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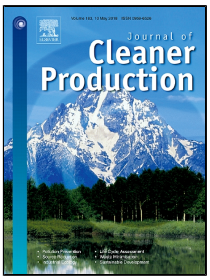

Integrated environmental management of pyrrhotite tailings at Raglan Mine: Part 2 desulphurized tailings as cover material

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Integrated environmental management of pyrrhotite tailings at Raglan Mine: Part 2 desulphurized tailings as cover material

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Abstract

Mine site reclamation is a major concern for mining companies, especially when mine tailings are potentially acid generating mine drainage. For mine sites located in Arctic environments, many factors, such as climate change, the evolution of permafrost, remoteness, the availability of materials, and harsh climatic conditions, can make difficult the implementation of conventional rehabilitation methods. Therefore, it is necessary to design and develop reclamation approaches specific to these conditions. This study focuses on assessing the effectiveness of covers with capillary barrier effects, made of desulphurized tailings from Raglan mine (Nunavik region, Québec). The approach would mitigate the risk of water contamination by simultaneously limiting oxygen migration into potentially acid-generating tailings, as well as reducing their temperature. The study involved a detailed characterization of the cover materials and the construction of two instrumented columns in a controlled-environment chamber (two residual sulphide level). Column tests demonstrated that capillary barrier effects induced a permanent high degree of saturation (> 85%) in the moisture-retaining layer made of desulphurized tailings. This high degree of saturation impeded oxygen migration; the estimated oxygen fluxes passing through the moisture-retaining layer being lower than 5.5×10^{-3} mol/m^2/day for the two columns. The column containing the desulphurized tailings with the highest sulphide content was slightly more efficient in controlling the