

DE BEERS

GROUP OF COMPANIES

Gahcho Kué Mine

**March 2018 Water Licence Amendment
Applications (MV20015L2-0015
and MV2005C0032)**

**Government of Northwest Territories
Intervention Responses**

July 2018

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1 INTRODUCTION

De Beers Canada Inc. (De Beers) submitted a Water Licence (WL) and Land Use Permit (LUP) Amendment Application Package to the Mackenzie Valley Land and Water Board (MVLWB) for the Gahcho Kué Mine on March 15, 2018, to amend the existing WL (MV2005L2-0015) and LUP (MV2005C0032).

The WL and LUP amendments are required to accommodate necessary changes to the mine plan resulting from a geotechnical issue within the pits (i.e. joint sets) that will result in additional mine rock to be extracted from each of the three pits. It is not possible to mine the ore bodies safely without making these adjustments. The additional mine rock must be extracted in order to ensure the pits remain safe for workers and equipment throughout the life of mine. It is expected that up to 100 Mt of additional mine rock may be removed. This mine rock will be stored on the West Mine Rock Pile resulting in a small increase in the footprint of the project. Most of the increase in the size of the West Mine Rock Pile will be within the water management pond, an area already designated for disturbance. Adjustments to the mine schedule and water management will also be required.

Review comments on the Amendment Application and the associated documents were received on May 8, 2018, and De Beers provided responses to these review comments on May 21, 2018. Following this, as part of the MVLWB permitting and licencing process, De Beers participated in a Technical Session held in Yellowknife on May 30 and 31, 2018.

On June 27, 2018, Government of the Northwest Territories (GNWT) submitted their final intervention (GNWT, 2018) for the WL and LUP Amendments containing recommendations on the remaining topics of concern. The following provides responses to those recommendations outlined in the GNWT intervention, with the intent of resolving the remaining topics of concern prior to the Public Hearing scheduled for July 25 to 26, 2018.

2 RECOMMENDATIONS AND RESPONSES

2.1 Lake N11

2.1.1 Chloride

2.1.1.1 GNWT Recommendation 2.1.1

GNWT has no concern with the proposed increase for chloride EQCs to 300 mg/L maximum average and 515 mg/L maximum grab. However, if monitoring results indicate that the chloride concentration exceed 120 mg/L at the edge of the mixing zone, the EQCs will need to be reduced accordingly.

2.1.1.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.2 Fluoride

2.1.2.1 GNWT Recommendation 2.1.2

GNWT has no concern with the proposed increase in EQC for fluoride to 1.5 mg/L maximum average and 3.0 mg/L maximum grab.

ENR supports De Beers' proposed fluoride SSWQO of 1.5 mg/L.

2.1.2.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.3 Sulphate

2.1.3.1 GNWT Recommendation 2.1.3

GNWT has no concern with the proposed reduction of the EQC for sulphate to 100 mg/L maximum average and 155 mg/L maximum grab.

2.1.4 Nitrate

2.1.4.1 GNWT Recommendation 2.1.4

GNWT is concerned that the nitrate increase relies upon anthropogenically induced hardness. However, the GNWT could support the requested increase provided De Beers reconfirmed its efforts to reduce nitrate in the WMP and continued progress on addressing blast residue as part of the nitrate response plan.

2.1.4.2 Proponent Response

De Beers is committed to reducing the nitrate loading to the water management pond (WMP). De Beers recommends that the best place to address nitrogen management processes is within the Explosives Management Plan. De Beers will update the Explosives Management Plan to include the management measures undertaken to reduce nitrate loadings to the WMP.

2.1.5 Ammonia

2.1.5.1 GNWT Recommendation 2.1.5

GNWT has no concerns with the reduction in EQC for ammonia.

2.1.5.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.6 Phosphorus

2.1.6.1 GNWT Recommendation 2.1.6

GNWT has no concerns with the reduction in EQC for phosphorus. GNWT will continue to provide feedback through the AEMP to ensure phosphorus and nitrate concentrations and nutrient enrichment action levels and responses are appropriate.

2.1.6.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.7 Aluminum

2.1.7.1 GNWT Recommendation 2.1.7

GNWT has no concern with the proposed increase of the EQC for aluminum to 0.23 mg/L maximum average and 0.35 mg/L maximum grab.

2.1.7.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.8 Copper

2.1.8.1 GNWT Recommendation 2.1.9

GNWT has no concern with the proposed increase to the EQC for copper of 0.004 mg/L maximum average and 0.007 mg/L maximum grab.

2.1.8.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.9 Iron

2.1.9.1 GNWT Recommendation 2.1.10

GNWT has no concern with the proposed increase to the EQC for iron to 0.6 mg/L maximum average and 1.0 mg/L maximum grab.

2.1.9.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.1.10 Molybdenum

2.1.10.1 GNWT Recommendation 2.1.11

GNWT has no concern with De Beers' request to remove molybdenum from the EQC list at this time. Concentrations should still be collected as part of the SNP.

2.1.10.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.2 Nickel

2.2.1.1 GNWT Recommendation 2.1.12

GNWT has no concern with De Beers' request to remove nickel from the EQC list at this time. Concentrations should still be collected as part of the SNP.

