



Mackenzie Valley Land and Water Board
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April 2, 2014

File: MV2011L2-0004

Mrs. Erica Bonhomme
Snap Lake Mine, De Beers Canada
Suite 300, 5102 - 50th Avenue
Yellowknife NT X1A 3S8 Email: Erica.Bonhomme@debeerscanada.com

Dear Mrs. Bonhomme:

Water Management Plan Denial

The Mackenzie Valley Land and Water Board (the Board) met on April 2, 2014 and reviewed the Water Management Plan in accordance with Part F, Item 5 of Water Licence MV2011L2-0004. Unfortunately, at this time the Board is unable to approve the Water Management Plan as submitted for the following reasons:

- More information is required about the locations at which the Action Levels for seepage quality apply.
- Action Levels must be developed for seepage quantity, as required in Schedule 5 of the Water Licence. Details of how seepage quantity will be monitored must be included.
- The specific types of changes or thermal conditions that would trigger review and reporting of monitoring data should be clearly outlined.
- Timelines must be specified for the submission of response plans when triggered by Action Levels.
- Information must be included on contingency measures for the Waste Management Pond.
- Given the Total Dissolved Solids (TDS) and Nitrogen Response Plans are currently tied-up in the Water Licence Amendment process, this Water Management Plan should be a stand-alone document that does not reference these plans.
- Other revisions and updates to the Water Management Plan are necessary as per the commitments made by De Beers Canada Inc. during the review process.

Please resubmit the plan, adhering to the above changes and commitments made during the review process, by July 2, 2014.

If you have any questions or concerns, please contact Rosanna Nicol at (867) 766-7467 or email rnicol@mvlwb.com or Marc Casas at (867) 766-7466 or email mcasas@mvlwb.com.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Willard Hagen', with a stylized, cursive-like script.

Willard Hagen
MVLWB Chair

Attachment: Comments Table

Copied to: Distribution List

Review Comment Table

Board:	MVLWB
Review Item:	MV2011L2-0004 - Snap Lake - 2013 Water Management Plan
File(s):	MV2011L2-0004
Proponent:	De Beers Canada Inc. - Snap Lake
Document(s):	Snap Lake 2013 Water Management Plan (3 mb)
Item For Review Distributed On:	Dec 11 at 16:12 Distribution List
Reviewer Comments Due By:	Jan 23, 2014
Proponent Responses Due By:	Jan 30, 2014
Item Description:	<p>As per Part F Item 5 and Schedule 5 Item 1 please review the Water Management Plan.</p> <p>Reviewer comments are due January 23, 2013.</p> <p>Proponents comments are due January 30, 2013.</p>
Contact Information:	<p>Marc Casas 867-766-7466</p> <p>Rebecca Chouinard 867-766-7459</p> <p>Rosanna Nicol 867-766-7467</p>

Comment Summary

AANDC: Rick Walbourne				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	Comment (doc) AANDC Cover Letter re DBCI Snap Lake Water Management Plan Recommendation GENERALFILE		
1	Daily Water Limit	Comment Pg 8 of the Plan states that 100-200 cubes/day are withdrawn from Snap Lake while Pg 9 references 100-400 cubes/day Recommendation Please provide consistent references in this regard.	Jan 30: Though two estimates are used to represent fresh/raw water withdrawal, the 100-200 cubic metre value is the most accurate value. The document will be revised to reflect this change.	The Proponent has agreed to revise the Plan as recommended.
2	Nitrate Concentration	Comment Section 2.1.6 states that regulating the volume of high nitrates reporting to the Water Management Pond is the most effective means of dilution control however this is not explained further beyond the "observational selection" by mine staff. Recommendation AANDC requests further information regarding the process involved with the regulation of the volume of high nitrates reporting to the Water Management Pond.	Jan 30: Further information regarding the process involved with the regulation of the volume of high nitrates can be found in the Nitrogen and TDS response plans, which were submitted under separate cover to the Board for approval. De Beers agrees to provide linkages and	The requested information is highly relevant to site water management and should be directly included in the Water Management Plan.

