FY18 UPDATE ON MODELING ACTIVITIES
FOR CRYSTALLINE WORK PACKAGE

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SFWST Working Group Meeting
University of Nevada, Las Vegas
May 22-24, 2018
Benchmark testing of fracture models (DFN and FCM) using relevant test case: Los Alamos – Sandia collaborative work

Developing and testing of fracture models using experimental field data: DECOVALEX-19 Task C

International Participation: DECOVALEX-19
- Tasks A: Modeling advective gas flow through low permeability materials
- Task C Hydro-mechanical-chemical-chemical-biological processes during groundwater recovery
- Task F: Fluid inclusion and movement in tight rock

Reports and Publications
- Evaluation of Spent Fuel Disposition in Crystalline Rocks: FY17 Progress Report
- Presentations at 2017 AGU, DECOVALEX-19 (4th and 5th Workshops)
- Contributed to Crystalline Club (CRC) report
- Two papers will be presented at DFNE-2018 conference, June 20-22, 2018
Spent Fuel and Waste Science and Technology

Mizunami Underground Research Laboratory

DECOVALEX Task C

GREET (Groundwater REcovery Experiment in Tunnel): Preliminary test (drift closure and water-filling) to estimate the recovery process in granitic rock.

L 46.5m x W 5.0m x H 4.5m
Tunnel Excavation Modeling

- Domain: 200 m x 300 m x 200 m
  - with cell size of: 2 m x 2 m x 2 m
- Number of Elements: 1,500,000
- Porosity: Anisotropic
- Permeability: Anisotropic
- Initial Conditions: Hydrostatic pressure and chloride conc. gradient
- Boundary Conditions: specified pressure and chloride conc.
- Pressure prediction at observation points
- Inflow rate prediction
Realization 2: Pressure distribution at \( t = 173 \) days

Inflow rate predictions of 10 realizations
Preliminary predictions of Closure Test Drift filling and post-filling period

Used Realization 2 upscaled fracture permeability and porosity fields

Initial condition:
- Pressure at Closure Test Drift (CTD) = 1 atm.
- Pressure at observation sections:
  - $P1 = 3.822 \text{ MPa}$, $P2 = 1.286 \text{ MPa}$, $P3 = 1.76 \text{ MPa}$, $P4 = 3.48 \text{ MPa}$, $P5 = 3.79 \text{ MPa}$, $P6 = 3.357 \text{ MPa}$

Ran flow model to one year applying 0.0 flux boundary condition at CTD walls
Realization 2: Pressure distribution at $t = 358$ days

Pressure predictions at Closure Test Drift (CTD)
Future Work

- **DECOVALEX19 Task C**
  - Update fracture model using additional data from boreholes. Conduct flow and non-reactive transport
  - Calibrate Step 2b predictions using experimental data
  - Finalize Task C interim report

- **Parametric Study**

- **Publications**

- **Crystalline WP progress report**