SNAP LAKE MINE

Water Licence Application Closing Arguments

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23 February 2020

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1. INTRODUCTION

1.1 Background

De Beers owns the Snap Lake Mine (the Mine), located approximately 220 km northeast of Yellowknife, NT and operated it from 2008 to 2015. Mining ceased in December 2015 when De Beers announced the Mine would be placed into Extended Care and Maintenance (ECM). In December 2016. De Beers received regulatory approval to flood the underground workings. This reclamation activity greatly changed the management of water at the Mine – changing it from continuous discharge of large volumes of groundwater mixed with surface water to seasonal discharge of small volumes of surface water and seepage only.

In December 2017, De Beers announced its intent to enter final Closure, and in March 2019, De Beers submitted the Final Closure and Reclamation Plan (FCRP) together with a renewal application for the Water Licence (MV2019L2-0004). In April 2019, De Beers submitted an Amendment Application for Land Use Permit MV2017D0032 for adjustment of conditions 1 and 50. The public review of these applications was initiated in April 2019 and to date has included: an initial five week review period (May to June 2019); a three-day technical session (July 2019); response to information requests (August 2019); a technical workshop focused specifically on water quality modelling and effluent quality criteria (September 2019); response to interventions (October 2019); a two-day public hearing (November 2019); separate meetings (December 2019) with Environment and Climate Change Canada (ECCC), the Government of the Northwest Territories (GNWT), and the Mackenzie Valley Land and Water Board (MVLWB); undertakings (December 2019 and January 2020); a meeting between the GNWT and De Beers consultants (January 2020); review of the draft Water Licence and Land Use Permit by interveners (January 2020); review of the draft Water Licence and Land Use Permit by De Beers and response to reviewer comments on the draft Water Licence and Land Use Permit by De Beers (February 2020). Written Closing Arguments were then provided by interveners (February 2020) followed by this Closing Argument submission by De Beers.

1.2 Planned Activities During Closure

De Beers is requesting a water licence that will allow us to proceed into Closure with a clear and concise water licence that is fit for purpose. The Mine has remained in ECM from December 2015 to present and De Beers intends to transition the Mine from ECM to Closure. The activities included in the Water Licence renewal and the Land Use Permit amendment are aligned with the closure objectives previously approved as part of the Interim Closure and Reclamation Plan (ICRP). The primary planned activities for Closure include:

- Capping and contouring the North Pile;
- Contouring water flow around the North Pile for passive (gravity) drainage and discharge to the receiving environment;
- Demolition of infrastructure;
- Deposit of non-hazardous waste within the on-site landfill;
- Transport of hazardous waste to approved off-site facilities;

- Reclamation; and
- Monitoring.

2. FINAL CLOSURE AND RECLAMATION PLAN

The overarching goal of closure is to return the mine site, and affected areas around it, to self-sustaining ecosystems that are compatible with a healthy environment and with human activities. This is consistent with the closure guidelines in the NWT, and has been the goal since the conception of the Snap Lake Mine. The closure goal is supported by four closure principles: physical stability, chemical stability, no long-term active care requirements, and future use (including aesthetics and values). These closure principles guided the selection of closure objectives for each of the various mine components and the outcomes required by engineering design and Project execution.

The Final Closure and Reclamation Plan (FCRP) that was submitted in March 2019 along with the water licence renewal application included detailed closure objectives (approved as part of the Interim Closure and Reclamation Process), as well as criteria to measure progress toward achieving those objectives. The criteria, as presented in the FCRP, are summarized in the Closure Completion Criteria table. This table also includes the key monitoring programs, reporting, and indicators that will be used to demonstrate that closure objectives have been successfully met. Closure criteria were presented to the MVLWB and key community stakeholders throughout a series of consultation meetings throughout the years of operations as well as during ECM and throughout the past year of review to support the water licence renewal. They have been well vetted and considered and are appropriate for approval in the FCRP.

The primary planned activities for closure are also summarized in the FCRP. Multiple appendices were included to provide further detail on exactly how each mine component would be reclaimed. The actual reclamation plans for each mine component are for the most part not in question. The three components of the Snap Lake Mine are the underground, the site infrastructure and the North Pile and associated water control structures. The underground has been flooded already and the mine openings will be capped. The infrastructure areas including the main camp will be demolished and reclaimed. Priority areas will be re-vegetated. The North Pile will be capped and re-contoured and the perimeter water control structures will be re-contoured to allow for passive drainage to Snap Lake. None of these major reclamation activities are in question.

Wetlands, which were the preferred option for water treatment at the time of submission of the water licence renewal application, will no longer be constructed. They are unnecessary to ensure the AEMP benchmarks will be met in Snap Lake, which was their only purpose. This decision came about through the water licence renewal process as a result of reviewers questioning the need for constructed wetlands in the closure plan. De Beers then re-examined the assumptions around the need for the constructed wetlands and updated the water quality models to reflect a “no wetland” closure scenario. Following the re-examination, it became clear that wetlands would not be required to meet AEMP benchmarks in the lake. The no wetland closure scenario has now become the preferred option, while the wetland closure scenario remains a contingency. The final design for the perimeter water control structures minimizes further land disturbance, further blasting, additional years of occupation of the site, further winter roads, and costs associated with wetlands construction and maturation. De Beers believes the no-wetland design is the

best design for this site and will ensure environmental protection for the downstream aquatic environment while also minimizing further impacts to the terrestrial environment.

