

#### To: Mr. Morgan Dyas Senior Project Lead, Major Mines Office, Mines Competitiveness and Authorizations Division Ministry of Energy, Mines and Petroleum Resources

- From: Copper Mountain Mine (BC) Ltd.
- Date: June 17, 2020

# Re: Copper Mountain Mine - *Mines Act* Permit M-29 - Amendment Application Project Description Update - New Ingerbelle Open Pit Push Back and Mine Life Extension

As requested in your email of June 3, and as per our follow-up telephone conversation on June 9, we provide below a summary of key clarifications or changes to the information provided in the Project Description for the 2019 Mine Plan Update and New Ingerbelle Open Pit Push-Back and Mine Life Extension made submitted July 9, 2019 as set out in our responses to review comments submitted by regulatory agencies June 2, 2020.

We have ordered the summary by subject area for ease of reference, as the detailed responses submitted June 2 are ordered by the specific referenced section or page number.

# 1. Hydrogeology

- CMM commissioned SRK to undertake a hydrogeological assessment of the New Ingerbelle development area. The hydrogeological assessment report will be included with the application. The hydrogeological investigations include an assessment of existing and pre-disturbance topography and surface drainage features at New Ingerbelle, surficial geology, consideration of bedrock lithologies as possible groundwater conduits and estimates groundwater recharge to the open pit.
- The hydrogeological assessment specifically investigated hydraulic conductivities of the rock between the Similkameen River and the Ingerbelle Pit. The field program, which took place in 2019, involved progressive packer testing with depth and two longer-term injection tests. Three piezometers were also installed for long term monitoring of water level between Ingerbelle Pit and the Similkameen River. Localized numerical groundwater models have been developed to assess the potential for water flow between the pit and Similkameen River, and to provide estimates of potential pit groundwater inflow. Results of these models will be included with the application and the need for any mitigation measures assessed and addressed as needed.
- The assessment report will include estimates of seepage rates from the Similkameen River into the Ingerbelle Pit during mining and from the Ingerbelle Pit into the Similkameen River post-closure. While the field investigations cannot entirely rule out the possibility of undetected fault systems being present, the current field work data shows no evidence of geological structures with high hydraulic conductivity nor connection of such structures between the pit and the Similkameen River. This is supported as well by geological knowledge of the fault systems and regional structures which suggests their absence in this area.
- Water quality modeling to be included with the application will provide estimates of the impacts of groundwater entering the Similkameen River from the existing Ingerbelle Pit and the proposed New Ingerbelle Pit.

### 2. Groundwater Monitoring

• The hydrogeological assessment report includes an appendix that provides recommendations for a groundwater monitoring program. This appendix, in the form of a technical memo prepared by SRK

summarizing the recommendations for groundwater well installation and monitoring, was provided to MEM and ENV for discussion purposes on April 23, 2020. A revised plan has been developed taking into account comments received and groundwater well installation is scheduled for June/July 2020, with monitoring commencing thereafter to give at least one year of data prior to commencement of mine operations at New Ingerbelle.

 A site-wide numerical groundwater model for the purposes of assessing large scale groundwater quality issues is not considered of particular value. Groundwater quality will be considered as part of the site wide water and load balance and water quality model to be included in the application. Groundwater quality inputs to be modeled will be accounted for based on geochemical source term estimates, combined with water quality measurements of surface seeps and Ingerbelle Pit water and water quality analogues from Copper Mountain. All groundwater reports to the Similkameen River which has been monitored continuously for decades and shows good water quality with all levels well below water quality guidelines.