2.2.1.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.2.2 Uranium

2.2.2.1 GNWT Recommendation 2.1.13

GNWT has no concern with De Beers' request to remove uranium from the EQC list at this time. Concentrations should still be collected as part of the SNP.

2.2.2.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.2.3 Discharging beyond Year 4

2.2.3.1 GNWT Recommendation 2.1.14

Given that multiple parameters are predicted to be above EQC and SSWQO, GNWT recommends that approval of Year 5 discharge not be granted at this time.

2.2.3.2 Proponent Response

As per De Beers' response to IR #3 from the Water Licence amendment Technical Sessions, the updated water quality modelling for the WMP indicates that effluent quality criteria (EQC) proposed for discharge to Lake N11 are projected to be achievable in Year 5 (2021) for all EQC parameters, with the exception of chloride, nitrate, total phosphorus, and total chromium. However, the response showed that if EQC are met in Year 5 (2021), and in each subsequent year of Mine operations through to the end of Mine life, and discharges occur at the maximum average concentration (MAC) EQC, site specific water quality objectives (SSWQO) will continue to be met in Lake N11 for all EQC parameters, with a few exceptions; the exceptions are total phosphorus, total aluminum, total chromium, total copper, and total iron, which are predicted to briefly occur at concentrations slightly higher than their respective SSWQO during under ice conditions. These short duration under-ice peak concentrations are attributed to the assumption that ice formation results in complete salt rejection (including nutrients and metals) from the volume of water that freezes into the underlying volume of water below the ice. As under-ice peak concentrations are only slightly higher than their respective SSWQOs and persist for a short duration, De Beers considers the risk of any potential adverse effects to be low.

De Beers is therefore requesting that the EQC proposed for discharge to Lake N11 in the EQC Report (De Beers 2018) included as Attachment 3 to the Water Licence amendment application remain applicable for the life of Mine. De Beers will not discharge if EQC are not met. However, should EQC be met in the WMP beyond Year 4 (2020 Calendar Year), De Beers should be permitted to discharge. De Beers requires more operational flexibility to discharge to Lake N11, with the security that in doing so the receiving environment would remain protected.

Allowing the discharge to extend beyond Year 4 in the Water Licence limits the need and the associated effort of De Beers, the MVLWB, and other stakeholders to go through a subsequent Water Licence amendment process within the next few years. Furthermore, this may alleviate any potential operational constraints in water management in the latter period of Mine life should water management become an issue (e.g., water storage capacity is less than projected due to several years of well above average wet conditions, an extension of the life of Mine) while EQC are met in the WMP.

2.3 Area 8

2.3.1 Water Management Discharge into Area 8

2.3.1.1 GNWT Recommendation 2.2.1

ENR recommends that a single set of EQC be included in the Water Licence that is applicable to all discharges from Area 7 into Area 8. These are noted in Table 2 of De Beers June 20th response, as follows:

Parameters of Potential Concern	Effluent Quality Criteria	
	Maximum Average Concentration	Maximum Grab Concentration
Chloride, mg/L	100	200
Fluoride, mg/L	1	2
Nitrate, mg N/L	4	8
Total phosphorus, mg P/L	0.009	0.018
Total aluminum, mg/L	0.083	0.17
Total cadmium, mg/L	0.00004	0.00008
Total chromium, mg/L	0.001	0.002
Total copper, mg/L	0.002	0.003

mg/L = milligrams per litre; N = nitrogen; P = phosphorus.

2.3.1.2 Proponent Response

De Beers requests that two set of EQC for Area 7 discharge to Area 8 be written into the amended Water Licence: primary EQC for Area 7 for water that collects in Area 7 from natural sub-watershed runoff; and a contingency set of EQC, which would be triggered in the event that any water from the WMP is transferred to Area 7.

De Beers is proposing the same EQC for Area 7 discharge as presented in the EQC Report (De Beers 2018) as the primary EQC for Area 7 discharge (EQC would be limited to copper; refer to attachment 3 of the Water Licence amendment application), which would apply for the life of Mine. The EQC for copper would be applicable to Area 7 discharge that is representative of water that accumulates in Area 7 as a result of the natural sub-watershed runoff. The water that drains to Area 7 will primarily be made up of natural watershed runoff and a proportion of drainage from the South Mine Rock Pile and stockpile pad. The refill period for Area 7 from this sub-watershed runoff is relatively slow, so planned discharge from Area 7 as an alternate to piped discharge from Lake N11 for downstream flow mitigation is limited to approximately four years over the remainder of the Mine life. This strategy for Area 7 and its use is part of the water management plan under the Water Licence amendment.

Under the water management plan, however, the option to transfer water from the WMP to Area 7, if required (e.g., water storage capacity was higher than projected due to extended periods of wet conditions, available pit space for water transfer from the WMP

was later than planned), is listed as a contingency. In the event this contingency is triggered, De Beers would then apply the contingency EQC as listed in the table presented above. These EQC were developed as part of the response to IR #1 from the Technical Sessions for the Water Licence amendment (Table 1-9 of the response) submitted to the MVLWB on June 20, 2018. As the contingency option is not proposed under normal operations of the Mine, these EQC are only required unless the contingency use of Area 7 for the storage of WMP water is necessary. De Beers, therefore, does not consider it appropriate to have this full list of EQC in the Water Licence for discharge from Area 7 that is composed entirely of Area 7 watershed runoff under the water management plan.

