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October 16, 2014

File: MV2005L2-0015

Ms. Veronica Chisholm
De Beers Canada Inc.
Gahcho Kué Project
Suite 300, 5120-49th St.
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Dear Ms. Chisholm:

Board Decision on Management Plans and Approval of Request to Modify Compliance Date to the Dyke A Final Detailed Construction Plan – Water Licence MV2005L2-0015

The Mackenzie Valley Land and Water Board (the Board) met on October 16, 2014 and reviewed the Standard Operating Procedure, Waste Management Plan (v.3), Construction Water Management Plan (v.3), Erosion and Sediment Management Plan (v.3), Explosives Management Plan (v.3), Dyke A Construction and Management Plan (v.2), and the Spill Contingency Plan (v.3) in accordance with Part E, item 6, Part G, item 2, 3, 11, 12, 15, and Part H, item 1, of Water Licence MV2005L2-0015, respectively. The Board also reviewed the request to modify the compliance date of the Dyke A Final Detailed Construction Plan and acknowledges receipt of this Plan.

The Board hereby approves the Explosives Management Plan, the Waste Management Plan, the Spill Contingency Plan, and the Standard Operating Procedure as submitted in accordance with the Water Licence. The Board also grants the request to modify the compliance date of the Dyke A Final Detailed Construction Plan.

The Board requires that De Beers re-submit the Erosion and Sediment Management Plan, the Construction Water Management Plan, and the Dyke A Construction and Management Plan, in accordance with the comments made during this review, as summarized in Tables 1, 2 and 3 (attached). These Plans are considered to be approved, conditionally upon receipt of this information and written confirmation of conformity from Board staff.

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.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Willard Hagen', with a stylized flourish at the end.

Willard Hagen
MVLWB Chair

Copied to: Distribution List

Attachment: Review Comment Table 1, 2 and 3

Tables 1, 2 and 3 – De Beers – Gahcho Kue – Summary of Commitments and Outstanding Items from Reviewers to be Completed and Submitted

Table 1: Erosion and Sediment Management Plan

De Beers Commitments				
	Topic	Commitment Recommendation	De Beers Commitments to be included in the updated submission	Additional outstanding items to be included in the updated submission
1	Table 1 - Summary of Commitments and Conditions	Comment: The requirements of Schedule 5, item 5 are not listed in this concordance table. Recommendation: For ease of reference, the complete requirements for the Erosion and Sediment Management Plan should be included in the concordance table in future versions of this Plan.	Oct 11: Acknowledged, De Beers will include a concordance table in future versions of the Plan.	The Erosion and Sediment Management Plan shall be updated with a complete list of requirements, as outlined in Schedule 5, item 5, in the concordance table.
2	Table 13 - Mine Erosion and Sediment Control Best Management Practice and Applicability	Comment: BMP 6 is missing from this table, but is referenced in the text and is present in Appendix A. Recommendation: In future versions of this Plan, BMP 6 should be included in this table, so that it is clear where BMP 6 could be applied.	Oct 11: Acknowledged. De Beers will update future versions of the Plan with the referenced Best Management Practice 6.	The Erosion and Sediment Management Plan shall be updated to include the BMP 6, in table 13.
3	Section 4.1 - Water Discharges	Comment: The frequency for downstream monitoring of water level, ice depth, and formation of aufeis is not specified in this Plan or in the Construction Water Management Plan. Recommendation: Please clarify the frequency of downstream monitoring during winter pumping.	Oct 11: The effects of aufeis development, which may block lake outlets, are intended to be monitored indirectly by monitoring lake water levels upstream of lake outlets. Section 2.2.1.5 of the Construction Water Management Plan also indicates that "if the discharge occurs during the winter season, lake water elevation, the ice thickness and flow condition at the outlets will be monitored weekly." This weekly monitoring will include direct observations of aufeis development. With regards to the link between aufeis development and erosion risk, the rationale is that ice blockages at lake outlets could result in erosion by increasing upstream lake water levels such that (a) a rapid release of water at the onset of freshet could cause erosion in the downstream channel; or (b) flow would be diverted out of the existing lake outlet channel during freshet. To address item (a), the proposed action levels are specified to limit the magnitude of the potential	The frequency of monitoring is provided as requested. The Erosion and Sediment Management Plan shall be updated to include this additional information about monitoring.