As part of the reconsideration of wetlands, the assumptions of the effluent quality criteria derivation were reconsidered. The methods of EQC derivation were corrected to align with the previous methods used, and approved in previous water licence applications. The result was a recommendation for a higher EQC for nitrate, one which would still ensure the AEMP benchmarks would be met. As such, it became clear that in order to meet the recommended EQC, and the AEMP benchmarks in Snap Lake, further active water treatment would not be necessary. Further water treatment requires continued occupation of the site, continued operation of the camp, continued use of site infrastructure including the diesel generators, power plant and all associated infrastructure as well as additional re-fueling of site and re-construction of the winter road. Demolition of site infrastructure cannot proceed while active water treatment is still required.

In the closing argument submitted by the GNWT (Section 2.0), they stated that changes made to the application through the process, have "substantially altered the plan for final closure". This is an over-statement. De Beers notes that the only items that have been moved from the core of the plan to contingency are wetlands and active water treatment during closure. These changes were made as part of the reconsideration of the construction of passive wetlands that was conducted at the behest of reviewers. These changes have been thoroughly vetted through the current process. Reviewers have had an opportunity to comment on the changes, to ask questions and to request additional information. De Beers has readily provided the information requested and has made ourselves and our consultants available to answer reviewer questions. An additional workshop specifically to address the changes was hosted by the MVLWB as part of the process (September 19, 2019). Changes within the process are almost always made in response to reviewer questions, recommendations, or re-consideration of information. This is part of the process and should be encouraged in order to arrive at the best final design. De Beers has arrived at the best possible design.

All of the other activities (e.g., capping and contouring the North Pile, contouring water for passive drainage, demolition of infrastructure, revegetation) remain unchanged. The changes within the design from primary to contingency options do not change the core of the FCRP as submitted and do not require a complete rewrite with a second public review. The FCRP and supporting documents will be updated in alignment with the agreements made by De Beers and any conditions imposed by the MVLWB. A concordance check that the updates have been completed will be adequate to provide assurance that all required changes have been incorporated. De Beers stands by the statement that another full public review is not required.

In accordance with the guidelines established in the NWT, closure costs have also been calculated using a deterministic costing tool, called RECLAIM, as revised and issued by the Government of the Northwest Territories. The RECLAIM model is based on the assumption that closure is completed by a third party and not the mining company. As part of the water licence renewal process, De Beers submitted an updated cost estimate for the mine site using the most recent version of the RECLAIM tool.

3. WATER MANAGEMENT AND PROPOSED EFFLUENT QUALITY CRITERIA

Determination of appropriate effluent quality criteria (EQC) for a final discharge point should take into consideration overall water management at the site, but also the quantity, quality, and load of the effluent to the receiving environment. At the Mine, water management has changed substantially since Operations. The water that is discharged to the receiving environment has changed. In addition, the activities at the Mine (i.e., from mining and milling to ECM and eventually to closure and reclamation) have changed. Thus, effluent quality that were appropriate for the Operational water licence are no longer appropriate for Closure and Post-closure. As such, De Beers proposed EQC for Closure and Post-closure (EQC Report v2 [Golder 2019c]) that are appropriate to the water that is and will be managed at site, are achievable, and are protective of the environment.

A core tenet of the De Beers proposed EQC for Closure and Post-closure is that environmental protection of the receiving environment will be provided for each of the following attributes, consistent with MVLWB (2011):

- Acute Toxicity: As discussed at the November 2019 hearings, De Beers is and will continue to adhere to the pollution prevention requirements of the *Fisheries Act*. Discharges do not currently, and will not in the future, result in acute toxicity at the point of release as defined under the *Fisheries Act* (and case law pursuant to that Act). Tests will be continued to demonstrate compliance under future exposure conditions. No evidence was provided by Interveners to suggest that acute toxicity would be expected at the proposed EQC; to the contrary, the proposed EQC is below both the CCME (2012) short-term guideline for nitrate, as well as the most sensitive acute toxicity benchmark included by CCME in the technical derivation.

- Chronic Toxicity: The EQC for nitrate has been developed to provide high confidence that conditions at the edge of the mixing zone will not result in chronic toxicity. The AEMP benchmark remains protective of aquatic life under Closure and Post-closure conditions, and conservative estimates of hardness were used to provide confidence that hardness-based amelioration is not overstated.

- Assimilative Capacity and Waste Minimization: The quantity and quality of water discharged during Closure and Post-closure result in a large reduction in waste relative to project operations. The early indications from environmental monitoring of seepage are that nitrate concentrations and loadings will decrease over time in the absence of water treatment.

3.1 Effluent Quantity

During operations, from 2008 to 2015 and during ECM from 2016 to January 2017, water that collected in the underground was pumped to surface for management and discharge. As the size of the underground workings increased, the quantity of water that collected in the underground Mine also increased. This resulted in larger quantities of water that required management and ultimately discharge to the receiving environment. The highest quantity of water discharged to Snap Lake was in 2016 (Golder 2019a,b,c; De Beers 2019). During this period (2004 to 2016), discharge of effluent to Snap Lake was year-round and continuous (except when minor shutdowns occurred). The daily volume of discharge by 2016 was close to 50,000 m^3/day, equivalent to 18,250,000 m^3/year. At the end of 2016, regulatory approvals were received

that enabled the cessation of pumping of this mine water to the surface. The underground mine workings were flooded and as of February 2017, water from the underground is no longer pumped to surface. The only water now discharged to the receiving environment is surface water (i.e. precipitation) runoff from the North Pile, and seepage from the North Pile, which is collected in the perimeter sumps, mixes with other sump water and is discharged to Snap Lake at defined, monitored locations. As of 2017, the quantity of effluent discharged to Snap Lake on an annual basis is a fraction of the quantity that was discharged annually during Operations.