2.3.2 Copper

2.3.2.1 GNWT Recommendation 2.2.2a

GNWT is concerned that copper may exceed the SSWQO in Area 8. The GNWT could support the EQC for copper provided De Beers continue to review copper concentrations and evaluate effects via the AEMP.

2.3.2.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT, and through the AEMP, will continue to review measured copper concentrations and the condition of the aquatic biota in the receiving environment to evaluate potential effects.

2.3.2.3 GNWT Recommendation 2.2.2b

GNWT will continue to provide review feedback through the AEMP regarding copper and appropriate action levels and management response actions.

2.3.2.4 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.3.3 Phosphorus

2.3.3.1 GNWT Recommendation 2.2.3

GNWT will continue to provide feedback through the AEMP to ensure phosphorus and nutrient enrichment action levels and responses are appropriate for Area 8.

2.3.3.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.4 Surveillance Network Program

2.4.1 Amendments to SNP-02 and SNP-04

2.4.1.1 GNWT Recommendation 2.3.1a

GNWT recommends the following re-wording of condition Part G, Item 29 of the Water Licence proposed by De Beers:

“The Licensee shall provide water sampling results to an Inspector from the SNP stations ~~currently active within the~~ **closest to the intake location in the** Water Management Pond **or Area 7** to determine the ability for the water to meet Effluent Quality Criteria during discharge to N11 **or Area 8** no later than five (5) days prior to any planned Discharge to the Receiving Environment. Discharge shall not commence until authorized in writing by an Inspector.”

2.4.1.2 Proponent Response

The proposed wording by GNWT for condition Part G, Item 29 of the Water Licence is acceptable to De Beers. De Beers appreciates the support for increased flexibility regarding the inclusion of additional pre-discharge samples from proximate SNP stations in the WMP or Area 7 for consideration by the Inspector prior to discharge, if required.

2.4.1.3 GNWT Recommendation 2.3.1b

GNWT recommends that the monitoring results provided to the Inspector prior to discharge should include all parameters for which applicable EQC exist, as well as any required toxicity testing outlined in the Water Licence.

2.4.1.4 Proponent Response

De Beers agrees to this recommendation from the GNWT.

2.5 Water Use

2.5.1 Water Use – 45,000 m³

2.5.1.1 GNWT Recommendation 5.1

GNWT has no concern with De Beers request to increase annual water use to 45,000 m³/year from Area 8.

2.5.1.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.5.2 Discharge Limits into Lake N11

2.5.2.1 GNWT Recommendation 5.2

GNWT supports De Beers request that additional sampling not be required on the anniversary date of the Water Licence. Regular monitoring should occur during discharge periods.

2.5.2.2 Proponent Response

De Beers acknowledges this recommendation from the GNWT.

2.6 Other Amendments

2.6.1 Definition of Modification

2.6.1.1 GNWT Recommendation 6.1

GNWT recommends that the definition not be changed.

2.6.1.2 Proponent Response

De Beers stands by its request for an amendment to the term 'modification' under Part A of the Water Licence, such that the definition of modification omits the exclusion of expansion.

As per the submission to the Board from De Beers (De Beers, 2018), the rationale for the request is based on recent Board decisions (i.e., Land Use Amendment #2; MVLWB June 7, 2017 – MV2005C0032 Reasons for Decision) where the increase in size (or expansion) of several internal dykes at the Mine (Dykes D, A1, and L) were considered modifications. De Beers is in agreement with this decision, which is consistent with De Beers' opinion that in order to maintain consistency in the interpretation and understanding of modifications, expansion of approved site infrastructure, including dykes, where the change does not alter the intent, purpose, or function of the structure, should be classified as a modification.

Expansion to existing structures are often required to address site-specific requirements, which generally results in an increase in the size of a structure. The increase in size appears to be the critical aspect of the Water Licence requiring advance approval from the Board to undertake this work. Under the current definition, therefore, it would appear that there would be very few, if any, adjustments to approved structures that could be addressed as modifications under the current licence without the amendment to the definition of the term, 'modification'. The conditions associated with Modifications (Part F, Item 1) provide the appropriate level of responsibility by De Beers and Board oversight for expansions to approved site infrastructure.

3 REFERENCES

De Beers (De Beers Canada Inc.) 218. Water License (MV2005L2-0015) and Lane Use Permit (MV2005C0032) Amendment Applications. Submitted to Mackenzie Valley Oland and Water Board March 18, 2018

GNWT (Government of the Northwest Territories). 2018. Technical Intervention for De Beers Canada Mining Inc. Gahcho Kué Diamond Mine Water Licence Amendment MV2005L2-0015.

Golder (Golder Associates Ltd.). 2018. Gahcho Kué Mine – Water Quality Model Updates. Prepared for De Beers Canada Inc. March 2018.