

# CHEMICAL EROSION OF BENTONITE – TRUE OR FALSE?

by

*Heini Reijonen<sup>1</sup> and Nuria Marcos<sup>1</sup>*

*<sup>1</sup>Saario & Riekkola Oy, Laulukuja 4 , FI-00420 Helsinki, Finland  
E-mail: Heini.reijonen@sroy.fi*

Bentonites are planned to be used as buffer materials in various types of geological repositories designed to host radioactive waste. Especially in case of HLW/SF disposal, the longevity of compacted bentonite in the repository environment becomes increasingly important due to very long timescales for the safety assessment (up to My). For the bentonite buffer and backfill materials one of the main environmental factors affecting their evolution is the hydrological and hydrogeochemical conditions. Since it is observed in laboratory tests that smectite, esp. montmorillonite forms colloids and dissolves in very dilute conditions, a scenario for chemical erosion has been discussed at lengths especially in relation to geological repositories located at future glaciated terrains and locations otherwise potentially hosting dilute groundwater conditions (e.g. Posiva 2013).

General understanding is that bentonite erosion does not occur when total charge equivalent of cations in groundwater is higher than 4mM, which is reflected in the requirements (SKB 2011, Posiva 2013). Regarding the occurrence of the process of chemical erosion within bentonite EBS, there are two processes to be looked at: 1) infiltration of dilute waters in the bedrock aquifer and related rock-water interaction in the system, and 2) the actual process of erosion of swelling clay in repository conditions assuming that the former produces dilute enough conditions. The objective of this presentation is to give examples on the natural analogue information in relation to the points 1 and 2 above and discuss whether the current assessment results reflect what is seen in nature.

## References

Posiva 2013. Safety case for the disposal of spent nuclear fuel at Olkiluoto – Performance Assessment 2012. POSIVA Report 2012-04. Posiva, Eurajoki, Finland.

SKB 2011. Long-term safety for the final repository for spent nuclear fuel at Forsmark. Main report of the SR-site project. SKB Report TR-11-01. SKB, Stockholm, Sweden.