Errata 2011-12

SKB TR-11-01

Long-term safety for the final repository for spent nuclear fuel at Forsmark

Main report of the SR-Site project

Volume II

In the earlier distributed report, there are errors that have now been corrected. The corrected page 403 is enclosed. The changed text is marked with a vertical line in the page margin. An updated pdf version of the report, dated 2011-12, can be found at www.skb.se/publications.

Svensk Kärnbränslehantering AB
Swedish Nuclear Fuel
and Waste Management Co
Box 250, SE-101 24 Stockholm
Tel +46 8 459 84 00

Erosion of deposition tunnel backfill

The erosion rate of the deposition tunnel backfill was calculated with the same model as that used for buffer erosion with the following modification: The loss rate is increased by a factor of 2 to account for the increase in diameter of the interface between the fracture and the tunnel (diameter 5 m) compared to the deposition hole (diameter 1.75 m). The rate hence scales more slowly than linearly with the diameter /Moreno et al. 2010/.

Fracture aperture and Darcy flux data were taken from the hydrogeological calculation results (Section 10.3.6) for the semi-correlated case without EDZ, to ensure that the analysis only included "true" tunnel intersecting fractures. Water velocities were determined from the Darcy fluxes with the same procedure as used for buffer erosion /Joyce et al. 2010/. The results from the hydro analyses show the fracture apertures and water velocities for structures where particles released in the deposition tunnels immediately above each deposition hole escape to the rock. Several of these structures are in fact deformation zones that intersect the tunnel system far away from any canister position. Such data should thus be excluded from the analysis when the aim is to establish whether tunnel erosion could affect the conditions near a deposition hole.

The result of the calculation is shown in Figure 10-73. As indicated in the Figure, none of the tunnel intersecting single fractures will cause erosion to the extent that the criterion is violated, i.e. that more than 220 tonnes is lost in one million years if erosion occurs 25% of the time. For a few positions where the particle escapes to a deformation zone, potentially more than 220 tonnes could be lost, but this is not relevant from the point of view of canister integrity. For an unrealistic, bounding case of erosion occurring 100% of the time, five tunnel intersecting single fractures experience losses just above 220 tonnes in one million years. The loss of 220 tonnes of backfill indicates that advective conditions may not be excluded in the deposition hole closest to the tunnel intersecting fracture. Considering that canister corrosion is a process requiring hundreds of thousands of years to cause failure of the canister's containment for advective conditions with high sulphide concentrations, and that 220 tonnes of tunnel backfill are lost in only five positions with the unrealistic, bounding assumption of erosion 100% of the time, the contribution of loss of deposition tunnel backfill to the possible generation of advective conditions in deposition holes is considered negligible.

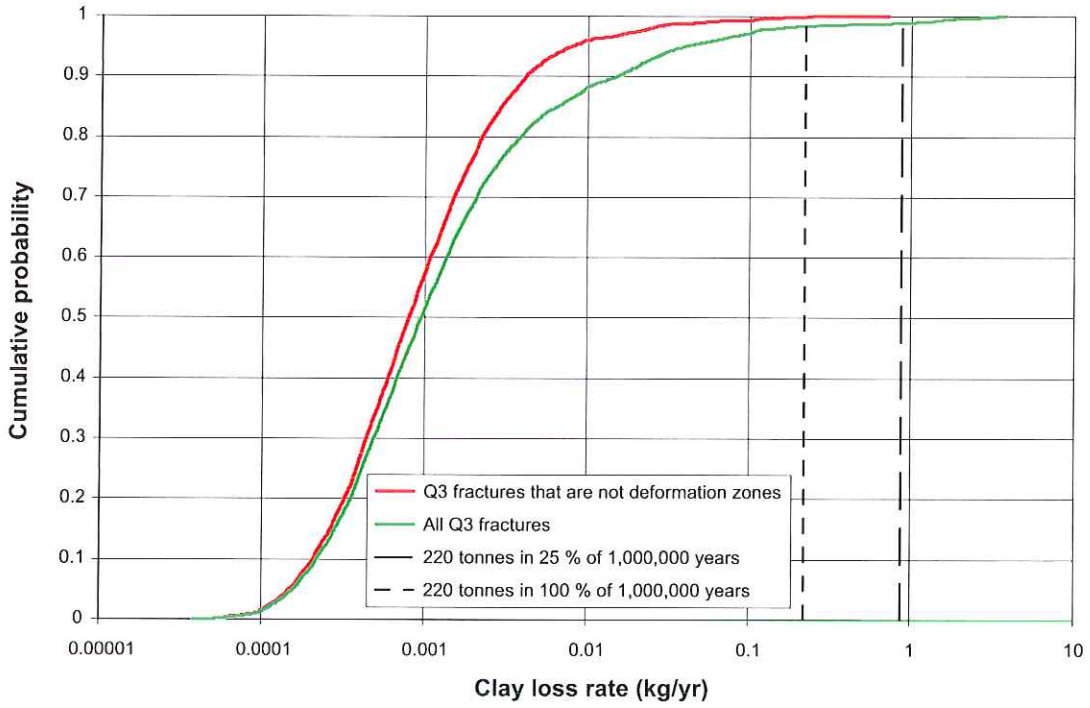

Figure 10-73. *Calculated distribution function of clay loss rate in deposition tunnels for the semi-correlated hydro case and assuming dilute conditions.*