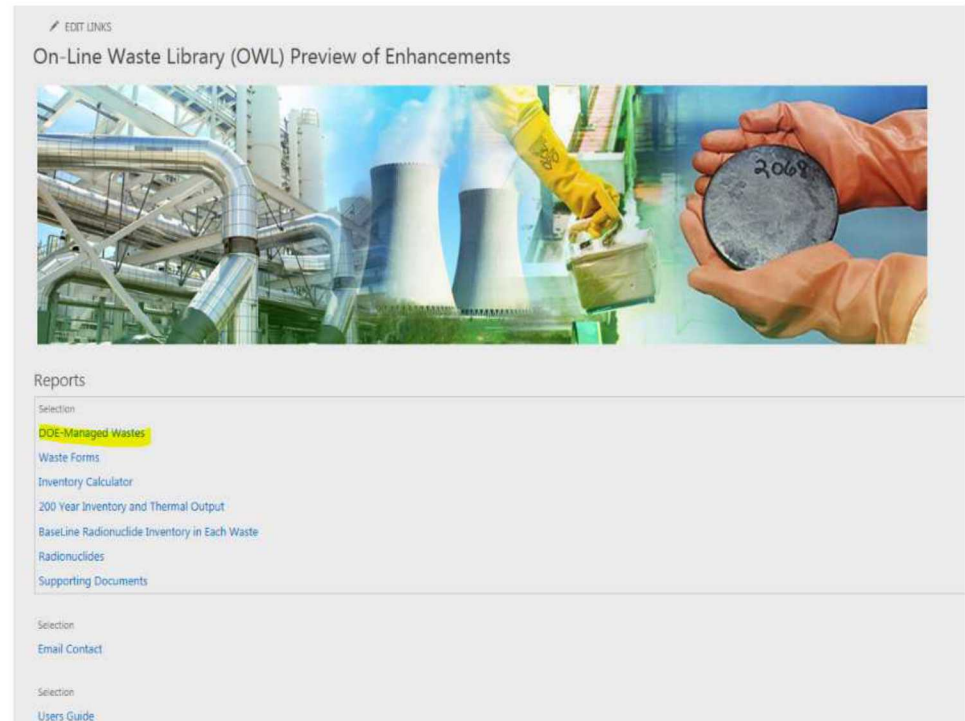




Selected Highlights in Disposal Research

■ Online waste Library (OWL)

- Completed receiving OWL BETA testing inputs (Nov. 2017) and began modifications to address inputs.
- Includes developing a “Preview” file that will become a link on the OWL Home page to show the “Coming Attractions” of the next version of the OWL



■ Completed additional FY18 re-planning based on new funding from the Omnibus Appropriations Bill passage

- Labs should have all received first tranche of funding, second week of May