



November 3, 2016

File: MV2005L2-0015

Ms. Sarah McLean  
De Beers Canada Inc.  
Gahcho Kué Project  
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YELLOWKNIFE NT X1A 1P8

Email: [Sarah.McLean@debeersgroup.com](mailto:Sarah.McLean@debeersgroup.com)

Dear Ms. McLean:

**Board Decision on Rock Placement Verification Program Report  
Water Licence MV2005L2-0015**

The Mackenzie Valley Land and Water Board (MVLWB or the Board) met on November 3, 2016 and reviewed the Rock Placement Verification Program Report in accordance with Part E, item 7 of Water Licence MV2005L2-0015.

The Board hereby approves the Rock Placement Verification Program Report as an interim Report and requires the resubmission of a revised Report by **November 17, 2016**. This revised Report shall include the changes that are outlined in the attached Reviewer Comment Summary Table. The revised Report will be reviewed by Board staff to ensure conformity. If De Beers requires additional time to complete the changes, please provide an alternate date and rationale.

The Board requires De Beers to update the Standard Operating Procedure, as per Part E, item 8 of the Licence, to provide further details of protocols for the selection, storage, preparation, and analysis of mine rock and determination of PAG material. It is recommended that the MEND Report 1.20.1, 2009 (<http://www.abandoned-mines.org/pdfs/MENDPredictionManual-Jan05.pdf>) be reviewed for guidance on selection, storage and preparation of samples. The revised Standard Operating Procedure shall be submitted for Board approval by **November 17, 2016**. This information is to also be included in the revised Rock Placement Verification Program Report. If De Beers requires additional time to complete the updates, please provide an alternate date and rationale.

The Board notes that upon approval of the Rock Placement Verification Program Report, De Beers is required to submit a revised Project Reclamation liability estimate as per Part C, item 5 of Water Licence MV2005L2-0015. As such, the Board requests that De Beers submit the revised estimate, for approval, by **May 17, 2017**. If De Beers requires additional time to submit the revised estimate, please provide an alternate date and rationale.

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The full cooperation of De Beers is anticipated and appreciated. If you have any questions or concerns, please contact Angela Love at (867) 766-7456 or email [angela.love@mvlwb.com](mailto:angela.love@mvlwb.com).

Yours sincerely,

A handwritten signature in black ink, appearing to read "F. M. Adlem". The signature is fluid and cursive, with a long horizontal stroke at the end.

Floyd Adlem  
MVLWB, A/Chair

Attachment: Reasons for Decision  
Reviewer Comment Summary Table

Copied to: Distribution List

## Review Comment Table

<b>Board:</b>	MVLWB
<b>Review Item:</b>	De Beers Gahcho Kue - Rock Placement Verification Program Report (Version 1) (MV2005L2-0015)
<b>File(s):</b>	<a href="#">MV2005L2-0015</a>
<b>Proponent:</b>	De Beers Canada Inc - Gahcho Kue
<b>Document(s):</b>	<a href="#">Rock Placement Verification Program Report</a> (2 MB) <a href="#">Addendum to Rock Placement Verification Program Report</a> (357 KB)
<b>Item For Review Distributed On:</b>	Apr 26 at 10:51 <a href="#">Distribution List</a>
<b>Reviewer Comments Due By:</b>	July 15, 2016
<b>Proponent Responses Due By:</b>	July 22, 2016
<b>Item Description:</b>	<p><b>JUNE 27, 2016 UPDATE:</b> An Addendum to the Rock Placement Verification Program Report was submitted (document attached to the section below). There is additional information on Acid Base Accounting laboratory results which were originally pending at the time of submittal of the Report, that have since been received. The review process is being reopened to allow for a review of this new information.</p> <p><b>JUNE 2, 2016 UPDATE: An extension to the proponent response deadline has been granted to June 23, 2016 as requested.</b></p> <p>De Beers Gahcho Kue has submitted a Rock Placement Verification Program Report (Version 1) to satisfy the requirements of Part E, item 7 of their Water Licence MV2005L2-0015.</p> <p>Please submit comments using the Online Review System by downloading the excel comment table or using the "add comment" button.</p> <p>If you have any questions or comments regarding this Report or using the Online Review System, please contact Angela Love at 867-766-7456 or <a href="mailto:angela.love@mvlwb.com">angela.love@mvlwb.com</a>.</p>
<b>General Reviewer Information:</b>	<p>This information has also been distributed by fax to:</p> <p>Fort Resolution Métis Council Trudy King fax: (867)394-3322; <a href="mailto:Fieldworker.frmc53@northwestel.net">Fieldworker.frmc53@northwestel.net</a></p> <p>Hay River Metis Council Karen Lafferty President fax: (867)874-4472; <a href="mailto:hrc@northwestel.net">hrc@northwestel.net</a></p> <p>NWT Metis Nation Tim Heron NWTMN IMA Coordinator fax: (867)872-3586; <a href="mailto:rcc.nwtmn@northwestel.net">rcc.nwtmn@northwestel.net</a></p>
<b>Contact Information:</b>	<p>Angela Love 867-766-7456 Jen Potten 867-766-7468 Kierney Leach 867-766-7470</p>

