



Modeling the migration of trace elements from tailings towards aquifers

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Abstract

This study focuses on the modeling of trace elements transport from mine tailings towards a local groundwater flow system located nearby a municipal water intake. The study site corresponds to the Quémont-2 tailing pond, a property of Glencore Canada Corporation - Fonderie Horne (GCC-FH), in Rouyn-Noranda, Quebec, Canada. The tailing pond is located 2,5 km SE of Lake Dufault, which is the main surface water intake for the city of Rouyn-Noranda. A total of 13 samples were collected in fall 2019 in order to evaluate water quality within the tailing pond and surrounding aquifers. An additional sampling campaign was realized in summer 2020 for collecting 13 groundwater samples and 9 surface water samples. The analyses included major and trace elements along with stable isotopes of the water molecule ($\delta^2\text{H}$ - $\delta^{18}\text{O}$), chlorine ($\delta^{37}\text{Cl}$) and bromine ($\delta^{81}\text{Br}$). These data are used jointly with pre-existing environmental studies for constructing 2D groundwater flow and transport models using SEEP/W and CTRAN/W. The simulations will allow for evaluating and optimizing reclamation plans aimed at minimizing the risks associated with the migration of trace elements towards potential receptors. Ultimately, this project will allow for a quantitative evaluation of the hydrogeochemical exchanges between the tailings pond to the surrounding bedrock aquifer.