			freshet peak; i.e., an instantaneous melt of the upstream lake would not cause the downstream flow to exceed approximately the 1:10 year flood. To address item (b), the proposed action levels are specified to prevent water levels from exceeding elevations that could cause flow to follow an alternate flow path to the downstream lake.	
4	Section 5.2 - Inspections	Comment: The frequency for inspections of erosion and sediment control/management measures is not specified. Recommendation: Please specify the frequency of inspections. If frequency varies according to the risk being addressed by the measure, specify the frequency for each risk level.	Oct 11: Inspections will be undertaken on a weekly basis, weather and safety permitting, as a base level of monitoring. The frequency of inspections may increase based on site specific conditions that require more intensive monitoring. This will be communicated with the Inspector.	Proponent response is satisfactory. The Erosion and Sediment Management Plan shall be updated to include this information about inspections.

Table 2: Construction Water Management Plan

De Beers Commitments				
	Topic	Commitment Recommendation	De Beers Commitments to be included in the updated submission	Additional outstanding items to be included in the updated submission
1	Section 2.2.1.5 Dewatering Monitoring Program	Comment: The plan states that "Lake dewatering discharge will be sampled weekly via SNP 02 and SNP 04 during discharge to monitor for compliance with TSS discharge limits specified in the Water Licence. Any water not meeting the discharge limits will be retained within the WMP." For management purposes, and in accordance with the requirements of the water licence SNP, sampling and analysis for physical parameters is to be done daily during dewatering discharges. Recommendation: Environment Canada (EC) recommends that the frequency be corrected to daily.	Oct 11: De Beers will follow the SNP requirements specified in the WL.	Proponent response is satisfactory. The Construction Water Management Plan shall be updated to reflect monitoring details as outlined in the Water Licence.
2	Section 2.4.3.2 Contingency Measures	Comment: In the event of a spill of untreated or partially treated sewage inside the plant, the plan indicates that the response would be: "treating recovered sewage and any materials contaminated with sewage by incineration; and" EC notes that the Proponent has	Oct 11: Acknowledged. De Beers has noted that sewage materials (i.e., sludge) will be disposed in the landfill and not incinerated. De Beers will ensure consistency with the waste management plan in future versions of the Water Management Plan.	The Construction Water Management Plan shall be updated to ensure consistency with other applicable plans to help prevent any unnecessary

		<p>committed not to incinerate sewage sludge, and recommends that any spilled sewage or sewage-contaminated materials similarly be disposed of in the onsite landfill.</p> <p>Recommendation: EC recommends the Contingency Measures Section be amended to indicate all recovered sewage materials will be disposed in the landfill.</p>		<p>confusion.</p>
3	<p>p. 12. Table 2a. "all mine rock used to construct the dykes will be Non-acid generating".</p>	<p>Comment: As I recall, this seems to contradict what was being discussed at the recent Reclamation Workshop (September 24, 2014, De Beers Presentation, page 12, states "PAG will also be used in building bases of some dykes").</p> <p>Recommendation: Clarify whether PAG will or will not be used in dyke construction (& if it will, confirm under what conditions it will be used).</p>	<p>Oct 11: Acknowledged, during the regulatory process, it was agreed that PAG material could be used to for engineered structures (e.g., dykes) that are submerged in water (e.g., Dyke L and Dyke B). De Beers will provide clarification in future iterations of the water management plans and will also specify in each of the Engineered Structure Detailed Design Plans (e.g., dyke design plans), where PAG material is proposed for construction. It should be noted PAG material will not be used to construct Dyke A.</p>	<p>The Construction Water Management Plan shall be updated to include further details to help prevent any unnecessary confusion.</p>
4	<p>p. 25. "During the winter discharge, the lake ice/water level should not exceed the 1:10 yer flooding level, or approximately 0.6m above the zero-discharge elevation of water.</p>	<p>Comment: Will there be some sort of visual indication in the field so staff/Inspectors can visually confirm that ice/water is below this critical level? i.e., a surveyed staff gauge.</p> <p>Recommendation: Confirm that a visual indication/marker (like a staff gauge) will be in place in Area 8 and Lake N11.</p>	<p>Oct 11: Ice levels will be inspected/measured weekly. These inspections will use visual observations such as shoals and banks, but it will be difficult to accurately access the ice level with these features or a staff guage on the ice.</p>	<p>The Construction Water Management Plan shall be updated to include further information on how the ice/water levels will be measured. The proposed method must provide De Beers with the ability to clearly compare the measured ice/water levels to the proposed action levels.</p>
5	<p>Section 2.2.1.5 - Dewatering Monitoring Program</p>	<p>Comment: Schedule 5, item 1(b)(iii) of the WL requires a description of both how and where flow will be continuously monitored. This section provides a general idea of where flow will be monitored, but does not describe how flow will be monitored.</p> <p>Recommendation: As required by the WL, a description of how flow will be monitored must be provided.</p>	<p>Oct 11: De Beers will use inline flow meters at pump locations.</p>	<p>This will be possible at discharge locations, but not at outlet locations for Lake N11 and Area 9 (SNP stations 18 and 19, respectively), where flow must be monitored daily during discharge in order to ensure compliance with the maximum flow at these outlets as</p>