			references between the various management plans in future iterations of this document.	
3	Water Balance Schematic Diagram	<p>Comment Figure 2.1 outlines a Water Balance Schematic Diagram with "q" values representing different water pathways. However, the "q" values designated in Figure 2-1 do not correspond with the text of the plan other than Table 2-3. (Example, all values in Section 2.4.3). It is likely that there were additions made to the schematic while the body of the report was not updated to reflect this.</p> <p>Recommendation AANDC recommends that the Plan and/or Figure 2.1 and Table 2-3 be updated so that they are consistent with each other.</p>	Jan 30: The Plan will be revised to correspond to Figure 2.1 and Table 2-3 as suggested.	Proponent has committed to updating the figures, text, and tables as recommended to ensure accuracy and consistency.
4	Water Retained in the North Pile	<p>Comment Column Q17 in Table 2-3 is labeled "Water Retained in the Pile" which is said to be calculated as Q28-Q11. While Q11 is present in the table as "Process Flows" involving water from North Pile to the North Pile sumps, there appears to be no mention of Q28 in the table nor in Figure 2-1 of the Schematic Diagram.</p> <p>Recommendation AANDC requests clarification on the calculation of water retained in the North Pile including a description of "Q28" and the location of that data.</p>	Jan 30: De Beers requested changes to the Water Balance Table (2-3) after initial submission of the Plan. Q28 became obsolete through these changes and is represented by "Q27". These changes were not carried through the document in its entirety. The sentence should read that water retained in the pile is calculated as Q27-Q11. The Plan will be revised to incorporate these changes.	Q27, referenced in the Proponent's response, is included in Table 2-3, but is not included in Figure 2-1. As noted in item 3 above, the text, figures and tables require revision to ensure accuracy and consistency with regard to the water balance.

5	Flocculation Tank	<p>Comment Section 2.6.1.3 refers to a 400 cubic meter settling tank which is operational during freshet to pre-treat and settle highly turbid water. There is little information on the treatment rate of this tank or its effectiveness.</p> <p>Recommendation AANDC recommends that DBCI provide additional information on the treatment rate of the flocculant tank as well as any information on past effectiveness of the flocculation tank</p>	<p>Jan 30: The flocculation tank was first used during the 2012 freshet and refined in 2013. The purpose of this tank is to reduce turbidity; however, further trials are needed to assess the efficiency of the tank, which will continue during freshet 2014. During Freshet 2012, high turbidity in the Water Management Pond (WMP) originating from the sumps created problems with pumping the pond down through the Temporary Water Treatment Plant. Due to high inflows during freshet, there was reduced settling time in the WMP, and NTU values became too high to feed the TWTP multimedia pressure filters. In order to eliminate or at least mitigate the</p>	<p>Proponent provided adequate response with the information available at this time. The Plan should be updated with this information and any further information that has become available at the time of revision.</p>
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			<p>potential high NTU from the sumps, a 20 x 20 x 1.2 m flocculant tank by Pure Elements with nominal capacity 380 m³ has been erected adjacent to PS3 on the south side. Flow from TS4, PS5, PS4 and PS3 can be pre-treated before proceeding into the WMP, enabling the settling and removal of solids upstream of the WMP and treatment plants. The majority of freshet flows originate from these sumps and turbidity is elevated due to the catchment area of the IL6 Ditch. It is envisaged that the tank will allow the management of NTU and prevent surface water having to be sent underground to the freshet storage areas, by enabling the continuous pumping</p>	
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			down of the WMP through the TWTP filters. The tank was designed for inflows ranging from 2,000 to 15,000 m ³ /day, and will be most effective at lower flow rates due to increased retention time for settling. further trials are needed to assess the efficiency of the tank, which will occur during freshet 2014.	
6	Water Management Pond - Seepage Rates	<p>Comment Section 3.2.1 states that the EA anticipated that approximately 17 cubes/day would seep from the Water Management Pond. It is unclear which pathway in Figure 2.1 , and column in Table 2-3, accounts for this. Q21 in the Table show seepage rates ranging from 32-36 cubic meters/day and it is AANDC's assumption that this column represents seepage from the WMP . This amount of water seeping from the WMP appears to be relatively large. Finally, the table illustrates that the seepage rate from the Water Management Pond is constant throughout the year, whereas it would be anticipated that there would be some seasonal variation.</p> <p>Recommendation AANDC recommends that DBCI clarify the pathway related to seepage from the water management pond. As well, AANDC requests verification on the magnitude and lack of seasonal variation of seepage volumes from the WMP.</p>	<p>Jan 30: The Environmental Assessment Report (February 2002) predicted subsurface seepage at 30 cubic metres per day. Please refer to Appendix III.4-5 (Table III.4-1), and further description can be found in section 4.4.1 (appendix III.4-12) of the EAR, which states "Theoretically, seepage from the WMP is estimated to be 10 to 30 m³/d; the</p>	The Proponent's response is adequate; however, the estimated seepage rate from the WMP (Q21) is currently slightly greater than that predicted in the EA. Action levels for seepage quantity and quality should be developed in the Response Framework as

