Geophysical Research Abstracts,
Vol. 11, EGU2009-1403, 2009
EGU General Assembly 2009

Cement degradation and the alteration of host rocks. Studies within the Grimsel Test Site Project.

J. M. Soler
Institut de Ciències de la Terra "Jaume Almera" (CSIC), Barcelona, Spain (jsoler@ija.csic.es, +34 934110012)

Cement is a major component of the engineered barrier system in proposed underground repositories for low- and intermediate-level radioactive waste. Cement grouting of highly-conductive fractures in the vicinity of such repositories is also planned. The interaction between the hyperalkaline solutions derived from the degradation of cement and the rocks hosting such repositories may change the physical and chemical properties of the host rocks.

The HPF project (Hyperalkaline Plume in Fractured Rock; ANDRA-FR-, DOE-USA-, JAEA-JP-, NAGRA-CH-, POSIVA-FI-, SKB-SE-) studied the alteration of a fractured granite due to the circulation of a synthetic high-pH solution. A significant decrease in fracture permeability was observed both in the laboratory (core infiltration experiment; decimeter scale) and in the Grimsel Test Site (circulation along a fracture; meter scale), despite the relatively minor mineralogical alteration. Coupling of mineralogical alteration and permeability changes was incorporated into reactive transport modeling of the experiments.

The hydration and degradation of cement are being explicitly incorporated into the new LCS (Long-Term Cement Studies; JAEA-JP-, NAGRA-CH-, NDA-GB-, POSIVA-FI-) project at Grimsel. New laboratory and field experiments including a cement source are being designed. Reactive transport modeling of the degradation of cement, causing the formation of hyperalkaline solutions and the alteration of the host rock, will be an essential part of the experiment.