As described in Section 1.2, one of the primary planned activities for Closure includes contouring water flow around the North Pile for passive drainage. This passively drained water will include runoff and seepage from the North Pile. This water will be discharged (pumped until passive flow is established, and passively discharged afterwards) to Snap Lake provided that water meets EQC. Through Closure and Post-closure, water discharge will be seasonal and intermittent, and the quantity will continue to be a fraction of the effluent discharged in Operations.

3.2 Effluent Quality

The quality of effluent has also been influenced by the change in water management at the Mine. The groundwater that seeped into the underground workings in Operations was high in total dissolved solids (TDS); higher than the concentration of TDS measured in surface water by an order of magnitude. To allow mining of the underground to proceed, the high-TDS water was pumped to surface throughout Operations. As mining progressed over the years, the concentration of TDS in the managed water also increased.

Since February 2017 however, when water from the underground was no longer pumped to surface, only surface runoff is discharged to the receiving environment. This surface runoff has much lower TDS concentration than previously provided by groundwater, but since the quantity of the surface runoff is relatively low, dilution by precipitation has been limited, and concentration of several parameters in the perimeter sumps and the water management pond remain higher than the current EQC.

As the Mine progresses into Closure, surface runoff and seepage from the North Pile will continue to be managed. The quality of the managed water will slowly improve as water quality parameters are flushed through by precipitation. The quality is expected to improve over time, however, there will be within year variability as concentrations increase through the winter from ice formation (salt rejection), decrease in spring from freshet, and then remain variable through the summer and fall (i.e., concentrations could increase from seepage, and decrease from summer and fall precipitation). In addition, there will be year over year variation as precipitation will vary and the pile will age (water quality parameters will be flushed and freezing will result in better water quality). Overall, concentrations are expected to decrease because there is a finite source of parameters of concern.

3.3 Effluent Load

Daily load of effluent is the product of quality and quantity, while annual load is the sum of the daily loads. The water quantity and quality models provided in the application (Golder 2019 a,b,c,d,e) accounted for the current water management at site and the future management with contoured flows around the North Pile and passive (as opposed to actively managed and pumped) drainage and estimated future loads. As

presented at the follow-up EQC workshop in September, annual nitrate loads to Snap Lake were approved for 250,000 kg N/year; in Operations, the load was as high as 90,000 kg N/year; in Closure, loads are predicted to be 14,000 kg N/year; and in Post-Closure, loads are predicted to be 16,000 kg N/year.

Even if concentrations of some effluent parameters are higher in Closure and Post-closure as compared to Operations and ECM, the loads to Snap Lake will be significantly lower because the volume of water to be discharged will be an order of magnitude lower.

3.4 Receiving Environment

Effluent that is released into the receiving environment must align with the Boards' approach to managing the deposit of waste with the primary objective being protection of water quality in the receiving environment (MVLWB 2011). Protection of the aquatic receiving environment is determined through monitoring within the aquatic effects monitoring program (AEMP), and comparison to AEMP benchmarks. These benchmarks are a collective list of generic water quality guidelines and site-specific water quality objectives that are considered appropriate for protection of current and future water uses (Golder 2019c). The evidence put forward (e.g., Golder 2019c,d,e) predicts that in Closure and Post-closure, water quality at the edge of the mixing zone will be equal to or less than the AEMP benchmarks, and that at all locations within Snap Lake and the downstream environment, water quality will be less than the AEMP benchmarks. In addition, over time, water quality within the mixing zone, Snap Lake, and the downstream environment will improve.

The EQC proposed in the evidence put forward (Golder 2019c,d,e) are protective of the environment, meet the measures of the Environmental Assessments that extend to Closure and Post-closure (MVEIRB 2003; MVRB 2014), and are aligned with the primary objective of the water and effluent quality management policy (MVLWB 2011). Specifically:

- The aquatic ecosystem will be protected
    - Water quality in Snap Lake remained below AEMP benchmarks through Operations when loads of constituents to Snap Lake were significantly higher than are proposed for Closure to Post-closure.
    - The AEMP benchmarks are virtually the same as in Operations, with variations limited to updates to match current guidelines.
    - The updated water quality models have demonstrated that water quality in Snap Lake will be better than the AEMP benchmarks.
- Water in Snap Lake will be safe to drink
- Fish will be safe to eat
    - Fish in Snap Lake have been safe to eat through Operations and as the constituent loads to Snap Lake will continue to be substantially lower than in Operations, fish will continue to be safe to eat.
    - The AEMP will continue to monitor fish and the lower trophic levels within Snap Lake. Low action levels are set as part of a Response Framework to ensure any trends are caught early and acted upon by De Beers.
- Total dissolved solids, or constituent ions, will be within the acceptable limit

- Water quality at the inlet to MacKay Lake has met the acceptable limit for total dissolved solids throughout Operations.
- The updated water quality models have demonstrated that the acceptable limit for total dissolved solids will continue to be met at the inlet to MacKay Lake.
- The inlet to MacKay Lake will continue to be monitored as part of the AEMP.

