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

AGE030-09 Room: 202 Time: May 26 11:15-11:30

Processes relevant to PA of deep geological disposal in the Czech Republic: Lab experiments within LTD project

Havlova Vaclava[1*]

[1]NRI Rez, Czech Republic

As with many other countries, the disposal of high-level radioactive waste and spent nuclear fuel in a deep geological repository (DGR) is the most realistic disposal option in the Czech Republic. According to the Concept of Radioactive Waste and Spent Nuclear Fuel Management in the Czech Republic, it is expected that a DGR will be constructed in granitic rocks (RAWRA, www.rawra.cz). Understanding the transport mechanisms and retardation processes occurring in granitic rocks is therefore crucial to a reliable safety assessment of the DGR.

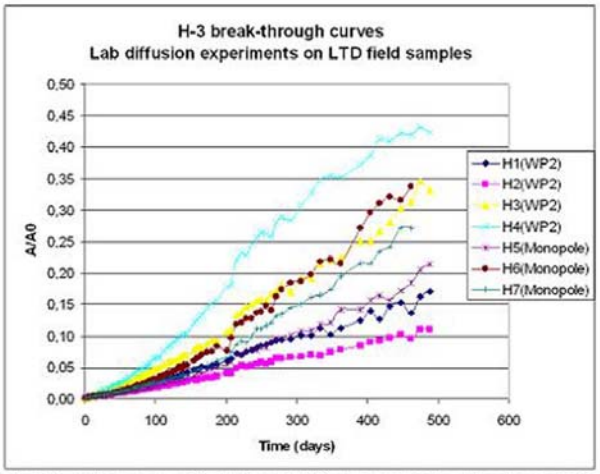

Fig. 1: Breakthrough curve range for lab through-diffusion experiments with rock samples from the LTD field experiments.

The systematic reseach approach to understanding these processes should comprise several components: modelling, laboratory research, field and underground research laboratory activities and natural analogues in order to cover the problems of scale. The Long-term Diffusion Project (LTD) is one such project studying rock matrix diffusion both in the laboratory and in-situ, namely in Grimsel Test site (Switzerland; www.grimsel.com).

Here the laboratory programme is presented within the framework of the LTD long-term diffusion field experiment where a radionuclide coctail (H-3, Na-22, Cs-134 and I-131) was succesfully circulated in-situ in Grimsel granodiorite for more than two years. Within the laboratory programme, diffusion and sorption of these radionuclides was determined using a multi-method approach. The following experimental methods were used:

- through-diffusion experiments,
- batch sorption experiments with crushed samples,
- batch sorption experiments with rock coupons,
- electromigration experiments (test).

The results of a diffusion experiment with H-3 yielded a wide range of De (m2/s), and was found to be independent of the mineral assemblages or grain sizes (see Fig. 1).

Electromigration methodology (modified after L?fgren, 2004) proved possibility to speed up the convential through-diffusion experiments, gaining both formation factor Ff and diffusion coefficients De.

The results of laboratory sorption experiments (Kd values) showed that Cs-134 sorption on Grimsel granodiorite under laboratory conditions did not reach values measured under real conditions in the in-situ field experiment. This along with the detailed results will be discussed in the presentation.

References:
L?fgren M. (2004): Diffusive properties of granitic rock as measured by in situ electrical method. Doctoral thesis. KTH Stockholm, Sweden.

Keywords: radionuclides, migration, LTD project, matrix diffusion, sorption, deep geological repository