## Comment Summary

De Beers Canada Inc - Gahcho Kue (Proponent)				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	<p><b>Comment</b> (<a href="#">doc</a>) Addendum to Rock Placement Verification Program Report dated April 2016 for Gahcho Kué Mine, NT</p> <p><b>Recommendation</b></p>		N/A
GNWT - ENR: Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
4	General File	<p><b>Comment</b> (<a href="#">doc</a>) ENR Letter with Comments and Recommendations</p> <p><b>Recommendation</b></p>		N/A
1	Topic 1: Verification of PAG Segregation and Placement	<p><b>Comment</b> Section 3.7 notes that some non-PAG material had to be placed in Zone 2, designated for PAG material, due to operational requirements. Specific details surrounding this rock placement are not provided. ENR seeks some information on the amount of rock placed in Zone 2, the purpose of placing non-PAG rock in Zone 2 and any implications for this rock placement, such as, the impact to available PAG rock storage volume or if the volume of PAG rock is anticipated to exceed the normal water level of Kennady Lake.</p> <p><b>Recommendation 1)</b></p>	<p><b>June 23:</b> Material is sampled prior to blasting. Once material has been blasted, it needs to be moved out of the 5034 pit to keep the excavation work moving forward. It may take up to 1 week for samples to arrive at the lab and additional time for results to be available. If material needs to be moved out of the open pit before results are available, it is placed in the PAG storage as a conservative measure. The total amount of material placed in Zone 2 as of February 2016 is 1,207,850 tonnes. Based on truck counts, approximately 802,629 tonnes of this material is non-PAG material placed between September 2014 and the end of February 2016. We have</p>	<p>Noted.</p> <p>De Beers shall update Section 3.7 with this additional information (clarification on the placement of non-PAG material into Zone 2) and resubmit the Rock Placement Verification Program Report.</p>

	<p>ENR requests clarification on the placement of non-PAG material into Zone 2, including:</p> <ul style="list-style-type: none"> <li>- Background on operational requirements that resulted in the placement;</li> <li>- Quantities of non-PAG material that was placed in Zone 2; and</li> <li>- Potential implications on PAG material storage in Zone 2.</li> </ul>	<p>examined the remaining potential capacity for PAG storage in SMRP and confirmed that there is sufficient capacity.</p> <p><b>September 16:</b> There is a total of 44.9 Mt of storage capacity within the SMRP remaining, 39 Mt of which is available space for PAG. This equates to 87% of the dumps total capacity.</p> <p>In comparison, we are predicting a total PAG volume of 3.4 Mt to be encountered during the remaining life of the South Mine Rock Pile. In other words, we have ten times more capacity for PAG storage than we require within the pile.</p> <p>All calculations were created using GEOVIA GEMS 6.7.2.1, 2015.</p> <p>In order to calculate the volume of PAG storage remaining within the SMRP, a dump shell was created by setting the parameters as follows:</p> <ul style="list-style-type: none"> <li>a) a 15 m offset inside the original design dump shell</li> <li>b) a minimum elevation for PAG at 421.5 (0.8 m higher than ordinary high water mark of 420.7 m)</li> <li>c) subtracting the volume already placed within the pile</li> <li>d) assuming no PAG in the final lift</li> </ul> <p>The expected volume of PAG to be encountered during the remainder of the life of the South Mine Rock Pile was calculated by taking the total volume of material expected</p>	
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			and multiplying that by the 7.5%.	
2	Topic 2: Proportion of PAG Material	<p><b>Comment</b> The Report states that of the total of 1,002 confirmatory samples from pre-excavation sampling that have been analyzed for Total Sulphur, 62 were classified as PAG, or 6.2%, which is below the estimate of 7.5%. However, ENR notes that of the samples taken from the South Mine Rock Pile outlined in Section 3.7.2, 17% of the samples were PAG. At this time, the overall percentage of PAG rock that has been encountered to date is unclear. ENR notes that a higher proportion of samples (37%) were collected from Zone 2 which may not be representative of the amount of PAG rock on site. However, it may be that a larger area of PAG rock has been encountered during the initial stages of construction. This may have implications for rock handling and storage and may impact the proposed disposal method of placing rock below the normal water mark within the rock piles. Other options such as segregation may need to be considered if the trend indicates more PAG rock than anticipated in rock pile</p>	<p><b>June 23:</b> The sampling for PAG material prior to blasting resulted in 6.2% of the samples being classified as PAG. This is the overall percentage of PAG rock encountered to date within the 5034 pit. To clarify the total amount of material classified as PAG is 6.2% based on the confirmatory sampling. Sampling of the South rock mine rock pile was designed to confirm the correct placement of PAG material in Zone 2 hence it would be expected that a greater proportion of the samples in zone 2 should be classified as PAG.</p>	<p>Noted.</p> <p>De Beers shall update Section 3.3.1 and/or Section 3.7.2 with this additional clarification (clarify the total percentage of PAG rock that has been encountered) and resubmit the Rock Placement Verification Program Report.</p>