3.5 Effluent Quality Criteria

3.5.1 Parameters of Potential Concern

The EQC proposed by De Beers were developed using the same method used to develop the Operational EQC, and following a method that has been approved and accepted by the Board. A screening was completed to identify parameters of potential concern (POPC). As described in the EQC report (Golder 2019c), the only water quality-based POPC is nitrate.

In the closing argument from ECCC (ECCC-FC2), they recommended that the water licence for Closure should include an additional six parameters. There is no justification to include these additional parameters because none of them screened in during the standard process of EQC development (i.e., predicted concentrations at end of pipe will not cause in-lake concentrations to exceed the benchmarks). A request to include additional parameters beyond those identified through the systematic screening procedure is not justifiable. The values that ECCC proposed for these parameters are equivalent to the highest of the predicted 95th percentiles from the Water Management Pond, Sump 3, or Sump 5 (Golder 2019c). They are not values required in order to meet AEMP benchmarks. It is important to keep in mind that De Beers will continue to monitor for a wide range of constituents in both the SNP and the AEMP programs. This monitoring allows us to detect trends and respond to any action levels that have been triggered. Results will be presented both on a monthly basis (SNP) and an annual basis (Water Licence annual report and AEMP annual report). Placing a regulated limit on additional parameters, at these levels, is unnecessarily restrictive.

In the closing argument from the GNWT (Section 5.4), they recommend that parameters without environmental quality benchmarks should be included in the screening. De Beers disagrees with this and notes that inclusion of these substances as formal POPCs will not improve the ability to monitor environmental risks (i.e., exposure does not indicate risk without some understanding of hazard). The process that De Beers used to identify POPC is in alignment with the Mackenzie Valley Land and Water Board (MVLWB et al. 2017) , which identifies POPC as parameters that are predicted to trend away from background concentrations in the receiving environment and trend toward a water quality objective.

In the closing argument from the GNWT (Section 5.4), they recommend that De Beers use 75% of AEMP benchmarks for screening POPC. In Version 1 of the EQC Report, De Beers did use 75% of AEMP benchmarks for screening POPC. The only water quality based POPC that was identified was nitrate. In Version 2 of the EQC Report, De Beers used 100% of AEMP benchmarks for screening POPC and the only water quality based POPC that was identified was nitrate. Therefore, the amended recommendation should be considered satisfied.

In the closing argument from the GNWT (Section 5.5), they stated that modelling conducted by De Beers was too conservative but also stated that the screening to identify POPCs was not conservative enough (Section 5.4). It seems they want both aspects of the work modified so as to generate different results. De Beers stands behind the modelling approach to predict future conditions and considers it to be appropriately conservative for environmental protection. Modelling methods used are consistent with our approach in previous regulatory processes approved by the Board. De Beers stands behind the screening approach completed to identify POPCs and is confident that our approach was appropriate, inclusive, and aligned with methods previously approved and accepted by the Board.

3.5.2 Treatment and Pollution Minimization

De Beers is requesting EQC for the renewed water licence that do not rely upon regular use of the reverse osmosis (RO) treatment plant and the modular water treatment plant (WTP). In the closing argument from the GNWT (Section 5.5), they recommend that the EQC parameters and values in the current water licence (MV2011L2-0004) should be maintained in the new licence. De Beers cannot accept the operational EQC in the new licence because the only way to achieve the operational EQC is to continue active water treatment. There is no longer any environmental justification for active water treatment. A higher EQC for nitratre, as proposed by De Beers will continue to protect the environment from toxicity or ecological degradation (as described in Section 3.3 and 3.4), such that there is no environmental benefit to the more restrictive EQC. Rather, imposition of active water treatment will incur environmental costs associated with running the facility, with no meaningful benefit from unnecessary nitrate reductions.

Nitrate, at the concentrations and loadings modelled in the effluent, and in the predictions in the receiving environment, does not warrant continuation of active water treatment (i.e., through the WTP and the RO). The total amount of nitrate predicted in Closure (14,000 kg/yr) and Post-closure (16,000 kg/yr) is approximately 16% of the limit (250,000 kg/yr) approved in the operational licence. Future nitrate inputs into the receiving environment therefore represents a small fraction of what was deposited, and approved for deposition annually into the receiving environment during Operations. Maintenance of active water treatment for the very small volume of surface water runoff and seepage that is currently managed, and that will be managed through Closure, is not justified on either environmental or economic grounds. It is not justified as a meaningful pollution prevention mechanism nor necessary for protection of the environment per MVLWB (2011) policy.

Pollution minimization should be holistic and consider overall benefit to the entire environment (air, land, and water). Water treatment may produce a better effluent quality, and have an initial lower load to the environment, but this treatment comes with other environmental costs. The holistic approach to waste minimization was described in detail in response to a GNWT intervention (response package submitted 22 October 2019) and is summarized:

- Minimization of waste includes consideration and evaluation of all waste deposited.
- In development of the FCRP, but also in development of the updated EQC proposed for Closure and Post-closure (Golder 2019c), De Beers considered overall minimization of waste and protection of the environment.
- The disturbance and waste created by running the WTP/RO plant.