### 3. Fugitive Dust

- CMM, as an operating mine, currently has a Fugitive Dust Management Plan (FDMP) in place which
  was prepared, submitted, updated and is being implemented in accordance with the requirements of *Mines Act* Permit M-29 and EMA Permit PA-105340 and which it follows in order to mitigate the
  potential for dust generation from ongoing mining operations. The practices and procedures of the
  FDMP currently being practiced on Copper Mountain side will be applied equally to activities associated
  with New Ingerbelle, and will be updated as necessary in order to reflect any necessary changes.
- In keeping with the FDMP, CMM has installed an additional 9 dustfall monitoring stations at key locations around and downgradient of the proposed development areas at New Ingerbelle, their locations designed to evaluate the potential for effects on sensitive receptors. One dustfall monitoring location was established in the vicinity of Kennedy Lake, one is upgradient of project area to act as a background station, two are adjacent to highway 3 while the remainder are located on the downgradient side of the NERSAs and the pit. These locations will be used to establish the current background level of inorganic dust and for measuring any additional dust generation associated with mining activities, and will continue to be monitored prior and subsequent to the commencement of operations at New Ingerbelle. The dustfall monitoring program and FDMP will be re-evaluated as development at New Ingerbelle proceeds and additional dustfall locations installed as needed.
- CMM has had considerable operating experience on the Copper Mountain side over the past decade with all of the activities proposed at New Ingerbelle, including blasting, hauling and storage of rock from the open pits. This experience has shown that dust generation from blasting and mine rock storage (ie. offloading of haul trucks) is fairly minimal due to the coarseness and inherent moisture content of the fresh rock, and that dust generation is mostly confined to haul road truck traffic which can be efficiently controlled by watering. As well, the haul roads will be located on the east side of the rock storage areas opposite from the highway. As a result, dust from mine operations is not expected to affect visibility on the highway. In the event that dust events impact visibility on the adjacent highway 3, additional mitigation measures, such as road watering or water sprays, will be implemented.
- CMM has established an internal Dust Task Force consisting of members of CMM's Job Occupational Health, Safety, and Environment Committee (JOHSEC) and management staff. The objective of the Dust Task Force is to ensure a common understanding of the hazards to health, safety and environment of fugitive dust emissions, identify our current dust sources, review existing controls, develop action plans appropriate to the risk(s), and communicate the actions to all CMM employees. This Dust Task Force will continue to be active as the New Ingerbelle development progresses and will address any dust associated effects on the highway and highway traffic.
- In conjunction with the vegetation monitoring program for New Ingerbelle, CMM initiated a vegetation metals uptake monitoring program. The USIB and LSIB were engaged in the program and contributed

to the selection of vegetation species to be monitored in order to ensure species of traditional usage were included. The vegetation metal uptake and dustfall monitoring programs will be used in combination to assess the potential effects on country foods, as well as vegetation and wildlife generally.

# 4. Geotechnical

- CMM commissioned Golder Associates to undertake a geotechnical assessment of the stability of the New Ingerbelle pit walls, which will be provided along with the permit application. The geotechnical assessment report documents, in particular, recommendations for the key fault zones in the north wall, including recommendations for groundwater pressure monitoring and mitigation efforts, including a potential north wall depressurization program, should monitoring indicate ground pressures exceed target levels.
- The pit design to be included in the application will be completed to a detailed design level by qualified
  professionals, taking into account the pit slope recommendations provided by Golder in their report. The
  criteria used by CMM for the other walls in the pit design are based upon the previous pit slope designs
  utilized at Ingerbelle which have resulted in very stable pit walls, as well as geotechnical experience
  with similar rock types at Copper Mountain. Additional field investigations will be completed for the
  adjacent pit walls prior to commencement of pit development.
- Golder has conducted runout analyses on both the North and South NERSAs. The results indicate a
  low likelihood that infrastructure is located within the runout zones of potential failures of the NERSAs.
  Recommendations have been provided that are intended to further reduce the runout risk in specific
  areas. The runout analyses results and recommendations are provided by Golder in the geotechnical
  report to be provided in the application.

# 5. Water Quality and Quantity Modeling

- An updated site wide water balance and water quality modeling to be included in the application will incorporate the predicted discharges associated with New Ingerbelle and will include all the listed sources of mine water.
- CMM maintains a site wide water quality model and under Section D.5 of *Mines Act* Permit M-29 CMM is required to prepare and submit an updated site-wide surface water quality model report to the Chief Inspector by September 30, 2021. The model is required to incorporate key surface water locations on the mine site and hydraulically down-gradient of the mine site for all individual waste rock dumps, in-pit waste rock dumps, open pits, tailings storage facility, low grade ore storage facilities, processing plants, and major site water management facilities. The water quality model is also required to be revised and updated as often as necessary to reflect changes to the mine plan, and an updated model report is submitted with every Five Year Mine Plan and Reclamation Program update thereafter, or more frequently as necessary to inform mine planning and mitigation design and engineering.
- Under Section D.6 of *Mines Act* Permit M-29, CMM is required to submit an assessment prepared by a Qualified Professional evaluating the feasibility of the mitigation measures proposed by an assessment of Best Available Technology with respect to achieving long-term water quality objectives for Wolfe Creek and the Similkameen River. The feasibility assessment will utilize the results of updated water quality predictions for Wolfe Creek and the Similkameen River for the Operations, Closure and Post-Closure scenarios, and recommends alternative mitigation measures if required to achieve long-term water quality objectives for the receiving environment.
- The TMF Expansion Design Report to be included in the application package will provide an updated water balance including estimates of seepage rates for both the East and West Dams to the ultimate configuration (EI. 1060 m). The updated water quality model to be included in the application will include predictions of flow and water quality of both East Dam and West Dam seepages and their respective receiving environments.