			amount of potential seepage will increase if the dams are raised." The seasonal variability is assumed but in discussions with the geotechnical engineer it would be very difficult to ascertain the exact volume of seepage without excavating the entire area.	per Schedule 5, item (c)(i)(a). Action levels for seepage quantity are still outstanding.
7	Water Management Pond - Thermal Conditions	<p>Comment Section 3.3.1.2 states that while a frozen condition of the WMP's retention dikes and dams is not required, monitoring data is reviewed and reported on "should thermal conditions cause concern." The specific thermal conditions that would cause concern is not clear . Additionally, AANDC is interested in any potential relationship between the increased seepage rate from the Water Management Pond and the unfrozen state of its retention dykes and dams.</p> <p>Recommendation AANDC recommends DBCI provide additional clarification of the type of thermal conditions that would cause concern and trigger monitoring data review and reporting. Additionally, AANDC requests that DBCI comment on the relationship between increased seepage rates from the WMP and the feasibility of freezing the retention structures to mitigate seepage rates that are currently observed, if verified in the previous comment.</p>	<p>Jan 30: The performance of the dams does not rely on thermal temperatures as stated in the water management plan document. During the winter months, warming of the area below the dam caused by impounding might cause the regular seepage to follow the talik zones and appear at the toe of the dam. To prevent this from occurring the dam area is regularly cleared of snow. Changes atypical to the season</p>	The comments are only partially addressed by the Proponent's response. The type of changes or thermal conditions that would cause concern should be specifically outlined in the Plan.

			as observed since installation cause a review with the geotechnical engineer above and beyond the annual inspections. As noted above, seepage from the water management pond was scoped during the Environmental Assessment and predicted to occur at a rate of up to 30 m ³ /day.	
8	Action Levels related to Water Licence Non-Compliance	<p>Comment Figure 3-4 (Nonconformance of Water Licence) implies that DBCI would be in non-conformance of the Water Licence if there is a "trend of samples below Water Management Pond dams exceeding EQC criteria for Maximum average." AANDC notes, as stated in the Water Licence, that these monitoring locations were established for operational monitoring during construction and operations as well as to evaluate dam performance. However, a review of montly reports from June - November 2013 show that seepage wells down gradient from the WMP are often frozen, dry or not sampled based on quarterly sampling requirements. It is not clear how dam performance or trends in water quality data can be reliably evaluated based on this sampling frequency. Additionally, water balances provided identify a seepage rate of 32-36 cubic metres/day that do not appear to be consistent with SNP sampling results (dry/frozen wells).</p> <p>Recommendation AANDC requests that DBCI provide rationale for the the selection of sampling stations below the Water Management Pond in determining water quality trends, given the monitoring difficulties outlined. Additionally, AANDC requests that DBCI explain any inconsistencies</p>	<p>Jan 30: De Beers is of the opinion that as the monitoring stations were previously installed and have been functioning as per design that there location not be up for discussion during a water management plan revision process. Two piezometers are installed downstream of the WMP, 02-11 and 02-12. While 02-12 remains frozen,</p>	As per Schedule 5, item (c)(i)(a), action levels for both seepage quality and seepage quantity should be developed in the Response Framework. As currently written, the Response Framework does not actually specify which stations the proposed action

		<p>related to seepage rates from the Water Management Pond referenced in previous comments above and the lack of water observed at SNP stations downstream of the WMP.</p>	<p>02-11 reports flows. 02-13 adjacent to Dam 2, was malfunctioning but was replaced in May 2013. Samples are also collected during rainfall events and freshet at Bog East and West to determine surface and subsurface flows to the downstream wetlands. These results when available are summarized in the Monthly SNP and the Water License Annual Report. Section 6.2 of the ARD and Geochemical Characterization Report specifically discusses trends in these locations since 2001. The geotechnical performance of the dams-stability and seepage control-rely on neither the presence nor the absence of frozen</p>	<p>levels for seepage quality would apply to. The selected monitoring stations should be specified and rationale for the selection of these stations should be included. Further, action levels for seepage quantity are still outstanding. These should be developed as they are required under the Water Licence. Details of how seepage quantity will be monitored should be described.</p>
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			<p>conditions. The required stability is provided through the construction of the dams using granular fills that were placed and compacted as engineered fill. The seepage control for the dams themselves is provided by the geosynthetic liners. The geosynthetic liners are tied-into bedrock using a bentonite-augmented granular fill. Seepage control through the dam foundations, namely bedrock, is provided by the management of the pond itself through the reduction of the applied hydraulic loading. The hydraulic load on each dam is reduced through the presence of the material upstream of the dam (PK and in situ material) and by</p>	
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			<p>control of the water level of the pond itself. The reduction of the hydraulic load serves to promote frozen conditions within the foundations of the dams. Whilst not frozen throughout, the frozen conditions further reduce the seepage through the foundations of the dams. The spatial variation of the thermal conditions beneath and surrounding the dams results in seasonal variations in seepage flow paths. The thermal monitoring, seepage monitoring (including standpipe and vibrating wire piezometers), and slope monitoring (visual surveys) are used to evaluate and confirm the geotechnical performance of the dams. The data is</p>	
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			<p>used to identify trends and/or variations from past trends. To date, the geotechnical performance of the dams is in keeping with that of their design. With respect to water quality the purpose of the SNP stations is to identify water quality if water is present outside of the Water Management Pond such that it can be evaluated if necessary. The absence of water outside of the water management pond, or frozen conditions within standpipes or standing water indicates that water is not moving through the system at that point in time in any substantial fashion, thus water quality implications on the downstream environment are</p>	
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			<p>minimal, and well within those predicted in the DAR. The freezing of the dam foundations in their entirety would further reduce the seepage; however, this is not considered to be practicable. Seepage is currently passing through the foundations-active seepage is difficult-to-impracticable to freeze. Further, it is expected that active thermosyphons would be required-the practicalities of locating and installing these would be challenging to infeasible. Also, the cost of operating such a system could be significant.</p>	
9	Response Actions and Action Levels	<p>Comment As illustrated within the Water Management Plan's Table 3-2, and observed previously at the Snap Lake minesite, revisions of Low Action Levels have been proposed by DBCI on site-specific benchmarks, once the action level has been exceeded. AANDC disagrees that low action levels be amended once they have been exceeded and that sufficient effort should be placed into the initial establishment of these levels. As illustrated in the</p>	<p>Jan 30: The intent of the low action level is to trigger an investigation of cause and importance. The low action level will</p>	<p>As noted by De Beers, this approach is consistent with Chapter 6 of the AEMP Design</p>

