

Paleohydrogeological investigations of the glacial water effects in the vicinity of an end moraine: Saimaa -Project

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Posiva Oy has carried out preliminary investigations at the second Salpausselkä end moraine in Kyläniemi, Eastern-Finland since 2011 in order to investigate the dilute glacial meltwater penetration in the bedrock, while the ice margin remained stationary hundreds of years during the deglaciation of Late-Weichselian glaciation.

Hydrogeochemical stability and the buffering capacity in the host rock of the waste disposal facility are special issues in changing future environmental conditions in Olkiluoto. Significant hydrogeochemical change in deep groundwater conditions is expected to occur during the deglaciation of the next glacial period, when large amount of meltwater will form and the driving factors of groundwater flow are increasing, compared to today's situation.

The hydrogeological structures and properties (i.e. locations and directions of water conducting fracture, groundwater salinity) and the retreating velocity (i.e. how long the meltwater can penetrate in to the groundwater system) are controlling the hydrogeochemical effects of the deglaciation in the geological disposal facility. Although the prevailing hydrogeological and hydrogeochemical properties can significantly decrease and buffer the meltwater penetration into the repository depth, it is finally a matter of time when the groundwater environment will be determined by meltwater signature at the repository depth. However, the significant change which would affect the function of the disposal facility is the almost complete dilution of the groundwater at the repository depth. This would expose the bentonite to the erosion.

The aims of this project are to determine 1) the penetration depth and dilution effect of meltwater, 2) the processes that cause the groundwater dilution during the extreme deglaciation phase, 3) the oxygen penetration depth during the extreme deglaciation phase, 4) the basic information for the deglaciation scenarios (e.g. bentonite erosion, chemical erosion, post-glacial fracturing), 5) the effects for the fracture network and the groundwater flow rate and 6) the stability of the meltwater disturbance in a timescale of 10 000 years.

The project will be a natural analogue study of the extreme situation, if the ice margin remains stationary while retreating on top of the geological repository in Olkiluoto for a long time periods.