Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

AGE030-07 Room: 202 Time: May 26 10:45-11:00

The Long-term Diffusion Project at the Grimsel Test Site, Switzerland

Andrew Martin[1*], Jussi Ikonen[2], Marja Siitari-Kauppi[2], Havlova Vaclava[3], Akira Hayano[4]

[1]NAGRA, Switzerland, [2]HYRL, Finland, [3]NRI, Czech Republic, [4]JAEA, Japan

The Grimsel Test Site (GTS) (www.grimsel.com) is an underground rock laboratory located in the crystalline rocks of the Aare Massif in the Swiss Alps. Several projects were recently initiated to study the long-term behavior of radionuclides in a simulated repository near-field and the surrounding host rock involving the setting up of large scale in-situ experiments in the radiation controlled zone of the Grimsel Test Site.

Here an overview is presented of one of such experiment - the Long-Term Diffusion project which is an international partner project* that aims to verify and understand in-situ processes that control the long-term diffusion of repository relevant radionuclides.

The project is divided into two phases. Phase 1 has been already completed and consisted of four work-packages: (1) an in-situ diffusion experiment in which weakly sorbing and non-sorbing radionuclides (H-3, Na-22, I-131, Cs-134) were circulated and allowed to diffuse into undisturbed rock matrix for almost 800 days; (2) experiments to characterize pore space geometry, including determination of in-situ porosity with C-14 doped PMMA resin for comparison with laboratory derived data; (3) a study of natural tracers to elucidate evidence of long-term diffusion processes; and (4) an investigation of the in-situ matrix diffusion paths for strongly sorbing radionuclides in core material from earlier GTS migration experiments. The present Phase 2 of the project is made up of three work packages: (1) a second monopole involving the circulation of Se-82, Cl-36, H-3 and Ba-133; (2) mock-up tests on block scale granites to derive effective diffusion coefficients for HTO, chloride and selenium; and (3) application of positron-emission-tomography (PET) for the visualization of radionuclide migration through a fracture plane in a Grimsel rock sample.

It is envisaged that by bringing together the results from modeling (predictive and post-mortem), laboratory scale experiments and the in-situ experiments, realistic values for the extent of in-situ matrix diffusion will be determined and further improvements to existing performance assessment codes can be made.

*JAEA (Japan), University of Helsinki (Finland), NRI (Czech Republic) and NAGRA (Switzerland)

Keywords: Diffusion, Radionuclides, Granite