		<p>designs.</p> <p><b>Recommendation 1)</b> ENR requests that De Beers clarify the total percentage of PAG rock that has been encountered thus far into construction and if this percentage aligns with the anticipated amount of PAG rock that has been included in rock pile designs (i.e. 7.5%).</p>		
3	None	<p><b>Comment</b> None</p> <p><b>Recommendation 2)</b> ENR requests that De Beers clarify if a larger area of PAG rock has been encountered, or if a larger area of PAG rock has exists in the rock pile to date.</p>	<p><b>June 23:</b> The area of PAG material that has been encountered within the 5034 pit is within the predicted ranges. Additional materials have been treated as PAG when lab results have been unavailable prior to excavation.</p>	Noted.

**GNWT - ENR: Monica Wendt**

<b>ID</b>	<b>Topic</b>	<b>Reviewer Comment/Recommendation</b>	<b>Proponent Response</b>	<b>Board Response</b>
1	1 - Acid-Base Accounting (ABA) Results	<p><b>Comment</b> (<a href="#">doc</a>) De Beers Gahcho Kué has submitted an addendum to the Rock Placement Verification Program Report which provides on Acid Base Accounting laboratory results. Of the three (3) samples from the South Mine Rock Pile submitted for ABA analysis, two (2) samples reported Neutralization Potential Ratio (NPR) Sobek values of 2.07 and 2.67. This would suggest that the samples are not PAG but some of the results are only marginally greater</p>	<p><b>July 22:</b> De Beers will continue to conduct performance monitoring as per the approved Geochemical Characterization Plan V.3 and consistent with Schedule 4, Part E of the Water license. This performance monitoring includes sampling from the drill hole cuttings at a frequency of 8 samples per 100,000 t of rock. Additionally, De Beers will continue to conduct a bi-annual audit of the storage areas of all solid-phase waste materials (e.g. mine rock, PK). These audits involve testing of material to confirm</p>	Noted.

	<p>that the "uncertain" limit. ENR notes that according to MEND 1.20.1 (Price 2009) that NPR values of less than 2.0 (i.e. between 1.0 and 1.9) would result in the classification of NPR as "uncertain". Rock that falls into this range is capable of generation acid rock drainage.</p> <p><b>Recommendation</b> ENR recommends that De Beers continue to conduct Acid-Base Accounting (ABA) assessments of the rock placed in the waste rock piles as part of the Rock Placement Verification Program, on a frequency outlined in Schedule 4, Part E of the Water Licence. ENR believes this is needed to ensure waste rock is appropriately handled and stored properly over the course of the operation. Further, ENR encourages De Beers to collect additional samples from South Mine Rock Pile to ensure NPR representation of the Pile is sufficient, specially around the zone in which the ABA results reported 2.07.</p>	<p>their acid-generating potential and any observed seepage or runoff around these facilities. Rock samples will be taken for assessment of ABA characteristics to confirm that materials were placed appropriately. The results of ongoing performance monitoring will be presented in the annual water license report. Additional sampling, beyond what is described within the Geochemical Characterization Plan, at the SMRP is not necessary as our results indicate that PAG is being placed within the pile appropriately and as per the approved plan.</p>	
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**MVLWB: Angela Love**

<b>ID</b>	<b>Topic</b>	<b>Reviewer Comment/Recommendation</b>	<b>Proponent Response</b>	<b>Board Response</b>
1	Section 1.3 Site Specific	<b>Comment</b> The criteria that has been established through	<b>June 23:</b> During Rock Placement verification sampling, three samples	Noted.