				specified in Part G, item 7 of the WL. Even if the flow will be measured through the use of a stage-discharge curve, the method for monitoring flow at the outlets must be described in the Construction Water Management Plan.
6	Section 2.2.1.5 - Dewatering Monitoring Program	<p>Comment: The section states that the lake ice/water level should not exceed the 1:10 year flooding level, or 0.6 m above the zero-discharge elevation of water. In the following section (2.2.1.6), the action level is set at 0.5 m above the original lake elevation. It is not clear if/how the reference points (zero-discharge and original lake elevation) are equivalent. Additionally, no numerical values are provided for the reference lake elevation, so it will be difficult to determine when action levels have been reached.</p> <p>Recommendation: Please clarify.</p>	<p>Oct 11: The value of 0.6 m used in Section 2.2.1.5 is an estimate based on a lake outlet stage-discharge rating curve. This references back to a response (Jan 2014) to MVLWB WL-LUP review comment 14, which states "Preliminary recommendations for suspending dewatering activities under winter conditions include (a) exceeding the 1:10 year water level of a lake, as defined by the open water stage-discharge rating curve; or (b) identifying significant aufeis growth in a lake outlet channel, such that water levels exceed the bankfull elevation of the channel. These values would vary for each lake and outlet channel and will be defined prior to the commencement of dewatering activities." The 0.6 value is not constant for each lake outlet, and depends on the geometry of the lake outlet channels however it is expected to be a reasonable assumption based on the baseline data collected. De Beers will confirm bankfull elevations using information from September 2014 drone survey and will submit to the Board in advance of dewatering.</p>	<p>The Board is aware of the information referenced in De Beers' response, but expected that the information required to clearly define and support the winter pumping action levels would be provided in this Construction Water Management Plan, so that the action levels could be considered by the Board prior to commencing drawdown.</p> <p>The Construction Water Management Plan shall be updated to include the bankfull elevations and corresponding action levels for each relevant outlet, which is to be provided to the Board prior to commencing any discharge associated with drawdown.</p>
7	Section 2.2.1.5 - Dewatering Monitoring Program	<p>Comment: The last sentence of this section states that "designated monitoring stations are detailed in the SNP" for lake ice/water elevation.</p> <p>Recommendation: The SNP stations should be specified, since the action levels will apply at these stations. If additional monitoring stations are needed, their locations should be specified in this Plan.</p>	<p>Oct 11: De Beers intends to use SNP 07 and 08 and possibly 03 as well as other visual inspection points in Area 8 and Lake N11. Inspection points will need to be field fit and will be summarized in the annual WL report.</p>	<p>SNP 07 is the effluent from the sewage treatment plant, while SNP 08 is one of the collection sumps in the open pit. These stations are clearly not appropriate for monitoring lake water/ice elevation. The monitoring locations for lake</p>

