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Abstract

Corrosivity of Different Natural Groundwaters from Repository Sites †

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Abstract: In Finland, the repositories for low- and intermediate-level waste (LLW and ILW) are situated in three different geographical locations in deep granite bedrock, where waste containers can be subjected to anoxic groundwater containing microbes. The composition of groundwater varies in terms of chemistry and microbial activity in different locations. In this study, groundwater from three repository areas was analyzed with regard to chemistry and microbial community. The corrosion tendency of three steel grades, carbon steel AISI/SAE 1005 and stainless steels AISI 304 and 316L, was studied in these groundwater environments using electrochemical methods. As a reference, measurements were also performed in simulated groundwater that did not contain microbes. The measurements show that the corrosivity of the water, and thus, the steels' performance, differed depending on its location of origin. Additionally, the groundwater differed remarkably in their chemical composition as well as the abundance and diversity of the microbial community within them. Consequently, the local environment has to be considered when evaluating the long-term safety of the disposal of nuclear waste.

Keywords: corrosion; groundwater; steel; LLW; ILW

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