



February 10, 2021

Authorization Number: 11678

VIA EMAIL: don.parsons@imperialmetals.com

Mount Polley Mining Corporation
Suite 200 – 580 Hornby St.
Vancouver BC V6C 3B6

Dear Mr. Parsons:

Re: Approval of the Comprehensive Environmental Monitoring Plan, dated October 31, 2019

Mount Polley Mining Corporation (MPMC) holds the *Environmental Management Act* Permit 11678 for the Mount Polley Mine. Section 3.2 requires an updated Comprehensive Environmental Monitoring Plan (CEMP) be submitted to the Director for approval by March 31, 2020 and every three years thereafter.

An updated CEMP was received by ENV on October 31, 2019.

By way of this letter, the CEMP, dated October 31, 2019 is approved under Permit 11678 and thus becomes a requirement under this permit. Approval of the October 31, 2019 CEMP is subject to the following requirements:

- 1) The following documents are hereby approved as part of the October 31, 2019 CEMP:
 - a) Supplemental soil and terrestrial tissue sampling and evaluation of bioaccumulation relationships for the terrestrial food chain model. Submitted to MPMC. Ref. No. 1894924-064-TMRev0- 23136. Golder Associates Ltd., March 13, 2019.
 - b) Update to Wildlife Food Chain Model – Mount Polley Mine. Submitted to MPMC. Ref. No. 1894924-069-R-Rev0-23196. Golder Associates Ltd., March 26, 2019.
 - c) Amphibian hazard assessment (Comprehensive Environmental Monitoring Plan). Submitted to MPMC. Ref no. 1894924-062-R-Rev0-23151. Golder Associates Ltd., March 18, 2019.
- 2) The conditions in this approval letter are monitoring requirements as part of the CEMP and thus this approval letter must be followed and attached to the hereby approved October 31, 2019 CEMP when provided to staff or external parties.

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- 3) In addition to the objectives listed in the CEMP, monitoring objectives for the CEMP include meeting the requirements outlined in the Engineer's Order.
 - 4) Mount Polley's fish & fish habitat program must be finalized in consultation with the Habitat Remediation Working Group (HRWG). The monitoring plan must achieve the general objectives of:
 - a) Monitoring the recovery and health of rainbow trout populations in Polley Lake, Hazeltine Creek and any other locations potentially affected by the tailings breach, as well as salmon smolt health in Hazeltine Creek;
 - b) Monitoring the recovery and utilization of remediated instream habitat throughout Hazeltine Creek by rainbow trout and salmon;
 - c) Monitoring the success and utilization of instream habitat created as a part of subsequent habitat offsetting designed to achieve the requirements of the Engineers Order.

Mount Polley must report out in their annual report on how the concerns, comments and recommendations from the Habitat Remediation Working Group were considered in the study designs.

- 5) Sampling at Quesnel Lake operational surface water monitoring stations (stations identified in Table 6.6 of the August 15, 2018 CEMP) must occur while the discharge to Quesnel Lake is occurring, for those sites where water quality monitoring happens less frequently than monthly (i.e., four times per year or semi-annually). In the event of an unexpected shutdown of the water treatment plant, MPMC must extend reasonable efforts to re-sample within the timeframe of the quarterly or other specified time period sampling upon restart of effluent discharge to Quesnel Lake.
- 6) For this condition, samples include both water chemistry samples and depth profile samples. Samples from HAD-3 must be collected on the same day as samples are collected at any Quesnel Lake sample location (i.e., QUL-58, -57, or -59) for comparisons to be made between water quality in the lake and in the discharge. QUL-57, QUL-58, and QUL-59 must all be sampled within a one-week period. Sampling at QUL-57 and QUL-59 must include consistent sample depths with QUL-58, except, if the plume or the thermocline is at or below the water depth at the site. Then a bottom sample must replace the sample below the plume (under a below) or the thermocline (under b below).. The profiling depths at each Quesnel Lake sample location must be matched to the water chemistry sample depths to allow comparisons over time and between sites. The sample depths shall be the following:
 - a) If plume is detected samples must be collected mid plume, 5 m above plume and 5 m below plume. If the plume is found to be at the lake bottom no below plume sample is required and a bottom sample will represent the below plume sample ; and
 - b) If plume is not detected samples must be collected from surface, 1 m above thermocline and 1 m below thermocline (or mid-depth if no thermocline exists), and from bottom.

