

PROJECT DESCRIPTION

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Study of potential damage in the claystone surrounding a HLW disposal cell for storage of high-level radioactive waste (HLW waste).



Fractures reproduced
Filling
Steel casing
Overpack

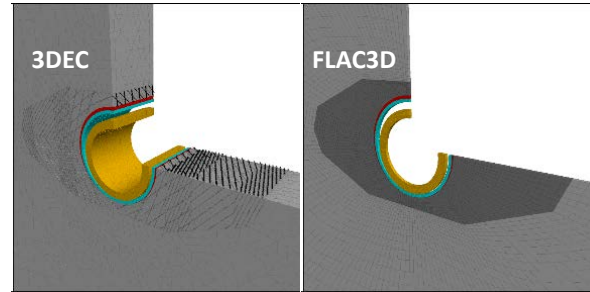


Figure 1: Geometry of the repository in 3DEC and in FLAC3D

ITASCA'S ROLE

Assessment of the short and long term behavior of the claystone and steel casing using both continuum (*FLAC3D*) and discontinuum (*3DEC*) numerical models, and accounting for:

- initial fracture induced by the tunnel excavation (Figure 1),
- influence of the heat generated by waste package on claystone creep,
- effects of steel corrosion on casing strength over the time.

PROJECT RESULTS

- Continuum vs discontinuum model: computed steel casing pressure and steel critical thickness are similar.
- The pressure applied on the steel casing may go up to 8-9 MPa.
- Casing behavior and average pressure evolution are dominated by corrosion.
- Modeling of initial fractures induced by the excavation in *3DEC* (joint) and in *FLAC3D* (weaker macroblock) leads to different claystone equivalent stiffnesses in the horizontal and vertical direction, thus affecting the casing ovalization direction (Figure 2).

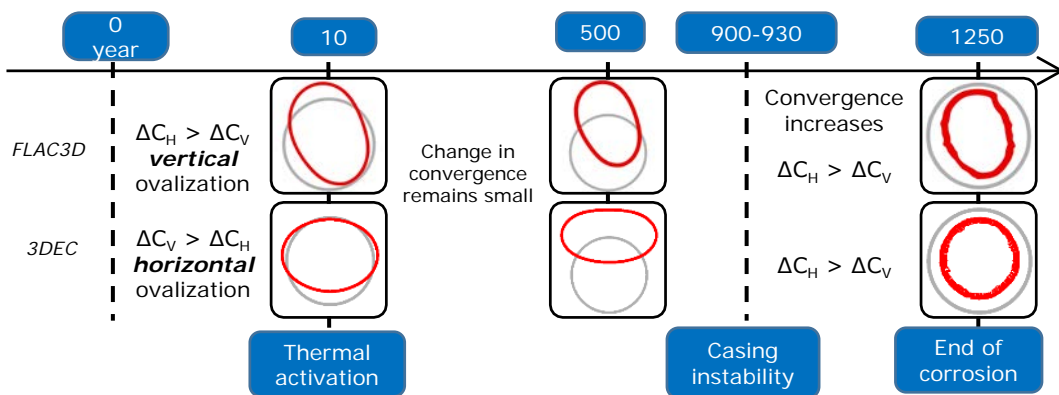


Figure 2: Steel casing ovalization for the two models