  - Water treatment to reduce the concentration of nitrate in the discharge water, and achieve a lower nitrate EQC, requires use of chemicals and supplies, the hauling of these supplies to site (e.g., chemicals and fuel), the generation of waste (e.g., concentrated brine), the use of energy, the occupation of site for much longer (i.e., sewage generation and other associated environmental impacts), and the delay of demolition and reclamation of the site due to continued activities and occupation of the site.

- Utilization of the WTP/RO plant is unnecessary to meet AEMP water quality benchmarks.
  - The continued active treatment of surface water is not necessary to prevent toxicity: the models have demonstrated the predicted water quality of the effluent is not anticipated to cause acute lethality; all concentrations are predicted to be below the short-term CCME guidelines for freshwater aquatic life; AEMP benchmarks at edge of mixing zone will be consistently met.
  - This level of treatment was not utilized in Operations when loadings to the lake were much greater than they are now. Moreover, continued operation of the WTP with the RO treatment unit is not justified by the predicted water quality, water volumes, or ultimately the loadings to Snap Lake.
  - The aquatic communities as documented in AEMP monitoring programs will remain healthy and productive even if water was discharged at the maximum average concentrations proposed by De Beers for the full volume predicted.
  - Reductions of the nitrate in the effluent to lower than 60 mg/L nitrate-nitrogen, or reductions of concentrations in the effluent to lower than the current water licence limits would not provide meaningful reduction of environmental risk because the risks to aquatic life are already negligible in this scenario.
  - If, as suggested by GNWT, short term reductions in nitrate concentrations occur (relative to the assumptions required to provide confidence in meeting SSWQOs), the benefit of active treatment will be further diminished, and the infrastructure invested in establishing a treatment facility wasted (i.e., low benefit to cost ratio).

- Infrastructure can be decommissioned and demolished as planned.
  - If active water treatment continues to be required, demolition of site infrastructure cannot be initiated as planned. Delays to closure and reclamation of the site are anticipated.
  - Lack of progress on capping and re-contouring the North Pile, or on demolishing the site and re-vegetating priority areas, would create competing environmental challenges even prior to consideration of technological or economic considerations.

- The use of the winter road can be reduced
  - The number and/or duration of the winter roads could be reduced if water treatment is not required. One of the items with greater environmental liability that is hauled on the winter road is diesel. If further years of water treatment are not required, the fuel needs are reduced (lowering carbon emissions), and the risk of spill during transport is reduced.
  - Any additional transportation of items to site (either by air or winter road) creates waste through the burning of fossil fuels (resulting in an increase in carbon emissions).

Maintaining water treatment at site will delay execution of full reclamation and achieving the goal of returning the site and affected areas around the Mine to technically viable and, where practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities.

3.5.3 Hardness Dependence of Nitrate

De Beers reaffirms that the AEMP hardness-dependent benchmark remains appropriate for Closure and Post-closure.

In the closing argument from the GNWT (Attachment A, Section 4.1), there are inaccurate statements made which led to an interpretation that is contrary to the state of the science on nitrate toxicity. In the closing arguments from the GNWT (Section 5.3), they recommended using the lower of water hardness at the start of Closure or measured hardness over time to determine the AEMP benchmark.

De Beers disagrees with this recommendation because the AEMP benchmark, including the assumption of hardness dependence, has already been approved on a Project-specific basis and is entirely appropriate to continue. There have not been developments in nitrate toxicity in the last decade that would render this approach invalid for application to closure. To the contrary, the demonstration of hardness-dependence has been confirmed in other work at Canadian mine sites (e.g., Teck 2014).

Lack of a universal relationship for every test endpoint, as indicated by a pooled slope, does not preclude considering hardness as an ameliorating factor. Arguments made by GNWT regarding the nitrate AEMP benchmark are not consistent with recent statistical investigations on the issue, and De Beers reaffirms that the AEMP hardness-dependent benchmark remains appropriate for closure and post-closure.

3.5.4 Criteria for Closure and Post-Closure

De Beers is seeking a water licence with EQC and conditions that will enable Closure and Reclamation, and execution of the planned Closure activities. Unfortunately, the GNWT has recommended in their closing arguments (Section 5.5) that the existing EQC parameters be retained for the next water licence, and ECCC has recommended in their closing arguments (ECCC-FC3) that the EQC for nitrate in Post-closure not be set at this time. De Beers disagrees with these recommendations and summarizes where there was a misinterpretation by the GNWT and why the EQC proposed by De Beers are appropriate and should be approved.

In the closing arguments from the GNWT (Section 5.5), they completed a statistical analysis of monitoring data (2017 to 2019) from the five perimeter sumps, SNP 02-02, and the water management pond. Following this analysis, the GNWT have recommended that the existing EQC parameters be retained for the next water licence.

The analyses completed by GNWT demonstrated that nitrate concentrations are lower in perimeter sumps 1, 2 and 3 as compared to perimeter sumps 4 and 5, and when water from all five sumps mix, the overall water will have lower nitrate concentrations. Based on the results of these analyses, the GNWT has drawn the incorrect conclusion that: 1) “median nitrate concentrations are already below the current Water Licence maximum average concentration EQC for nitrate (12 mg/L), or are projected to be within 2 sampling

seasons" and 2) that "a maximum average concentration EQC of 60 mg/L is unnecessary". These conclusions are incorrect because:

1) once the Influent Storage Ponds are constructed, water from perimeter sumps 1, 2, and 3 will combine into the East Influent Storage Pond, and water from perimeter sumps 4 and 5 will combine into the West Influent Storage Pond. Water from all sources will not mix together. The better water quality at one location will not improve poorer water quality at the second location.

