

Non-Technical Summary

Acid rock drainage (ARD) from mine wastes (tailings) is a major environmental concern at various abandoned mine sites in Yukon. Acidic water with high metals concentrations is a result of ARD that can negatively impact groundwater and surface water.

The presence of both *oxygen* and *water* is required for ARD to develop. To reduce the amount of oxygen and water available within the tailings, a fine-grained soil (low permeability) cover can be used. This is the approach that was taken at the Arctic Gold and Silver (AGS) Tailings Site in Carcross, Yukon.

Funded by the Mining Environment Research Group (MERG), EBA and partners began a study of the performance of the low permeability cover system at AGS in the fall of 2000. The information from the first phase of the study suggested that the cover was working to limit the amount of oxygen and water within the tailings, however further monitoring was recommended.

With funding from MERG, and laboratory costs covered by Indian and Northern Affairs Canada (INAC), the second phase of the study was initiated by EBA and project partners to gather additional information on the performance of the low permeability cover. The second phase of the monitoring program was designed to study the following:

- Concentrations of oxygen within the tailings and cover.
- Moisture levels within the low permeability cover and near surface tailings.
- Temperatures within the cover, tailings and underlying native material.
- Groundwater quality using existing monitoring wells at the site.
- Surface water quality within the nearby unnamed lake and Tank Creek.

Observations from the second phase of the field-program supported the results reported in Phase 1 of the study that the low permeability cover at AGS is functioning to limit moisture and oxygen migration into the tailings. In general, the observations of oxygen and moisture data between phase 1 and 2 of the study might suggest that the cover is not acting as effectively as it was during the first phase of the study.

Groundwater and surface water sample results provided valuable data for comparison of water quality from before and after the construction of the low permeability soil cover. In general, groundwater results showed slightly higher concentrations of certain metals, and similar pH between the pre- and post-consolidation events.

Surface water sampling results from both the unnamed lake and the outflow of the lake at Tank Creek showed that pH during each of the pre-reclamation and post-reclamation events were neutral to alkaline, while total metals concentrations remain below CCME guidelines and the water license criteria.

It is recommended that long-term study of the cover be continued to recognize long-term trends in the effectiveness of this type of system to limit ARD, and to assess the effective lifespan of the system in a semi-arid cold climate.