	Material Classification	<p>various programs for the classification of potentially acid generating (PAG) and Non-PAG rock is a total sulphur value of 0.1%. PAG rock is segregated into specified rock management areas whereas Non-PAG rock can be used for construction purposes. The Verification Program Report suggests that for those samples for which complete acid-base accounting (ABA) analyses are conducted, the rock classification also considers the neutralization potential ratio (NPR) and guidelines provided by MEND (Price, 2009); thus, the results of the ABA analyses could supersede the total sulphur criteria (page 2). <b>Recommendation</b> De Beers should provide the relevant data to the Board (and therefore the public record) for samples where the ABA analysis results are used to classify the rock, instead of the total sulphur criteria.</p>	<p>stored in the areas for non-PAG overburden, and non-PAG rock were found to contain total sulphur values at the limit of the criteria for the classification of PAG. These three samples were sent for Acid Base Accounting analysis. The results of this ABA are provided in the attached addendum to the Rock Placement Verification Report, and confirm that these samples are non acid generating consistent with their classification and placement as Non-PAG.</p>	
2	Section 3.3 PAG Identification Pre-Excavation Sampling	<p><b>Comment</b> Sampling of pre-excavation materials were noted to consist of approximately 1 kg collected over a 3 m interval which was subsequently split to create two identical</p>	<p><b>June 23:</b> Initially (from September 2014 to October 2015) a grab sample was collected from a 3 meter interval within the drillhole and this was subsequently expanded to a composite sample from the full length</p>	<p>Noted.  De Beers shall update Section 3.3 with this additional information (details as to exactly how the specific intervals are selected) and</p>

		<p>samples (page 7). Further it states that specific sample intervals varied hole to hole.</p> <p><b>Recommendation</b> De Beers should provide detail as to exactly how the specific intervals are selected and whether or not an entire 3 m interval is included in the sample or is it composited of smaller intervals within a 3 m section.</p>	<p>of the hole, as this is more representative and aligned with the SOP developed and submitted with the approved Geochemical Characterisation Plan.</p> <p><b>September 16:</b> As per Appendix A, Section A3 of the approved Geochemical Characterization Plan V.3 (De Beers, January 2015), samples consist of drill cuttings collected as composite grab samples from each hole. Samples are collected from the drill cuttings on surface around the drill collar at the end of drilling and before explosives are loaded into the hole. The sample is intended to represent the entire drill hole evenly. For further clarity, samples are not selected from specific increments within each hole, but rather from the hole as a single sampling unit. The purpose of the sampling is to representatively characterize the material slated for excavation, and not to identify individual fine pods of PAG material. The sampling program respects the limitations of the minimum mining units/bench sizes.</p>	<p>resubmit the Rock Placement Verification Program Report.</p>
3	<p>Table 1: Summary of Sample Areas and Material Classification - All Pre-Excavation Sampling</p>	<p><b>Comment</b> Table 1 provides a summary of sample numbers by pit bench.</p> <p><b>Recommendation</b> Because the sample frequency specified is based on a tonnage, De Beers should provide the</p>	<p><b>June 23:</b> Please see attached Addendum. An updated Table 1 is provided with quantities excavated per bench.</p>	<p>The quantities provided in the addendum indicate that sampling frequency has in general met the requirements of 8 samples per 100,000 tonnes excavated, though on a bench by bench basis, pit bench 411 fell short of this requirement. Care should be</p>

