

Gibraltar Mine

Tailings Storage Facility (TSF) In-Situ Biological Water Treatment



Highlights

- From conceptual design to initiating discharge in 20 months
- Within 60 days of in-situ biological treatment, TSF supernatant water met discharge requirements

LOW CAPITAL AND OPERATING COSTS

- 60% reduction in costs compared to ex-situ water treatment costs
- Zero investment in permanent infrastructure

ACHIEVED ESG OBJECTIVES

- No permanent power requirements or ecosystem disruption associated with building and operation of an ex-situ plant
- No waste generated (e.g., brine, backwash)

LOW RISK

- Off-site trials provided confidence that the full scale treatment would meet discharge requirements
- Geochemical modelling of reagent dispersion in conjunction with trial results lowered implementation risk and enabled regulator approval

The Project

The Gibraltar Mine, owned (87.5%) and operated by Taseko Mines Ltd. (Taseko), is a copper-molybdenum mine located 60 km north of Williams Lake, British Columbia, Canada. Elevated nitrate + nitrite concentrations in the water stored in the Tailings Storage Facility (TSF) prompted Taseko to seek out innovative water treatment technologies. They turned to Ensero Solutions for assistance.

The Ensero Solution

Ensero utilized company-wide resources from all our core service lines to support Taseko in finding the best solution. Drawing from our extensive in-situ biological treatment experience, Ensero provided Taseko with water management and permitting support, from developing a treatment concept and supporting verification bench trials, through engineering and geochemical design, construction, commissioning, and full implementation of an in-situ water treatment approach.

Ensero was initially contracted to complete a Trade-Off Study to select the best overall solution for nitrate treatment within the operating TSF. We reviewed available site information and evaluated a number of potential approaches.

Ensero identified that ***in-situ biological water treatment***, where microbes within the TSF facilitate targeted nitrate treatment, offered significant advantages over other more conventional treatment approaches. Notably, this approach could treat a significantly larger water volume at a fraction of the cost without producing a waste stream, and had the potential to be completed in months as opposed to years.

Next, Ensero conducted trials in our in-house laboratory, replicating TSF conditions. The trial data confirmed presence of the required microbes and provided confidence that a full-scale system would rapidly meet discharge requirements. Trial results facilitated permitting of the full-scale system.



Overhead view in situ application infrastructure

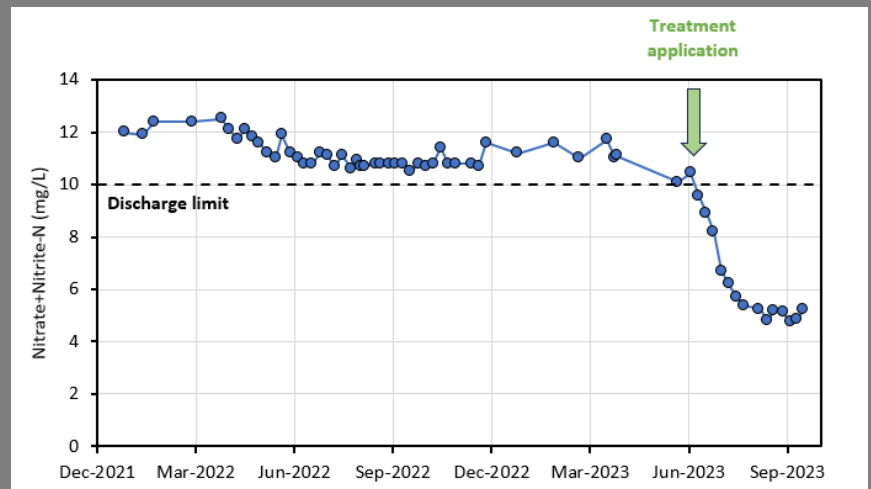
Ensero then completed the full-scale implementation engineering designs and, working with site personnel, conducted early-stage planning and in-situ background water quality monitoring. We also modeled reagent distribution and mixing within the TSF supernatant and procured all required equipment and supplies to execute a turn-key implementation.

This in-situ biological treatment approach is the first of its kind for a TSF in British Columbia. Ensero's technical team also supported the Gibraltar Mine in permitting the full-scale field treatment and liaised as required with BC regulators and First Nations.

Following regulator approval to proceed, Ensero implemented the in-situ treatment which was completed in 8 days. Within 60 days of the application, TSF supernatant water met the requirements for discharge.

Vital Statistics

- An in-situ approach made it possible to treat more than 6x the water volume in the same amount of time compared to treatment using membrane-based technologies.
- In-situ biological treatment avoided generating brine and backwash from equivalent membrane-based active water treatment technologies.



Nitrate+Nitrite concentrations from representative TSF monitoring point.



Project Office

Ensero Solutions
410 – 885 Dunsmuir Street
Vancouver BC, V6C 1N5
778-404-1179

Headquarters

Ensero Solutions
305 W Magnolia St, PMB 225
Fort Collins, CO 80521
+1 (970) 632-2242
info@ensero.com