2) These analyses did not account for potential future trends, future inputs of nitrogen from blasting, changes in water collection due to re-configuration of the sumps, or variation due to precipitation or otherwise. In Closure, blasting will be required for construction activities such as creating the influent storage ponds. The residual nitrate from ammonium nitrate explosives will cause greater variability in nitrate concentrations than the variability observed in the 2018 and 2019 data from the North Pile sumps and Surveillance Network Program (i.e., SNP 02-02 and SNP 02-14).

Based on the water quality models, De Beers is not at all confident that current EQCs could be met within two years.

The water quality models included in the submission are a tool to help plan for the future. In the closing arguments from the GNWT (Section 5.5), the GNWT stated that our models over predicted the measured concentrations in 2019 (and thus may be too conservative) which is in contrast to another statement made in the closing arguments by the GNWT (Section 5.4) that "a greater level of conservatism should be used during Closure and Post-Closure than during operations as the mine is transitioning into a state of reduced monitoring frequency".

Models are a tool and are used to predict not the expected case but a case with some contingency. The over-prediction that is incorporated in the modelling is not an error, but rather a protective feature intended to buttress against uncertainty and risk. It is also expected that there will be within open-water season variability in the effluent and receiving environment. A static set of EQC were proposed (i.e., a maximum average concentration, and a maximum grab concentration) for each of the four EQC. This static set of EQC needs to account for the expected variability yet allow the site to remain in compliance. In other words, nitrate concentrations in the effluent are not expected to remain at 60 mg-N/L in all samples, or to remain sustained at 60 mg-N/L for a long duration, but this EQC value will allow the expected variability to occur, allow for activities to proceed, and allow for discharge of effluent. The proposed EQC will allow the site to remain in compliance throughout the open-water season, remain protective of the environment and meet the measures of the Environmental Assessments.

3.5.5 Requested Effluent Quality Criteria

De Beers proposed EQC for Closure and Post-closure that were developed for the water volumes and water quality associated with the surface water runoff and seepage at the North Pile. These EQC took into account measured data, progressive closure of the Mine, the final Mine footprint, and activities that are planned in Closure. They are reasonably achievable and protective of the environment.

The EQC proposed (Golder 2019c) and requested by De Beers for the Closure and Post-closure water licence include nitrate, pH, and total suspended solids (Closure and Post-closure), and faecal coliforms

(Closure only). The EQC are strict limits on discharge. No other parameters should be regulated through the water licence because there are no other parameters of potential concern remaining once the water quality on site, the water quality in Snap Lake and downstream, the AEMP benchmarks and the mixing zone have been considered. Regulation of other parameters is not justified.

The EQC for nitrate has been developed to provide high confidence that conditions at the edge of the mixing zone will not result in unacceptable chronic toxicity. The AEMP benchmark remains protective of aquatic life under Closure and Post-closure conditions, and conservative estimates of hardness were used to provide confidence that hardness-based amelioration is not overstated.

Regular monitoring of a wide range of constituents will continue through the SNP and AEMP programs in Closure and in Post-closure. This monitoring allows us to confirm the predictive models, confirm that measures are being achieved, detect trends and respond to any action levels that have been triggered. Monitoring of a large suite of parameters will continue through those programs. Monitoring results will be presented both on a monthly basis (SNP) and an annual basis (Water Licence annual report and AEMP annual report).

4. MIXING ZONES

4.1 200 m Mixing Zones are required for discharge from ISPs

De Beers stands behind our position that the mixing zones should remain at 200 m from the point of discharge, either at the diffuser or at the shoreline post establishment of the discharge from the ISPs.

The size and location of the current and future proposed mixing zones were provided in response to Undertaking 3 (provided 16 December 2019). The current mixing zone for the Snap Lake Mine is circular in shape, extending 200 m from the diffuser. Discharge occurs through the submersed diffuser at a depth of 15.4 m. The mixing zone represents 1% of the volume of Snap Lake. This mixing zone was established for continuous Operational discharge. The new proposed mixing zones will be similar in concept to stream discharges that mix within lakes. The new proposed discharge locations will be bankside and discharging into mixing zones that are semi-circular in shape, extending to 200 m from the shore, in a water depth of 0 m extending to about 5 or 6 m, and both new mixing zones combined, represent 0.6% of the volume of Snap Lake. The new mixing zones, which will become the long-term and permanent mixing zones, are each less than 1/3 the size of the currently approved mixing zone.

In addition, all of the modelling suggests that nitrate in the receiving environment will exceed the AEMP benchmark at 50 m, 100 m, and 150 m from the discharge points, and thus a mixing zone of 200 m is required. The 200 m mixing zone is necessary to meet the AEMP benchmark for nitrate, but the magnitude of concentration reduction (relative to full strength effluent) is rapid close to the discharge location(s). Chronic effects will not occur in the outer portions of the mixing zone because those areas are predicted to have nitrate concentrations close to or below the AEMP benchmark. Furthermore, any effects within the outer portions of the mixing zone would be small in magnitude because at concentrations close to the AEMP benchmark, few if any sensitive species (e.g., crustaceans) would be adversely affected at the population level. As such, the mixing zone of 200 m is proposed to attain a high degree of confidence that the AEMP benchmark will be consistently achieved, and not as a means of providing high dilution in the receiving

environment. If sustained effluent concentrations are found to be less than 60 mg/L N, the AEMP benchmark will be attained closer to the discharge point than 200 metres, but this cannot be assumed given the considerations discussed in Section 3.5.4.

