Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.35480

Assessment of Geochemical Behavior of Tailings-Dolomite Co-Disposal for a Graphite Mine Project

MAXIME A.A. KAM[1], **ISABELLE DEMERS**[2], JAVIERA A FARIAS VIACAVA[1] AND CARMEN M NECULITA[2]

[1]Université du Québec en Abitibi-Témiscamingue
[2]University of Québec in Abitibi-Témiscamingue (UQAT)

Lac Knife is a graphite mining project located in eastern Quebec. It is expected to produce pyrrhotite-rich tailings that will be stored in a filtered tailings storage facility (TSF). A dolomite deposit located near the site could support effective management of these tailings. The company is therefore considering the combination of dolomite with the sulfidic tailings as blended amendment and/or deposited in successive layers within the TSF to delay acid mine drainage (AMD) generation.

The primary objective of the study is to evaluate the effect of tailings/dolomite mixtures on the geochemical response of different scenarios to delay the onset of AMD. Mixtures with NP/AP ratios of 0.3, 0.4, and 0.6 (potentially acid generating based on static tests) were placed in kinetic test columns (D = 14 cm, H = 60 cm) under both blended and layered configurations. Two columns were covered with organic material to promote anoxic/anaerobic conditions. The columns were flushed monthly with 2 L of deionized water, and leachates were collected after 7 days for geochemical analyses.

Results show near-neutral pH values, ranging from 6,6 for tailings alone to 8,21 for the blended system with NP/AP = 0.6. Iron concentrations remained below 0,05 mg/L for all NP/AP ratios. Sulfate concentrations remained elevated, ranging from 1800 - 2500 mg/L for tailings alone and the NP/AP = 0.3 blend, while a decrease from 3600 and 3200 mg/L down to 2400 and 2100 mg/L was observed for NP/AP = 0.4 and 0.6, respectively. Intermediate sulfur species (thiosulfates) were also present across all columns, showing greater variability ranging from 2000 to 0,5 mg/L in the NP/AP = 0.6 blend, whereas tetrathionates generally remained below 1 mg/L. Precipitates were observed during column dismantling in both the tailings-only column and the blended ratio columns, with larger aggregates noted in the blended systems.

Overall, the blended configurations demonstrated satisfactory performance in delaying AMD generation, particularly NP/AP = 0.6, which showed elevated pH values and low iron and sulfate concentrations.