

Session #5 - Abandoned Sites Management

Time 925am-945am

Topic Baker Creek Remediation at Giant Mine, Northwest Territories

Abstract Giant Mine, located at Yellowknife, NT, is a mine now owned by the Government of Canada due to financial insolvency of the previous owner. The mine operated from 1948 to 2004 and produced approximately 7 million ounces of gold over that period, through open pit and underground mining. The mine is currently in care and maintenance while closure planning and water licensing is in progress. Giant Mine includes 7 open pits, 4 tailings containment areas and other surface infrastructure, with several mine pits and other openings providing potential surface connections to the underground mine.

Shallow underground mine components with risk of instability have been addressed since 2010 through a site stabilization program. However, approximately 237,000 tonnes of arsenic trioxide, a byproduct of the roasting process used to recover gold at the mine, remains stored in several underground chambers. The closure plan includes a system to freeze the rock surrounding these chambers to prevent release of this toxic, water soluble material.

The lower portion of Baker Creek, with a drainage area of 176 km² at the mouth, runs through the Giant Mine site. Baker Creek was diverted twice during the mine life to allow development of pits along its alignment, with those alignments comprising channels with no floodplain and limited environmental value. Another reach of the creek was diverted a third time after closure to reduce seepage to the underground mine, and that diversion incorporated a geomorphic design for flood conveyance and fish habitat. In its present state, Baker Creek presents a risk of flooding to the underground mine, which could result in release of poor quality mine water and, in the worst case, mobilization of arsenic trioxide from the underground chambers.

Between 2005 and 2012, closure planning at Giant Mine included conceptual and preliminary design of a closure diversion, and incorporation in a Developer's Assessment Report for environmental assessment. Measures included in the subsequent Report of Environmental Assessment by the Mackenzie Valley Environmental Impact Review Board led to further public engagement, alternative evaluation, and changes to the design basis for the closure diversion and associated mine components. The planning and design process and outcomes for the remediated Baker Creek closure diversion, contributing to the Giant Mine Closure and Reclamation Plan, are described herein.

Presenter(s) Nathan Schmidt, Golder Associates Ltd.

Bio(s) Nathan Schmidt is a Principal and Senior Water Resources Engineer with Golder Associates Ltd. in Edmonton, Alberta. He holds bachelors and masters degrees in civil engineering from the University of Alberta and a Ph.D. from the University of Canterbury. Nathan is a registered professional engineer in Yukon, the Northwest Territories and Nunavut, Alberta and British Columbia. He has worked on many mining projects in the Canadian north and is currently Golder's project director for the Faro Mine Remediation Project environmental assessment, as well as the design lead for Baker Creek and surface drainage at the Giant Mine Remediation Project.