- CMML retained Swiftwater Consulting to conduct dispersion modeling of all major channels entering the Similkameen from the mine site. Six channels will be modeled, three on the east side of the Similkameen (SW07, 09, 38), and three on the west side (10A, 57 and 61). The modeling is being done both to meet requirements of BAT implementation, as well as for the permit application. The modeling results will provide a two-dimensional map of the Similkameen showing discharge concentrations within the Similkameen River extending from the confluence of SW38 down past the point of complete mixing downstream of SW07. Specific constituents of interest will be assessed independently. The model result will be used to establish IDZs for each of the six discharges.
- The water quality model will estimate potential changes to water quality on a monthly basis at various points in the downstream environment for all mine phases (current, operations, closure and postclosure). Estimates of concentration gradients within the mixing zone will be evaluated and be reported as part of the mixing modeling. Concentration estimates for low-flow conditions will also be issued. The application will also contain an assessment of predicted changes in water, sediment and/or tissue quality at critical points downstream of drainages.
- The assessment of habitat quality has been done immediately downstream of some of the mine site drainage channels and likely already cover the area of the future IDZ. This habitat data will be used to supplement any additional habitat data possibly required once the IDZs are defined. Given that it is not possible to access the majority of seep confluences with the Similkameen River safely due to the steep terrain, some desktop habitat assessments will be required using a GIS-based gradient analysis, along with detailed air photos to identify relevant habitat features, using professional knowledge and experience. The confluence of the West TMF Dam seepage is accessible and sufficient data will enable a more detailed assessment of available habitat at that confluence.

### 6. Ingerbelle Pit Water

- Under the proposed New Ingerbelle development plan all mine contact water is to be directed for recycle to the mill process and TMF. The water currently contained within the Ingerbelle Pit water is considered contact water and would be pumped to the mill or TMF along with other contact water. The potential effects of pumping New Ingerbelle waste rock seepage and mine water to the TMF will be fully evaluated by the updated water balance and water quality model to be included in the application.
- The CMM TMF operates under a negative water balance and can accommodate these additional volumes without compromising the water balance or significantly increasing storage volumes. Any excess volume to the TMF/mill operating requirements associated with inputs of contact waters would be offset by less withdrawal of freshwater from the Similkameen River under the Water Licence.
- Under the proposed NI development plan, the approximate 1.5 Mm3 of water currently contained within the Ingerbelle Pit water is considered contact water and would be pumped to the mill or TMF along with other contact water. The volume of make-up water pumped to the Copper Mountain Mill is on the order of 8 to 9 Mm<sup>3</sup>/year in years with normal operation. Pumping 1.5 Mm<sup>3</sup> of water from the Ingerbelle Pit to the TMF would off-set approximately 2 months of water make-up from the Similkameen River. By reducing the intake of water from the Similkameen River as water is transferred from the Ingerbelle Pit the free water inventory can be kept relatively constant at 2 Mm<sup>3</sup>. Provision for the transfer of Ingerbelle Pit water to the TMF has been incorporated into the water chemistry of the TMF associated with loadings from the Ingerbelle Pit water will be accounted for in the model to be included in the application.
- The alternative to directing Ingerbelle Pit water to the TMF would be to discharge it directly to the Similkameen River. CMM believes that this water could be safely discharged directly to the Similkameen River without impact by matching the hydrograph at high water levels, but has developed the plan to pump to the TMF based upon negative experience with the acceptance of such discharges

irrespective of the lack of any demonstrated impact. That said, CMM is fully prepared to discuss with ENV the option of discharging directly to the receiving environment.

