

Sub-sea tailings deposition leach modeling

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The sub-sea/deep sea tailings deposition is a controversial method for disposing of mine wastes. Hazardous chemicals used during processing and deposited metal sulfides may dissolve, affecting the sea environment.

The overall objective for this project is to evaluate the copper leaching potential from tailings on the example of the proposed submarine tailing disposal in Repparfjorden discharged from 2 deposits - Nussir and Ulveryggen, mined by Nussir ASA. This experiment gives better understanding of the reactivity of sulfide minerals in saline system during sub-sea deposition.

Several kinetic tests were run based on recirculation of the leachate (batch experiments) using a constant flow rate over the tailings material of 1-2 m/h. The columns were run at approximately 10 °C (Fig. 1).

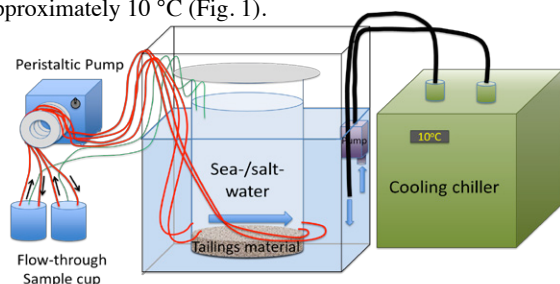


Fig. 1. Scheme of sub-sea tailing deposition leach test model.

There is a distinct increase in copper concentration during the experiments; while other hazardous elements (like Se, As, Ni) do not reveal changes. Copper leaching is a two-stage process: (1) initial rapid dissolution of secondary minerals formed from sulfide oxidation, related to the tailings material disposing period, and (2) long term slow leaching of available surface material of tailings settled on the bottom. Copper concentrations reached 0.02 mg/l after 100 days. Towards the end of experiments (from 70-100 days) the leaching rate leveled off (approximately 2.8 mg/m²/year) with time. Cu content data indicated that there were no further increase or leaching. These experiment results are potentially overestimating sub-sea tailings deposition natural conditions.