Title:
Performance of Low-permeability Tailings Cover, Arctic Gold and Silver Mine, Yukon

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Abstract:
The production of acid rock drainage (ARD) from mine tailings is a significant environmental concern at many active and abandoned mine sites. Leachate with low pH and high dissolved metals concentrations deriving from mine tailings impoundment areas can negatively impact groundwater and surface water resources.
The presence of both oxygen and water is required for ARD to develop. Therefore, the reduction of the oxygen and water sources from the mine tailings will limit ARD production. This is the basis of reclamation of the abandoned Arctic Gold and Silver (AGS) Tailings Site near Carcross, Yukon using a low-permeability tailings cover which acts as an oxygen and water infiltration barrier.
ARD processes have resulted in high metals concentrations in the groundwater beneath the tailings impoundment with multiple dissolved metals showing elevated concentrations. Very high arsenic concentrations are especially of concern at the AGS site.
The use of a low-permeability tailings cover to reduce ARD at the AGS site is one of the first such reclamation applications in Yukon. Initial performance assessments of the tailings cover shortly after installation suggested that the cover functions as an oxygen and infiltration barrier; however, the limited data and short period of monitoring precluded any prediction of its long-term performance.
Another performance assessment was completed about 10 years after installation of the low-permeability cover and found persistently high metals concentrations in groundwater beneath the covered tailings impoundment. Possible reasons for these persistent effects on groundwater quality may include slow groundwater flow and replacement of affected groundwater, high groundwater levels and (seasonally) saturated tailings, or failing of the low-permeability cover. Further long-term monitoring is required to appropriately evaluate the performance of the tailings cover at the AGS mine site.