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Sr behaviour Flow-Through Columns Representative of Near-Surface Disposal of Very Low Level Radioactive Wastes

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Short-lived, very low-level radioactive wastes (VLLW) will be stored in near surface repositories in many countries, including Finland, Sweden and the UK. Very low-level radioactive wastes may be produced whilst operating or decommissioning a nuclear power plant, as medical waste or as naturally occurring radioactive materials. Here, most radionuclides have half-lives less than 30 years and the burial site is designed with a multi-level barrier that will isolate the radionuclides from the surrounding biosphere for several hundreds of years. An example design for a near surface repository is summarised in Figure 1 (Keto et al., 2020). Despite careful planning, there are still uncertainties regarding the long-term performance of the barriers and therefore the long-term transport of the radioactive contaminants must be studied.

Using flow-through column experiments our work assesses the mobility of a key risk-driving radionuclide (Sr), under conditions that would prevail in a Finnish near-surface repository. Specifically, we focus the potential retention mechanisms of Sr transport with respect to the evolving repository studying the effects of the bentonite barrier, steel corrosion, and microbial activity. Preliminary results suggest that Sr is well retained across all systems and the addition of bentonite increases Sr sorption capacity. Post-mortem analyses, including X-ray Absorption Spectroscopy, help elucidate the mechanisms that control Sr mobility.

• Figure as detailed in attachment

Primary author: VETTESE, Gianni (The University of Helsinki)

Presenter: VETTESE, Gianni (The University of Helsinki)

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