In the closing argument from the GNWT (Section 5.1), they state that "unduly conservative assumptions were used to derive the mixing zones". De Beers does not agree with this statement. De Beers has made reasonable assumptions based on the monitoring data, the planned activities, and the variation expected in future values. GNWT has not conducted any modelling that predicts water quality values into the future. They have not considered the changes that will be made to the Perimeter water Control Structures, the future capping and re-contouring activities planned, nor the effects of variation in annual precipitation or other environmental variables.

The environmental relevance of this push for a smaller (100 m mixing zone) is questionable. Why such a strong push to reduce the zone by 100 m? This change would not result in a meaningful improvement in the environmental effects of the Mine on the aquatic environment. The difference to the receiving environment would be negligible at best. What this change would accomplish however is to impede the ability of De Beers to end operations of the reverse osmosis plant, to demolish the site infrastructure as planned, and to proceed with capping and closing the site. It would cause financial harm to De Beers.

4.2 Mixing Zone Boundaries Needed to Define EQC

De Beers has requested mixing zone boundaries for the new discharge locations from the East and West ISPs. De Beers has provided modelling evidence to support this request. The mixing zone boundaries should be defined now as they are fundamental to the derivation of the EQC and fundamental to progress closure. In the closing arguments from the GNWT (Section 5.1), they recommended that "MVLWB not approve the proposed mixing zone at this time and the exact mixing zone dimensions for each effluent discharge location be determined and included in the SNP after plume delineation studies have been completed". De Beers continues to disagree with this recommendation.

EQC are set in such a way as to ensure the AEMP benchmarks, at the edge of the mixing zone, are achieved. If the mixing zone boundaries were set smaller than 200 m, the EQC limits would be lower and are not predicted to be achievable in Closure or Post-closure. Deferring a decision on where AEMP benchmarks must be met would create substantial uncertainty for De Beers and could result in an inability for us to proceed with active closure. If there will continue to be EQC in the water licence, and AEMP benchmarks in the AEMP, De Beers needs to understand what those values are and where to measure them.

De Beers is requesting a 200 m mixing zone as proposed for the new discharge locations to the main basin of Snap Lake and to the Northwest Arm of Snap Lake, and that these mixing zones be approved at the start of the new licence.

4.3 Plume Delineation Study Prior to Post-closure

In Undertaking 6, the GNWT recommended "A plume delineation study should be completed in the first open water season following the approval of the Reclamation Completion Reports for the North Pile (minus

the landfill area) and all water management structures". This position was referenced again in the closing arguments from GNWT (Section 5.1).

De Beers does not object to completing a plume delineation study in the first open water season following approval of the reclamation completion report for the north pile, however we wish to clarify that by that point, we will have been discharging from the same locations for several years.

Water collected in the water management structures around the North Pile will be discharged on an annual basis. As soon as the sumps are reconfigured and water is passively flowing to the ISPs, water will be discharged from those influent storage ponds to the receiving environment. This activity will occur during the Closure period and will extend into Post-closure. The first year of discharge from the ISPs therefore will be long before the reclamation completion reports for the North Pile will be submitted.

De Beers would suggest that a plume delineation study is more appropriately timed with the first year of discharge from the ISPs, to confirm that mixing is as expected and the AEMP benchmarks are continuing to be met at the edge of the mixing zone boundary.

5. AMENDED RECOMMENDATIONS FROM GNWT

In the closing arguments from the GNWT, they proposed amended recommendations for the North Pile Runoff model, erosion monitoring stations, the ARD and Geochemical Plan, and toxicity modifying factors. As summarized in this section, De Beers cannot accept these amended recommendations. Where we have not commented, we refer the Board to our earlier submissions on the topics raised by GWNT.

5.1 North Pile Runoff Model

In the closing arguments from the GNWT (Section 5.2), they amended their earlier recommendation regarding an update to the Site Water Quality Model and indicated that the model should include: a) thermal monitoring assessment; b) a sensitivity analysis of acid rock drainage and geochemical characterization; and c) the most recent runoff/perimeter sump water quality data. Of these, the GNWT included parts a and c in their intervention report to which De Beers responded (intervention response submission filed 22 October 2019). Part b of this recommendation has changed substantially.

Below are the specific explanations for each of the GNWT's sub-points to the recommendation

a) Thermal monitoring

   De Beers already has developed a thorough understanding of water quality influencing factors and conditions and has selected the most appropriate inputs for the site water quality model. The data to support this statement has been provided to the Board and reviewers, along with analyses and summaries of results.

b) Sensitivity analysis of acid rock drainage and geochemical characterization

   The portion of the GNWT recommendation has changed significantly since the Intervention Report was submitted by the GNWT (7 October 2019).

De Beers considers that it has accounted for the appropriate range of input conditions for the model, whereas GNWT continues to suggest De Beers is too conservative while at the same time being not conservative enough. De Beers position is that we have found an appropriate balance in model inputs that considered all available data, including all available ARD related data, as of the model date and that allows for closure of the site in a manner that is protective of the environment and allows closure to proceed without undue interruptions or exceedance of arbitrary criteria.

c) The most recent runoff/perimeter sump water quality data

In regards, to the use of more recent data, De Beers agreed, in the response to comments on the draft water licence, to develop an EQC Re-evaluation Report that uses the most recent set of monitoring data. The data will confirm that the water licence EQC will continue to be appropriate for the Post-closure phase (response to comments ECCC-9, GNWT-27, SLEMA-24 on the draft water licence).