				water/ice elevation should be provided in conjunction with the additional information required in response to item 6 above.
8	Section 2.2.1.5 - Dewatering Monitoring Program and Section 2.2.1.6 - Action Levels and Responses	<p>Comment: In Tables 4 and 5, Average Monthly Limit and Daily Maximum Limit are used instead of the terms Maximum Average Concentration (MAC) and Maximum Grab Concentration (MGC). This is inconsistent with the terminology used in the Water Licence, and the definition for the Average Monthly Limit is not equivalent to the MAC defined under the WL.</p> <p>Recommendation: The terminology should be consistent with what is in the Water Licence, since these action levels are being set to ensure that Effluent Quality Criteria, set out as the MAC and MGC, are not exceeded.</p>	Oct 11: Acknowledged. De Beers will use consistent terminology in the reporting and future version the Water Management Plan.	<p>Proponent response is satisfactory.</p> <p>The Construction Water Management Plan shall be updated to reflect terminology as outlined in the Water Licence.</p>
9	Section 2.2.1.5 - Dewatering Monitoring Program	<p>Comment: In its response to review comments on the WL application, De Beers stated that winter snowfall tracking and the use of historical records of temperature and precipitation could be combined with winter discharge monitoring to assess the risk of erosion in the spring. There does not appear to be any discussion regarding the use of this type of information for assessing risk of erosion in this Plan or in the Erosion and Sediment Management Plan with respect to managing winter pumping.</p> <p>Recommendation: Please explain how snowfall tracking and historical data will be used in combination with monitoring in assessing risk of erosion.</p>	Oct 11: Records of snowpack, which is a standard input in hydrology models, would be used in combination with water level data acquired for Lake N11 and Area 8 as an input to the GoldSim hydrology model to estimate freshet conditions. Specifically, measured snowpack could be used as a model input, lake levels could be used as an input, and the model could be run for a range of plausible spring temperature conditions (governing snowmelt) to predict the range of possible runoff conditions. If the model predicted floods exceeding the design criteria during freshet, then pumping could be curtailed to allow the lake water levels to recede prior to the start of freshet.	<p>Proponent response is acceptable.</p> <p>The Construction Water Management Plan shall be updated to include this information on how climatic data will be used in assessing risk of erosion.</p>
10	Section 2.2.1.6 - Action Levels and Responses	Comment: While the development of aufeis is included in the monitoring section of the Erosion and Sediment Management Plan and in earlier sections of this Water Management Plan, it is not included in the monitoring program or action level sections of this Plan. It is also not clear how	Oct 11: The effects of aufeis development, which may block lake outlets, are intended to be monitored indirectly by monitoring lake water levels upstream of lake outlets. Section 2.2.1.5 of the Construction Water Management Plan also indicates that “if the discharge occurs during the winter season, lake water elevation, the ice	<p>Proponent response is acceptable.</p> <p>The Construction Water Management Plan shall be updated to include this information, and the additional information</p>