		tonnages against which the sample frequency can be compared.		taken to ensure the sampling frequency is obtained on each bench.
4	Section 3.3.2 PAG Zones and Data Trends	<p><b>Comment</b> It is noted that the report indicated an addendum to this report would be submitted with sample locations for ABA submitted samples shown on figures (page 8).</p> <p><b>Recommendation</b> In that addendum, De Beers should provide the ABA data on those samples submitted for more detailed testing which was not provided in this report. In addition, a specific discussion on those samples for which De Beers has proposed a re-classification based on ABA data should also be provided. It also appears that only samples initially classified as PAG are resubmitted for ABA analyses. De Beers should clarify whether any Non-PAG samples were submitted for full ABA analyses and if not, it would be prudent to do so in regular on-going characterization.</p>	<p><b>June 23:</b> See attached addendum which contains the requested information with respect to samples submitted from the SMRP for more detailed testing. For a discussion on the additional ABA testing, to confirm the correct placement of Non-PAG material see question MVLWB Question 1. We confirm that no Non-PAG samples have been submitted for further testing. As per Section 5.1 of the GK Geochemistry Characterization Plan, all materials with total sulphur values less than 0.1% are classified as non-PAG as per site specific criteria.</p> <p><b>September 16:</b> De Beers is confident that PAG zones are not being overlooked because 1) the samples collected from the south mine rock pile non-PAG zone were confirmed as non-PAG; 2) the samples taken from the infrastructure areas were confirmed as non-PAG, and 3) the step-out program provides additional cluster sampling around PAG zones to fully delineate those zones where they are encountered. 1) As part of the PAG Verification Study, 38 samples were collected from Zone 3 of the SMRP, which is to contain only non-PAG material. Thirty seven of the 38 samples contained less than 0.1 S% total Sulphur and</p>	<p>Noted.</p> <p>De Beers shall update Section 3.3.2 with this additional information (detailing the approach used to not conduct a step out sampling for non-PAG and how this approach provides the confidence that PAG zones are not being overlooked) and resubmit the Rock Placement Verification Program Report.</p>

		<p>were therefore classified as Non-PAG. Sample SMRPZ3-11 had a total Sulphur concentration of 0.1 S%. However, additional ABA data showed that this sample was Non-PAG based on the Sobek NPR value. Therefore all 38 samples were confirmed as Non-PAG. If PAG material had been overlooked then PAG samples would have been identified in the non-PAG zone of the SMRP.</p> <p>Additionally, as part of the Bi-Annual audit inspections, infrastructure components across the project site were sampled to confirm that Non-PAG material only was used in construction as intended. The results of that Bi-Annual Audit confirmed that all samples were in fact non-PAG. Again, if PAG material had been overlooked in the original sampling, PAG samples would have been identified in the bi-annual audit sampling.</p> <p>Finally, additional sampling conducted through the step-out program ensures that PAG zones are fully delineated when encountered. The step-out sampling program is intended to ensure that PAG zones, when encountered through the general sampling program, are fully delineated, and also that non-PAG material in proximity to PAG material is not unnecessarily stored in</p>	
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			<p>PAG areas. It is a form of cluster sampling well suited to detect non-randomly distributed, or clustered material. If we were to also conduct a step-out program in non-PAG areas, this would be equivalent to increasing the sampling frequency everywhere, which would not be appropriate for a non-randomly distributed sample such as PAG. Given there is no evidence to indicate that PAG zones have been misclassified (i.e. PAG has not been found in non-PAG deposition areas), there no reason to increase the overall general frequency of sampling beyond the 8 samples per 100,000 t of rock that we are currently required to conduct as per our approved Geochemical Characterization Plan (Section 6.4). De Beers is confident the current sampling program is sufficient to detect, delineate, and properly store PAG at site.</p>	
5	<p>Section 3.4 Focused Sampling Program with Increased Sampling Density</p>	<p><b>Comment</b> De Beers indicates that as of the beginning of December 2015 step out sampling has not been undertaken (page 9). <b>Recommendation</b> De Beers should clarify whether the areas defined as PAG extend to the nearest Non-PAG sample as stated (page 9) or as half-way between the PAG sample and the nearest Non-PAG sample as</p>	<p><b>June 23:</b> PAG extents are stretched half way between the nearest NAG sample and the respective PAG sample. This method is only deviated from when additional delineation drilling is conducted.</p>	<p>Noted.  De Beers shall update Section 3.4 with this additional clarification (clarifying the extent to which the areas of PAG extend to) and resubmit the Rock Placement Verification Program Report.</p>