De Beers does not agree that any changes to the Site Water Quality Model are required. None of the suggestions will result in material differences in the water quality predictions or management. The value of putting time, effort, and resources into such an exercise is not apparent and not justified.

5.2 Erosion Monitoring Stations

In the closing arguments from the GNWT (Section 6.1.2), they amended the recommendation for monitoring of uncontrolled runoff under the Erosion and Sedimentation Plan. They recommended that SNP stations be determined prior to the commencement of regrading.

De Beers will prepare an Erosion and Sedimentation Plan and will monitor and collect samples should erosion and sedimentation be identified, and to confirm that mitigation was successful. It does not make sense to identify specific, geo-referenced stations in advance of the works. Thus, these should not be SNP stations within a Schedule of the Water Licence. This should entail monitoring under the Plan when and where the regrading is happening and if erosion/sedimentation is identified to confirm that the mitigation was successful. This is consistent with the approach taken in the Gahcho Kue water licence. The Gahcho Kue water licence does not include specific stations for erosion monitoring, but rather require erosion monitoring and reporting as per the management plan (Gahcho Kue MV2005L2-0015 Part G Item 11).

5.3 ARD and Geochemical Characterization Plan

A full review of the quantity of geochemical information collected, including the mineralogy and kinetic test results as developed for the EAR (De Beers 2002), geochemical results from operational monitoring, and review of seepage and water quality information for the entire site was all considered in determining the appropriate FCRP for the Mine, including the ARD potential and mitigation strategy of the North Pile.

De Beers and their geochemical consultants (who have been with the project since 1999) are intimately familiar with all of the geochemical data, and have the greatest stake (including both reputational risk and financial risk) in developing the correct conclusions and predictions with respect to acid generation. We consider that the geochemical characterization information provided and referenced is both comprehensive and suitable for determination of acid rock drainage and geochemical evaluation of

expected water quality from the North Pile and that the predictions are reasonable and conservative based on the full dataset available.

In the closing argument from the GNWT (Section 7.3), they amended the recommendation for the ARD and Geochemical Characterization and Management Plan. They recommended additional items be added to Schedule 4, Condition 3 of the water licence. A management plan should include how samples are to be collected and analyzed for future reporting, mitigation, and adaptive management. It should not include detailed discussion and analyses of data or calculations to support conclusions. These additional items are outside the scope of a management plan and should not be added to the condition.

The style and expected content of ongoing data reporting will however be described within the management plan, and many, if not all of the suggested items will be covered off during reporting, as data is collected from the site.

De Beers has always followed, and is committed to continue to follow industry standard practice in the definition and management of ARD as is defined in several well vetted, industry standard practice documents including INAP (2009), MEND (2009), Price (1997), and DIAND (1992). These documents outline appropriate evaluation, calculation and management strategies. Repeating all of these strategies and methods in detail in the ARD and Geochemical Characterization and Management Plan document is inappropriate and unwarranted, when an appropriate reference to these documents will suffice.

5.4 Toxicity Modifying Factors

In the closing argument from GNWT (Section 5.3), they have recommended that hardness be artificially constrained, in the application of the AEMP benchmark equation, to not exceed the hardness in Snap Lake at the start of closure. Although we understand that GNWT has adopted a policy position regarding the use of anthropogenically influenced modifying factors, De Beers maintains its position, based on science and toxicology, that the pertinent hardness for use in the AEMP benchmark calculation, is the hardness synoptic with the measured concentration (e.g., nitrate, chloride, sulphate) at the time of sampling. De Beers maintains that as a general default procedure, the toxicity modifying factors should be relevant to the actual water composition and not artificially constrained to non-anthropogenic levels.

6. CLOSING

This Mine is the first of several diamond mines in the NWT to close. To investors, closing of a Mine is just as important as opening of a mine. As noted at the Public Hearing in November 2019, future investors are wondering if they should invest in the NWT or if they are likely to be saddled with licence conditions that are not evidence based, not reasonably achievable, and could impose undue financial burden. The newly elected Territorial Government noted there were concerns with the future of the exploration and mining industry in the GNWT and stressed that there needs to be increased investor confidence to enable the future of the mining industry.

De Beers is seeking a renewed water licence that aligns with the planned closure and reclamation activities of the Mine and allows for flexibility. Mines are always changing, whether due to changing economic,

market, commodity, and/or environmental conditions. De Beers is seeking a term of the next water licence that allows for future adjustments without overly burdensome and lengthy amendments and processes.

De Beers is committed to the safe, responsible, and environmentally sound closure of the Mine. We request the Board approves the renewal application, including the proposed EQC because they are evidence based, protective of the environment, and will allow for Closure objectives to be met, and for Closure activities to proceed.

De Beers would like to thank the MVLWB, its staff, and all of the Interveners on the FCRP, Water Licence, and Land Use Permit process for their efforts to review and provide recommendations. We are appreciative of the contributions made through this process and we feel that the resulting application package is well founded in evidence, protective of the environment, and aligned with the MVLWB guidance on closure.

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