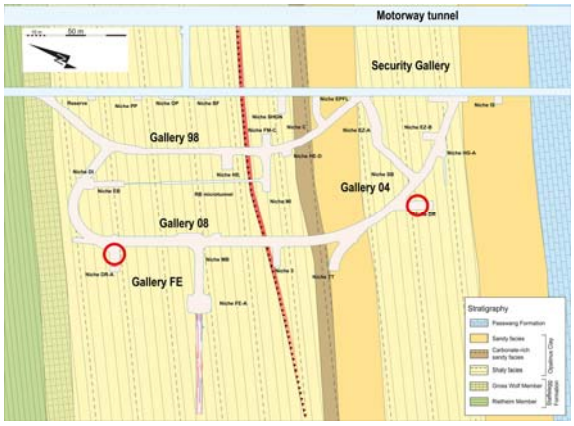
Guide

2 Diffusion and sorption



Objective: Molecular diffusion and sorption are of great significance because of the very low permeability of Opalinus Clay (radionuclides are getting caught by clay minerals). Based on experiments in boreholes, the characteristic properties of different radionuclides can be investigated. So the questions are: how far do the radionuclides spread over a certain period, into which pore spaces do they penetrate and what is their retention capability?

Procedure: Make a central borehole (around 10 m long).
Introduce a low concentration of radioactive tracer cocktail into the borehole.- The wait one to five years.
Overcore the central borehole and remove the core.
Saw planar sections into the overcore, mark the profiles.
Measure the activities along the profiles (Paul Scherrer Institute, Würenlingen).

Results: Excellent retention of radionuclides. They usually progress only very slowly. Their concentration diminishes over distance. Robust diffusion parameters can be evaluated.

Start: 1997 (5 experiments already completed)
End: 2015
Project Partners: NAGRA, NWMO
Cost: around CHF 0.5 million per diffusion experiment