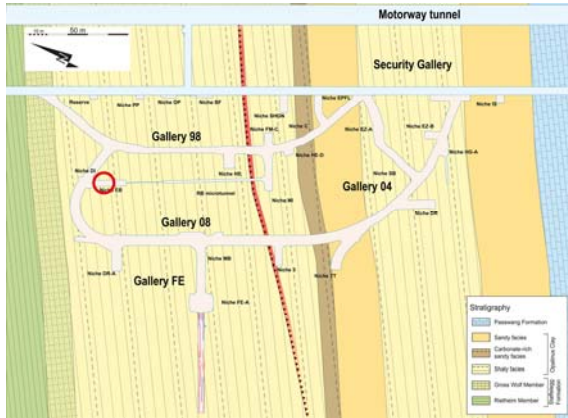




8 Engineered barriers



Objective: The 'engineered barriers' experiment is a demonstration test whereby a new concept for the backfilling of horizontal emplacement tunnels is verified for deep geological disposal of highly radioactive waste.

Procedure: Excavate niches (6 m long, 2.5 m in diameter).
Drill boreholes; install pressure sensors, acoustic emission sensors ('microphones') and geo-electrics in boreholes and niche walls.
Lay canister on bentonite blocks (unheated).
Water pipes for artificial saturation. Climatic sensors between the canister and the niche walls.
Carefully fill the remaining space with granular bentonite (avoiding damage to sensors). Seal with a concrete plug. Saturate with artificial pore water (salt water).

Results: The filling with granular bentonite was not uniformly successful. The saturation of the bentonite was accurately measured over 10 years and lasted longer than originally predicted.
(Pressures due to swelling of up to 22 bars were measured). In 2012 the installation will be dismantled and analysed (in terms of corrosion of the steel canisters, chemical reactions at the bentonite/Opalinus Clay interfaces).
Further development of the experiment: PEBS (long-term Performance of Engineered Barrier Systems).

Start: 2001
End: 2014
Project Partners: ANDRA, BGR, ENRESA, NAGRA (EC co-funding)
Cost: Installations: CHF 0.7 million. Monitoring: CHF 0.15 million.