		indicated on figures provided (Figures 2 to 4).		
6	3.4.1 Step Out Program Sampling Areas in 2014 and 2015	<p><b>Comment</b> Step out sampling, when conducted, was completed only in those zones where PAG results were returned and increased the sampling frequency from 1 sample in 12,500 tonnes to anywhere between 2 and 13 samples per 12,500 tonnes with the result that smaller areas of PAG zones could be delineated. It appears there was no similar step out sampling work conducted in Non-PAG zones.</p> <p><b>Recommendation</b> De Beers should conduct step out sampling in Non-PAG zones to assess whether or not there could be PAG zones between sampling points that were not captured in the existing sampling frequency.</p>	<p><b>June 23:</b> The PAG verification program has confirmed that our current level of testing in accordance with the board approved SOP is adequate as no PAG material has been found in non-PAG storage areas or construction materials. As such no additional step out sampling within the areas confirmed as NAG is required.</p> <p><b>September 16:</b> De Beers is confident that PAG zones are not being overlooked because 1) the samples collected from the south mine rock pile non-PAG zone were confirmed as non-PAG; 2) the samples taken from the infrastructure areas were confirmed as non-PAG, and 3) the step-out program provides additional cluster sampling around PAG zones to fully delineate those zones where they are encountered. 1) As part of the PAG Verification Study, 38 samples were collected from Zone 3 of the SMRP, which is to contain only non-PAG material. Thirty seven of the 38 samples contained less than 0.1 S% total Sulphur and were therefore classified as Non-PAG. Sample SMRPZ3-11 had a total Sulphur concentration of 0.1 S%. However, additional ABA data showed that this sample was Non-PAG based on the Sobek NPR value. Therefore all 38 samples were</p>	<p>Noted.</p> <p>De Beers shall update Section 3.3.2 with this additional information (detailing the approach used to not conduct a step out sampling for non-PAG and how this approach provides the confidence that PAG zones are not being overlooked) and resubmit the Rock Placement Verification Program Report.</p>

		<p>confirmed as Non-PAG. If PAG material had been overlooked then PAG samples would have been identified in the non-PAG zone of the SMRP.</p> <p>Additionally, as part of the Bi-Annual audit inspections, infrastructure components across the project site were sampled to confirm that Non-PAG material only was used in construction as intended. The results of that Bi-Annual Audit confirmed that all samples were in fact non-PAG. Again, if PAG material had been overlooked in the original sampling, PAG samples would have been identified in the bi-annual audit sampling.</p> <p>Finally, additional sampling conducted through the step-out program ensures that PAG zones are fully delineated when encountered. The step-out sampling program is intended to ensure that PAG zones, when encountered through the general sampling program, are fully delineated, and also that non-PAG material in proximity to PAG material is not unnecessarily stored in PAG areas. It is a form of cluster sampling well suited to detect non-randomly distributed, or clustered material. If we were to also conduct a step-out program in non-PAG areas, this would be equivalent to increasing the sampling frequency</p>	
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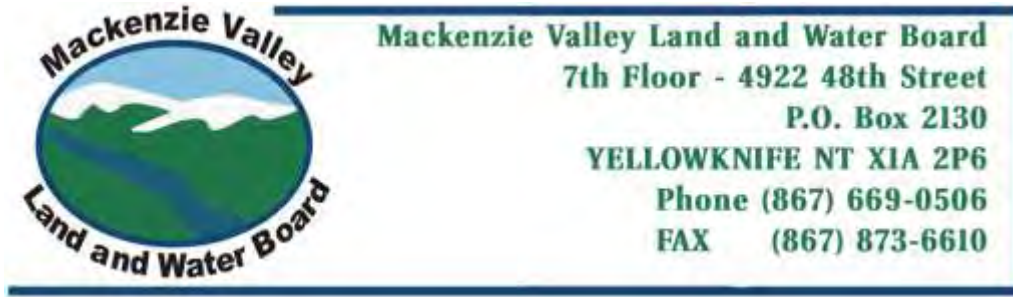
			<p>everywhere, which would not be appropriate for a non-randomly distributed sample such as PAG. Given there is no evidence to indicate that PAG zones have been misclassified (i.e. PAG has not been found in non-PAG deposition areas), there no reason to increase the overall general frequency of sampling beyond the 8 samples per 100,000 t of rock that we are currently required to conduct as per our approved Geochemical Characterization Plan (Section 6.4). De Beers is confident the current sampling program is sufficient to detect, delineate, and properly store PAG at site.</p>	
7	<p>Table 2: Areas Delineated as PAG Based on Step-Out Program Sampling</p>	<p><b>Comment</b> The areas delineated as PAG without step out sampling are significantly greater than those with step out sampling (Table 2). <b>Recommendation</b> De Beers should confirm that there is sufficient capacity for this excess volume that can be accommodated?</p>	<p><b>June 23:</b> Refer to GNWT ENR Question 1</p> <p><b>September 16:</b> There is a total of 44.9 Mt of storage capacity within the SMRP remaining, 39 Mt of which is available space for PAG. This equates to 87% of the dumps total capacity. In comparison, we are predicting a total PAG volume of 3.4 Mt to be encountered during the remaining life of the South Mine Rock Pile. In other words, we have ten times more capacity for PAG storage than we require within the pile. All calculations were created using GEOVIA GEMS 6.7.2.1, 2015. In order to calculate the volume of PAG storage</p>	<p>Noted.</p> <p>De Beers shall update Section 3.7 with this additional information (details on the calculations used to determine the remaining capacity for PAG storage, confirming that there is sufficient capacity for this volume to be accommodated) and resubmit the Rock Placement Verification Program Report.</p>