#### 7. Water Management

- CMM commissioned Klohn Crippen Berger (KCB) and Ausenco to develop a detailed water management design for New Ingerbelle to prevent off-site discharge of contact water up to the 200-year 24-hour return period event, with contact water collected in a system of specifically designed ditches, ponds and sumps, and conveyed by dedicated pumps and pipelines. The collected runoff will be transferred across the Similkameen River using the existing pipe bridge to the existing Fresh Water Booster Station, and from there via existing pipeline to the mill and TMF.
- Detailed designs of the water management structures, including mechanical details for pumps and piping, have been prepared by qualified professionals and will be included in the application. Hydrology reviews have been completed to support the design basis, including incorporating recent severe weather events on record into the designs.
- CMM maintains and regularly updates a site wide Water Management Plan (WMP) which it implements as required under Section D.4.(b) of *Mines Act* Permit M-29. The most recent update was completed and submitted on December 31, 2019.
- The New Ingerbelle water management plan will create a new inflow to the TMF water balance via the mill process system. The TMF Expansion Design Report to be included in the application package will provide an updated water balance for the TMF to the ultimate configuration (EI. 1060 m). The 200-year storm volume for the TMF direct catchment (525 ha) and additional local contributing catchments requiring pumpback (670 ha) is about 0.2 Mm<sup>3</sup> which combined with the New Ingerbelle (catchment area of 1610 ha) storm volume of 0.3 Mm<sup>3</sup> equates to a total input to the TMF of about 0.5 Mm<sup>3</sup> for this event. The impact on the TMF water balance is almost negligible because the annual fresh water draw from the Similkameen River is about 8 to 12 Mm<sup>3</sup>/yr to maintain the water balance in the TMF which operates under a negative water balance. The New Ingerbelle 200-year storm input is about 5% of the makeup water required for milling which does not impact the annual deficit which can be enhanced by managing the reclaim and fresh water pumping systems where the storm flows are inputted.

### 8. Surface Erosion and Sediment Control

- CMM, as an operating mine, currently has an Surface Erosion and Sediment Control Management Plan (SESCP) in place which was prepared, submitted, updated and is being implemented in accordance with the requirements of *Mines Act* Permit M-29 and which it follows in order to mitigate the potential for sediment mobilization and control from ongoing mining operations. The practices and procedures currently being practiced on Copper Mountain side will be applied equally to activities associated with New Ingerbelle, and will be updated as necessary in order to reflect any necessary changes.
- The Water Management system described above will serve as a key component in the SESCP. Detailed designs of the water management structures will be prepared by qualified professionals and included in the application.
- A Construction Environmental Management Plan, including the development of sediment control measures such as sediment ponds and collection ditches as well as a construction phase monitoring plan will be developed in advance of ground disturbance activities at New Ingerbelle.
- Separate Construction Environmental Management Plans specific to each of the bridge installation and East Access Road, including the development of sediment control measures such as sediment ponds and collection ditches as well as a construction phase monitoring plan will be developed in advance of development activities.
- The majority of the East Access Road will be developed from the top down using mining techniques as a cut in rock and as a result will have fairly limited erosion potential. Drainage and sediment control features will be built into the road cut design as development proceeds. A slope stability assessment

has been completed for the east access road which will be provided with the application. Upon completion of the road development, contact water associated with the East Access Road will be collected in a sump at the base of the East Access Road and transferred to the NI water management system.

- Upon completion of the road development, contact water associated with the East Access Road will be collected in a sump at the base of the East Access Road and transferred to the NI water management system.
- The bridge will have a solid deck with contiguous raised side walls sloped at a 10% grade towards the
  west side. Water from the approach on the east side and the bridge deck will be directed across the
  bridge to a containment structure on the west side which will also collect water from the approach on
  the west side of the bridge. Collected water will be directed from there to the New Ingerbelle water
  management system for return to the TMF

# 9. Similkameen River Bridge

- CMM commissioned COWI to undertake a detailed design of the proposed clear span bridge, including abutments. The design was completed by qualified professionals and will be included in the application.
- A river engineer was engaged as part of the bridge design team and evaluated the potential for abutment erosion and ice jams as part of the process for choosing the bridge location.
- Under the proposed design the bridge slopes upward at 10% from West to East with the bottom of the beams supporting the bridge deck at the low end on the West side approximately 3.85m above the 200 year flood level and 7.85m above the nominal river elevation of 772m under normal flow conditions.
- Removal of the bridge at closure will be included as part of the closure plan and reclamation cost estimate.

# 10. Geochemistry

- CMM commissioned SRK to undertake a geochemical assessment of mine waste (non-economic rock and tailings), and other exposed potentially mineralized rock surfaces (pit walls, haul road), for the proposed New Ingerbelle Pit push-back and redevelopment activity. The ML/ARD Characterization Report will be provided with the application.
- CMM currently has a ML/ARD Management Plan in place, including Standard Operating Procedures (SOPs), which has been submitted and approved under *Mines Act* Permit M-29. The geochemical assessment report will propose additional ML/ARD management measures specific to New Ingerbelle. These measures, once agreed upon through the review process, will be incorporated into an updated ML/ARD Management Plan in advance of the commencement of mining activity at New Ingerbelle.

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