

Mount Polley Mine Embankment Breach: Overview of Aquatic Impacts and Rehabilitation

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The Mount Polley Mine, located near Likely, BC is an open-pit and underground copper and gold mine. During the early hours of August 4, 2014, the failure of a glacial lacustrine layer beneath the Perimeter Embankment of the Tailings Storage Facility at the mine resulted in the release of supernatant water, tailings slurry and interstitial water, and tailings dam construction material. The released material caused deposition and scouring of native soils and vegetation in the down-gradient Hazelton Creek corridor, as well as deposition in Polley and Quesnel Lakes, resulting in physical, chemical and biological impacts to these environments. Rehabilitation was necessary and is ongoing. It continues to be carried out within the context of an adaptive rehabilitation framework. Short-term impact studies and initial response actions were prioritized on the basis of potential for further environmental impact, risk of impact or key gaps in information necessary to identify rehabilitation actions.

1 BACKGROUND

1.1 *The Mount Polley Mine*

The Mount Polley Mine, located near Likely, BC is an open-pit and underground copper and gold mine operating at a deposit formed approximately 200 million years ago and classified as an alkaline copper-gold porphyry. Primary ore minerals are chalcophyrite and bornite, (copper sulfide minerals) with associated very fine-grained gold inclusions.

The mine is an approximately 22,000 tonne per day operation that employs approximately 350 persons.

1.2 *Mount Polley Mine – Environmental Setting*

The mine is located in the Quesnel Lake watershed, adjacent to Polley Lake and Hazelton Creek which flow into Quesnel Lake and then the Quesnel River (Figure 1) in the Province of British Columbia (BC).

Quesnel Lake is the deepest fjord-type lake in the world consisting of East, West and North Arms, which have a combined surface area of 266 km². Mount Polley is situated near the West Basin of the West Arm (113 m maximum depth, pre-impact) which is separated from the deeper East Arm (511 m maximum depth) by a 35 m deep sill located near Cariboo Island. The West Basin has vertical mixing that is typical of temperate lakes, with thermal stratification for most of the year interrupted by brief turnover periods in the spring and the fall when vertical density gradients are lowest. In the deeper portions of the lake, seasonal overturn events only occur in the upper 100 to 200 m of the water column due to changes in temperature-density relationships with