			<p>remaining within the SMRP, a dump shell was created by setting the parameters as follows:</p> <ul style="list-style-type: none"> <li>a) a 15 m offset inside the original design dump shell</li> <li>b) a minimum elevation for PAG at 421.5 (0.8 m higher than ordinary high water mark of 420.7 m)</li> <li>c) subtracting the volume already placed within the pile</li> <li>d) assuming no PAG in the final lift</li> </ul> <p>The expected volume of PAG to be encountered during the remainder of the life of the South Mine Rock Pile was calculated by taking the total volume of material expected and multiplying that by the 7.5%.</p>	
8	Section 3.5 Sulphide Block Model	<p><b>Comment</b> With respect to the sulphide block model, it is understood that there are limitations with respect to sample density.</p> <p><b>Recommendation</b> De Beers should consider integrating the sulphur data from the pre-mining characterization programs in order provide greater density and greater spatial coverage that, if spatial trends exist, could become a predictive model over time and allow for more flexibility in planning.</p>	<p><b>June 23:</b> DeBeers will consider updating the block model with data from the exploration phase.</p>	Noted.

9	General	<p><b>Comment</b> Sampling of Non-PAG rock used in construction was described; however, a map was not provided. It is assumed that the samples can be geospatially referenced.</p> <p><b>Recommendation</b> Results should be provided with corresponding maps such that an inventory of placed rock can be documented over time.</p>	<p><b>June 23:</b> Sampling of the non-PAG rock used in construction for the mine Rock Placement Verification Report is presented in Figure 1 of the 2015 Biannual Geochemical Audit (April 21, 2015).</p>	<p>Noted.</p> <p>De Beers shall resubmit the Rock Placement Verification Program Report with any maps that document the sampling locations of rock.</p>
10	General	<p><b>Comment</b> While not specifically defined, it appears that sampling frequency of placed rock within the South Mine Rock Pile (SMRP) was done on a grid basis (approximately 50 m spacing) and not on a tonnage sampling frequency basis.</p> <p><b>Recommendation</b> Additional detail and justification on sample spacing should be provided. On a volume basis, the sampling frequency as indicated Table 6 range from approximately 1 sample per 16,000 tonnes (for Zone 1) and 1 sample per 80,000 tonnes (Zone 3) which is generally a lower frequency than completed on the pre-excavation sampling campaign.</p>	<p><b>June 23:</b> All materials placed in the SMRP had been previously sampled prior to excavation, and sampling of the SMRP was to confirm that the materials were properly placed in the assigned areas of the SMRP, therefore there was no requirement to sample at the same frequency as the initial confirmatory sampling program.</p>	<p>Noted.</p> <p>De Beers shall update Section 3.7 with this additional information (rationale for systematic sampling in the SMRP as the intent is to document the sampling approach so that there are no biases assumed in sample selection) and resubmit the Rock Placement Verification Program Report.</p>

11	General	<p><b>Comment</b> No information was provided as to what grain size was sampled and tested from blasted rock used for construction or placed within the SMRP.</p> <p><b>Recommendation</b> De Beers should confirm whether or not grain size specific sampling or testing was completed. It would be recommended that additional analyses of specific particle size fractions should be conducted such that there can be an evaluation of whether there is partitioning of sulphides and/or carbonates into any one particle size. In general, the -2mm size fraction is considered the most reactive size fraction and therefore the focus of geochemical sampling in blasted rock piles.</p>	<p><b>June 23:</b> Rock is ground up by the drill prior to sampling and furthermore the sample is prepared in the lab where it is dried and finely crushed to better than 70 % passing a 2 mm (Tyler 9 mesh, US Std. No.10) screen. A split of up to 250 g is taken and pulverized to better than 85 % passing a 75 micron (Tyler 200 mesh, US Std. No. 200) screen.</p> <p><b>September 16:</b> In accordance with the approved sampling program for the Bi-Annual Audit (Section 8.1, Geochemical Characterization Plan, V.3), samples of mine rock have been collected from construction material, mine roads, rock pads and mine rock piles. No specific particle size fraction was selected for the sample collection or analysis, as this is not a component of the approved sampling program. Sample rock was selected at each location by examining rock fragments characteristics (colour, grain size, texture, visible minerals etc.) and selecting a sample representative of the dominant rock type at each location.</p>	<p>Noted.</p> <p>De Beers shall update the Standard Operating Procedure to provide further details of protocols for the selection, storage, preparation, and analysis of mine rock and determination of PAG material. It is recommended that the MEND Report 1.20.1, 2009 (<a href="http://www.abandoned-mines.org/pdfs/MENDPredictionManual-Jan05.pdf">http://www.abandoned-mines.org/pdfs/MENDPredictionManual-Jan05.pdf</a>) be reviewed for guidance on the approach to selection, storage and preparation of samples. De Beers shall also make this update to the Rock Placement Verification Program Report.</p>
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## Reasons for Decision