- 7) Frequency of sediment sampling as per Appendix B1 is to be followed.
- 8) DGT sampling may be discontinued for shallow and deep areas of Quesnel Lake and shallow areas of Polley and Bootjack Lakes. DGT sampling must be conducted in deep areas of Polley and Bootjack Lakes for one additional year to confirm decreasing trends for copper above the bottom sediment. Rationale shall be provided to ENV to explain the installation of the DGTs at 1 m above the bottom sediment at deep sites vs. 0.5 m above the bottom sediment at shallow sites.
- 9) Regarding the update of Condition 11) of the approval letter of November 09, 2018 in the approval letter of March 14, 2019, the Director approves discontinuation of the *Hyalella azteca* toxicity testing using sediment of shallow habitat from Polley Lake. However, the 14-day sediment toxicity test on *H. azteca* must be conducted every three years (i.e., next in 2022) using sediment of shallow habitat from Polley Lake unless MPMC can clearly show that copper concentrations in all Polley Lake shallow sediment samples are below the 95th percentile of the copper concentrations in the Bootjack Lake reference area shallow sediment samples. *H. azteca* toxicity testing using sediment from shallow areas of Quesnel Lake must be continued as stated in the March 14, 2019 approval letter. “No effect to *H. azteca*” in that letter shall mean “no unacceptable response” relative to the reference area, as defined on page 37 of “Mount Polley Comprehensive Environmental Monitoring Program 2019 – Sediment and Aquatic Life” (Minnow 2020; Appendix K to MPMC’s 2019 Annual Environmental Report for the Mount Polley Mine).
- 10) In the submission of the next update of the CEMP (in 2023), MPMC must submit details on the monitoring that is or was conducted to determine which lake would be the best reference lake for Polley Lake. In addition, results of this monitoring and rationale for the selection of the reference lake based on these results must be provided in the next CEMP iteration.
- 11) Parameters measured at QUL-57 and QUL-59 must include the same parameters and field measurements as listed in Table 6.4 of the CEMP for QUL-58.
- 12) Any updated CEMP documents in the future must include all sample sites in a Site Matrix.
- 13) QUL-120a must continue to be used as a reference site and sampling must be conducted at a minimum four times per year at evenly spaced time series plus or minus one month. In addition, for future CEMP versions, the permittee must consider recent scientific publications about water and sediment quality effects in Quesnel Lake, including Hamilton et al. 2020. “Seasonal Turbidity Linked to Physical Dynamics in a Deep Lake Following the Catastrophic 2014 Mount Polley Mine Tailings Spill”, and clearly identify

how proposed monitoring will identify spill and mine related effects on receptors in and east of the West Basin of Quesnel Lake.

- 14) As recommended by Golder (2019c), a habitat survey by a qualified biologist must be completed, followed by targeted soil, water, and sediment sampling for any areas identified as providing valued habitat.
- 15) Rescreen of the surface water data under the Environmental Risk Assessment (ERA) must be completed (in advance of the habitat survey) using the new BC ENV Water Quality Guideline (WQG) for copper based on the biotic ligand model (BLM) to affirm the target screening concentration by area, indicating habitat quality for each area.
- 16) Provide additional support (incl. literature) for the soil/sediment copper screening value of 800mg/kg as it is based on limited data, and hence, has a high degree of uncertainty.
- 17) Provide a discussion of the available vanadium soil/sediment data relative to the BC ENV soil screening value of 150mg/kg in order to provide a better understanding of potential toxicity of vanadium.
- 18) MPMC must submit a plan for a quantitative wildlife study design by October 30, 2021 to determine wildlife recovery by area and reclamation type, which includes associated outcomes from the previous years as an attachment. The submitted study design and results should incorporate the following comments from the Government to Government Technical Working Group (G2G TWG) on the 2019 “Detailed Study Design for Terrestrial Wildlife Monitoring”, the “Update to Wildlife Food Chain Model for Mount Polley Mine”, and the “Amphibian Hazard Assessment”:
 - a. Continued monitoring in the study area for species abundance (e.g., tracks, scat, visual observations, etc.), by subarea, is required to determine how species are re-colonizing the area, as succession advances with continued rehabilitation.
 - b. Outline specific objectives and endpoints of the monitoring components (e.g., vegetation, birds), in addition to guiding principles. The overall goal is to track natural ecological succession, but specific objectives can be presented on how this will be measured from the monitoring data collected. For example, objectives can be set to test for differences in songbird assemblages and species richness across the different treatment areas.
 - c. Include reference areas (control sites), which correspond with the end land use objectives of the rehabilitated areas, in the bird and vegetation monitoring programs. This would add value to the monitoring and help to clearly understand the trends to natural ecological succession.
 - d. Include analysis and reporting of songbird community indices. Songbird assemblages can be easily assessed for the treatment areas (including the control sites).

