**Field Monitoring of Soil Covers for Controlling Moisture and Oxygen Ingress in Waste Rock Dumps under a Wet Climate**

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# ABSTRACT

Acid mine drainage (AMD) is a significant environmental concern due to its detrimental ecological, ecotoxicological, and socioeconomic impacts. Effective management and storage of potential acid-forming (PAF) materials during and after the life of a mine site present a major challenge. A key strategy for managing AMD is to control the net percolation of water and limit oxygen exchange, as these factors drive the formation of acid. This can be achieved by restricting oxygen ingress into PAF materials.

This study focuses on monitoring the behaviour and performance of a soil cover system installed in a wet climate with an annual rainfall of 2 meters. The cover system consists of a clay layer at varying depths, which acts as a sealing layer to minimise net percolation and oxygen ingress into the underlying PAF waste. Above the clay layer, a non-acid-forming (NAF) material is used as an armouring layer to prevent erosion and root penetration through the clay.

A sensor array was deployed using sonic drilling and backfilled with the same material, extending to the PAF waste located 20 meters below ground. These sensors were used to monitor moisture content, electrical conductivity (EC), temperature, and oxygen concentration profiles at various depths. Additionally, a weather station was installed to measure net inflow (via rainfall) and net outflow (via evapotranspiration).

Key findings from the study include:

* The clay layer effectively intercepted water infiltration, limiting it from reaching the underlying PAF material.
* The majority of the rainfall above the clay was diverted horizontally through the NAF material and flow horizontally, eventually appear as tow drain.
* Oxygen (gaseous) content in the water-saturated waste remained relatively low, at less than 10%.

This project provides valuable insights into the design of soil covers for AMD management in wet climates and presents the monitoring data collected to date.