

Case Study

Suboxic Evaluation of In-Pit NAG Mine Rock Backfill

Telkwa Mining Ltd.
British Columbia, Canada

> Background

Located in a historically mined region since 1918, the Tenas Project is set to produce approximately 800,000 tons of steelmaking coal annually over a 25-year lifecycle, encompassing construction, operations, and reclamation. Okane was engaged by Telkwa Mining Ltd. to design and develop source terms for a number of scenarios of backfilled non-acid generating (NAG) mine rock, employing a bottom-up construction approach with overburden covers. The design aims to limit oxygen and water ingress, minimizing the potential release of contaminants like selenium and sulfate into the receiving environment.

> Approach

Drawing on our experience in managing oxygen ingress and water percolation into mined material, we used advanced numerical models to develop precise source terms. Our modelling process included 1D soil-plant-atmosphere model, 2D oxidation model, 3D GoldSim oxidation model, and geochemical modelling to estimate the extent of suboxic development, and seepage quantity and quality for the backfilled NAG mine rock in the open pit. The 2D model projected the suboxic zone's development over time, while the 3D model offered detailed insights into oxygen dynamics and the wetting up and drain-down of the facility by varying the material properties of each lift through the Monte Carlo simulation.

> Client Benefit

Our modelling results demonstrated a reduction in dissolved selenium and sulfate levels from the NAG backfill, improving upon previous estimates. Our refined source term models will be integrated into the site-wide load balance model to help quantify the effects of the backfill design on site water quality.



Mitigating potential environmental impacts from selenium and sulfate contaminants through comprehensive modelling.

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Plan view of backfill strips



Estimated development of the suboxic zone