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- e. In addition to monitoring birds we recommend including the monitoring of soil invertebrates (specifically terrestrial arthropods) as indicators of ecosystem recovery every five years. This is because although bird surveys are relatively easy to conduct, they can also result in a highly variable dataset. Furthermore, it is unclear if the surveys will focus on year-round resident species and/or neotropical migrants that utilize breeding habitats in the area on a seasonal basis. If the latter, the ability to detect long-term trends may be challenging since most species are facing pressures outside of their breeding areas and overall trends in migratory bird populations are showing general declines. These larger scale attributes would have to be accounted for in any reporting.
 - f. Mount Polley had developed their wildlife monitoring program based on the results of a food chain model. Mount Polley interpreted the results of the model as there not likely being risk to wildlife from the tailings breach. The G2G had identified several uncertainties in the food chain model, and since the wildlife monitoring study design is based on the food chain conclusions, these uncertainties and comments need to be addressed. To ensure that the wildlife monitoring program does not miss potential effects and recovery from those, we recommend that the following food chain model uncertainties be addressed as indicated in the following bullets:
 - i. Uncertainty in the application of the dietary absorption values for copper (40%) and vanadium (10%) to avian species should be further discussed, due to paucity of supporting literature for avian species. Further support should be provided for the application of these values to avian species.
 - ii. Physiologically Based Extraction Test (PBET) values for soil were reviewed. Statistical metrics used in the Food Chain Model merit further support. To address this comment, and the comment above, it is recommended that for dietary and soil absorption, a sensitivity analysis of the implications of alternative values to those used in the ERA, relative to the hazard quotient (HQ), be provided to add context on the effect this could have on the HQ. As part of this, identification and discussion of the dominant exposure pathways (i.e., that have the greatest influence on the risk estimates) would be helpful, and will provide additional context for the data collected in the wildlife monitoring program (e.g., insectivorous wildlife species have the highest risk potential, and hence, are of greatest interest in the wildlife monitoring program).
 - iii. Copper TRV was reviewed; while we do not completely agree with some of the detailed TRVs developed, listed species largely screen off at the Screening ERA stage. HQs for insectivores remain slightly elevated (American robin and Shrew). Completion of a sensitivity analysis (as indicated in previous bullet, above), will add insight into factors predominantly influencing risk levels for this receptor group.

19) As per the request by MPMC of November 11, 2020, the water quality sampling sites HAC-01 and EDC-01 are now replaced by EDC-01a, located 100m downstream of the

new confluence of Hazeltine and Edney Creeks. The sampling frequency must be monthly.

- 20) The hydrological station H3 is now replaced by H3a with the condition that manual flow measurements be conducted at H3a at least 5 times per year during the non-freezing period until a stable rating curve has been established (typically at least 6 unique measurements over a range of flows are required to establish a stable rating curve as per the Manual of BC Hydrometric Standards (ENV, 2018)). Once the rating curve has been shown to be stable, the measurements may be reduced to a minimum of 3 times per year.

If you have any questions regarding this letter, please contact Gabi Matscha at 250-312-6793 or Gabriele.Matscha@gov.bc.ca.

Yours truly,

Luc Lachance P.Eng.
for Director, Environmental Management Act

cc: Aaron Higginbottom, T'exelc (Williams Lake First Nation)
Edna Boston Xat'súll First Nation (Soda Creek Indian Band)