		<p>aufeis observations are linked to assessment of erosion risk. Recommendation: Aufeis monitoring must be included in these sections of this Plan, and it must be clear how this monitoring will be considered in assessing risk of erosion and in managing winter discharge.</p>	<p>thickness and flow condition at the outlets will be monitored weekly.” This weekly monitoring will include direct observations of aufeis development. With regards to the link between aufeis development and erosion risk, the rationale is that ice blockages at lake outlets could result in erosion by increasing upstream lake water levels such that (a) a rapid release of water at the onset of freshet could cause erosion in the downstream channel; or (b) flow would be diverted out of the existing lake outlet channel during freshet. To address item (a), the proposed action levels are specified to limit the magnitude of the potential freshet peak; i.e., an instantaneous melt of the upstream lake would not cause the downstream flow to exceed approximately the 1:10 year flood. To address item (b), the proposed action levels are specified to prevent water levels from exceeding elevations that could cause flow to follow an alternate flow path to the downstream lake.</p>	<p>regarding action levels provided in the response to item 6 above.</p>
11	Section 2.4.3.2 - Contingency Measures (Sewage)	<p>Comment: This section states that raw or partially treated sewage may be discharged to the Water Management Pond or the adjacent wetland in the event of a spill or malfunction. While it is understood that this may occur initially until the spill or malfunction is identified, it is unclear what the contingency plan is for storing untreated/non-compliant sewage while a malfunction is fixed. Discharging untreated/non-compliant sewage to the Water Management Pond is not a contingency, since this is the discharge location for treated sewage. Recommendation: The contingency plan for non-compliant sewage should be described.</p>	<p>Oct 11: Acknowledged, should a sewage spill and/or malfunction occur untreated sewage will be collected in drums or tanks for treatment, as described in the Spill Contingency Plan.</p>	<p>Proponent response is acceptable.</p> <p>The Construction Water Management Plan shall be updated to include this information to help prevent any unnecessary confusion.</p>
12	TSS-Turbidity Relationship	<p>Comment Schedule 5, item 1c) requires information about how the TSS-Turbidity relationship will be established and verified. This Plan refers the reviewer to the Dyke A Construction Plan for this information. In the Dyke A Construction Plan, general information on how TSS-Turbidity</p>	<p>Oct 11:  Please refer to attached Technical Memorandum: Total Suspended Solids/Turbidity Relationship Results Gahcho Kué Project, NT, Canada (October 10, 2014).</p>	<p>De Beers must clarify whether this TSS/Turbidity relationship will still apply for drawdown. Additionally, the procedure for calibrating the field instrumentation, and</p>

	<p>relationships are established is provided, but no site-specific information is provided on how or where samples will be collected for this survey, or what will be an acceptable level of accuracy in the relationship. Further, in its response to interventions, De Beers committed to providing "a procedure to calibrate the field instrumentation and present or develop the detection limits for all instruments used for field detection." This information is not provided. Additionally, the focus of the information provided is on dyke construction. While this relationship will be invaluable for dyke construction monitoring, as per the Board's August 11, 2014 Reasons for Decision (pages 35-36), this relationship is also related to compliance for TSS in drawdown discharge, which is why the Board requested that this information be included in the Construction Water Management Plan. It is important that De Beers clearly demonstrate how this relationship will be developed for this site, and how the relationship will be applicable to both dyke construction and drawdown discharge. The need to verify this relationship over time also applies to the entire drawdown period. It is unclear when De Beers intends to develop and provide this information, since the current versions of these management plans are intended to address the applicable construction phase.</p> <p>Recommendation The correlation survey must be completed prior to commencing drawdown (as per Part A, item 9 of the SNP), and as noted by De Beers in Section 4.2 of the Dyke A Construction Plan, it must be developed prior to Construction of Dyke A. A clear description of how this survey will be conducted for this site, and the TSS-Turbidity relationship established and verified, must be presented in advance of conducting the survey.</p>		<p>the detection limits for field instrumentation should be provided. Finally, further clarification must be provided on how and when the relationship will be verified over time.</p>
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Table 3: Dyke A Construction and Management Plan:

De Beers Commitments				
	Topic	Commitment Recommendation	De Beers Commitments to be included in the updated submission	Additional outstanding items to be included in the updated submission
1	Topic 2: EQC and Action Levels	<p>Comment: Table 5 in Section 4.1 identifies EQC for TSS during dyke construction (15 mg/L Average Monthly Limit (AML) and 25 mg/L Daily Maximum Limit (DML)). Table 6 identifies Action Levels for TSS during dyke construction of 12 mg/L AML and 20 mg/L DML. The CCME provides both short term (24 hour) and long term (24 hour to 30 day) TSS guidelines. The short term guideline is a maximum increase of 25 mg/L from background levels. The long term guidance is a maximum average increase of 5 mg/L from background levels. The CCME guidelines are based upon changes from background conditions in the receiving water body. The short term EQC and DeBeer's proposed short term action levels are conservative, since they will limit the change from background to 25 mg/L or less. The long term EQC may be appropriate depending upon the dilution behavior within the receiving environment. However, the proposed long term action level appears high for use as an action level within the receiving environment. Depending upon baseline concentrations in Area 7/8, the proposed concentration of 12 mg/L in the receiving environment may represent a change of greater than 5 mg/L. DeBeers should provide additional information supporting the proposed long term action level.</p> <p>Recommendation: 1) ENR recommends DeBeers provide additional information supporting the selection of 12 mg/L as a suitable action level for use in the receiving environment.</p>	<p>Oct 11: An EQC for TSS outside of the silt curtain for dyke construction is not an appropriate use of the term as there is no discharge in this circumstance. De Beers also agree that the listed concentrations, even as low action levels for AML and DML concentrations are too high; it is agreed that the proposed mitigation using silt curtains is to limit the mobilization of TSS from dyke construction activities within Area 8 outside of the silt curtain. De Beers will be monitoring TSS and other physical parameters at SNP 03, which is situated downstream in Area 8 and outside the silt curtain. A low level action level long-term action level of 5 mg/L as an AML and 10 mg/L as a DML will be monitored at this location.</p>	<p>The revised action levels proposed by De Beers are conservative, but it is unclear whether they are reasonable since the response does not address the question of how the proposed action levels relate to the background concentrations in Area 8. The Board does not have adequate information to independently assess whether these action levels will be reasonable in practice and, therefore the Board accepts the proposed action levels as revised in De Beers' response. As noted in Board comments below, terminology should be consistent with the WL, so the action levels should be presented as an MGC of 10 mg/L, and an MAC of 5 mg/L. These action levels should be applied at SNP 03, and at other Dyke A construction monitoring stations as detailed in the Dyke A Construction Management Plan.</p>

2	Topic 5: Monitoring Plan	<p>Comment: The process described for comparison to the DML is to calculate an average turbidity at each sampling station using the measured maximum values over the past 24 hours. This turbidity value will be converted to a TSS value. A moving average will be calculated and a value will then be compared to the appropriate DML value. There appears to be some disagreement between this procedure and the statement on page 21, Section 4.1, which states that the action level for the daily maximum limit is a single sample that exceeds the DML TSS concentration. This disagreement may be resolved in Section 4.5 where it appears that a single sample exceeding the DML action levels triggers a certain response and where the 24 hour average TSS exceeding the DML triggers a greater response. However, additional clarity should be provided in the text of Section 4.4.2. ENR further notes that per part A.9 of the water Licence, the TSS/turbidity correlation survey is to be completed prior to the start of dewatering.</p> <p>Recommendation Recommendation(s): 1) ENR recommends that DeBeers clarify the procedure for ensuring that the DML is met.</p>	<p>Oct 11: De Beers will use a single sample to trigger the action level. The Total Suspended Solids/Turbidity Relationship Results Gahcho Kue Project, NT, Canada Technical Memorandum October 10, 2014 is attached to this response.</p>	<p>Proponent response is acceptable.</p> <p>The Dyke A Construction and Management Plan shall be updated to include this information to help prevent any unnecessary confusion.</p>
3	Topic 6: SOP Figure 4	<p>Comment: This figure appears to be missing components and should be corrected.</p> <p>Recommendation: 1) ENR recommends that DeBeers provide an updated figure.</p>	<p>Oct 11: Agreed. De Beers will provide an updated figure as part of the annual WL reporting.</p>	<p>Proponent response is acceptable.</p> <p>The Dyke A Construction and Management Plan shall be updated to include this information to help prevent any unnecessary confusion.</p>
4	p. 25, point 1. "TSS monitoring will include two monitoring events per day approximately every 8 hrs.	<p>Comment: To achieve twice/day sampling in daylight during winter months, samplers will basically be limited to dawn/dusk sampling. Will this create any concerns with regards to the data collected (i.e., if sampling occurs</p>	<p>Oct 11: Acknowledged. Please also refer to response in EC # 5 regard the installation of lights in the construction area to facilitate monitoring outside daylight hours.</p>	<p>Proponent response is satisfactory.</p> <p>The Dyke A Construction and Management Plan shall be updated to</p>

	during daylight".	at the same time each day, will that data be adequately representative of the worst TSS in any given day of construction)? Recommendation: Just a comment to consider.		include this information to help prevent any unnecessary confusion.
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