Issued pursuant to section 72.25 of the *Mackenzie Valley Resource Management Act* and section 54 of the *Waters Act*

Water Licence	
<b>Preliminary Screener</b>	MVLWB
<b>Reference/File Number</b>	MV2005L2-0015
<b>Proponent</b>	De Beers Canada Inc. – Gahcho Kué Mine
<b>Submission/Project</b>	Rock Placement Verification Program Report

### Decision from Mackenzie Valley Land and Water Board Meeting of

November 3, 2016

### Background

Part E, item 7 of Licence MV2005L2-0015 states:

*Upon commencement of Construction, the Licensee shall initiate a **Rock Placement Verification Program** in accordance with the requirements set out in Schedule 4, item 1, to assess the effectiveness of the SOP referred to in Part E, item 6. Within eighteen (18) months following issuance of this Licence, the Licensee shall submit a **Rock Placement Verification Program Report** that describes the results of the Program to the Board for approval.*

The results of this Report will inform the Board of the accuracy of predictions made and the success of rock segregation practices detailed in the SOP. The results will also provide necessary information regarding any future monitoring and reclamation activities that would be appropriate for the site; this includes rock handling procedures that would be necessary during operations for a “design for closure” approach. This data will also inform the security amount that should be in place to conduct the reclamation work, and is intimately linked to the security provision for a revised project reclamation liability estimate.

On March 3, 2016 De Beers requested an extension to the submission date of the Report from March 24 to April 24, 2016. This extension was requested to ensure that the report was complete with all required data at the time of submission. De Beers submitted the Report on April 25, 2016.

## Public Review

By June 1, 2016, comments and recommendations on the Report were received from two reviewers:

- Government of the Northwest Territories – Environment and Natural Resources; and
- Board Staff.

On June 2, 2016, De Beers requested an extension to the proponent response deadline from June 8 to June 23, 2016 to allow further time to address the comments submitted. Board staff granted the extension request. De Beers responded to reviewers on June 23, 2016 which included the Addendum. Information that was included in the Addendum was additional information on Acid Base Accounting laboratory results which were originally pending at the time of submittal of the Report.

The review process was reopened to allow for a review of this new information. By July 15, 2016, comments and recommendations on the Addendum were received from one reviewer: Government of the Northwest Territories – Environment and Natural Resources

De Beers responded on July 22, 2016.

## Security

The GNWT currently holds \$23,776,270.00 in reclamation security for the Gahcho Kué Project for Licence MV2005L2-0015. De Beers' next deposit of security (in the amount of \$40,713,234) is due prior to year 4 of Operations (the end of mining of the Hearn Pit).

## Decision

After reviewing the submissions of the Proponent, the written comments received by the Board and the Staff report prepared for the Board, the Board, having due regard to the facts and circumstances, the merits of the submissions made to it, and to the purpose, scope, and intent of the MVRMA and the *Waters Act* and Regulations made thereunder, has determined that some components of the Rock Placement Verification Program Report are incomplete. Therefore, the Board has decided to approve the Rock Placement Verification Program Report as an interim Report and require the resubmission of a revised Report by November 17, 2016. The revised Report will include the updates identified by reviewers in the Online Review System Reviewer Comment Summary. The Board has also decided to request the submission of a revision to the Standard Operating Procedure to provide further details of protocols for the selection, storage, preparation, and analysis of mine rock and determination of PAG material, by November 17, 2016. This information is to also be included in the revised Rock Placement Verification Program Report.

SIGNATURE

Mackenzie Valley Land and Water Board



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Floyd Adlem, A/Chair

November 3, 2016

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Date