		<p>WLWB's Draft Guidelines for Adaptive Management - A Response Framework for Aquatic Effects Monitoring (2010), action levels should be below significance thresholds based on EA predictions and benchmarks for sensitive species. It is crucial to have a clear understanding of these levels to ensure action levels are appropriate. As per the guideline "a Low Action Level is meant to pre-emptive in nature and is well below the level at which a benchmark concentration is reached or a biological effect is measured."</p> <p>Recommendation AANDC recommends that the Plan remove reference to revision of Low Action Levels once the action level is exceeded. DBCI should instead focus their attention on responses including confirmation of the low action level and investigation of trends. While site-specific benchmarks could be established prior to the establishment of Low Action Levels, they should only be reviewed during the establishment of Medium and High Action Levels</p>	<p>only be revised if through investigation it has been determined to be insignificant or inappropriate to monitor a specific parameter. This is consistent with the approved AEMP redesign plan.</p>	<p>Plan, which was approved by the Board on November 29, 2013. Any revision to a low action level must be scientifically defensible, and must be approved by the Board.</p>
10	Contingency Measures	<p>Comment Table 2-1 provides maximum storage capacity of water containment structures including 92,762 cubic meters in the Water Management Pond. It is uncertain what the retention time is within this pond, or the free storage capacity should water have to be retained in the WMP due to malfunctions with the WTP or other issues requiring contingency storage.</p> <p>Recommendation AANDC requests information on the ability of the Water Management Pond to act as a contingency holding area including an approximate length of time to reach capacity under multiple seasons/scenarios (freshet, plant malfunction, etc). Additionally, DBCI should outline additional contingency measures in the event capacity is surpassed in the WMP.</p>	<p>Jan 30: Retention times in the WMP are dependent on a number of conditions and/or factors (i.e. starting levels in the pond, weather conditions, nitrate levels, seasons, flow rate to the pond vs volume being treated, etc). Currently the retention time of the pond is approximately 5 days. During peak flows, the WMP can currently hold 2.2 days of underground water if required,</p>	<p>Information on retention times should be included in the Water Management Plan. Additionally, management plans typically include a description of contingency measures. Although contingency measures are not specifically listed in Schedule 5,</p>

			otherwise, excess water would normally be diverted to the underground.	item 1, this information should be included as part of the “other information” required under Schedule 5, item 1(a)(vii).
11	Related Plans	<p>Comment Sections 5-7 are place holders for various plans that were required to be submitted on December 31st, 2013. AANDC notes that the Strontium Response Plan and the Nitrogen Response Plan should be provided as soon as possible for review and input. Regarding the TDS Response Plan, AANDC recognizes that additional processes are underway regarding TDS limits at site and that the Plan may be delayed as a result.</p> <p>Recommendation AANDC recommends that DBCI submit the Strontium Response Plan and Nitrogen Response Plan to the Board for review or otherwise provide an update including rationale on any delays. Additionally, AANDC recognizes that the TDS Response Plan will be delayed until such time that issues surrounding TDS are worked out in due process. However, as timelines surrounding these discussions are unknown, additional efforts should be made to highlight contingency measures in the Plan in the event that levels in discharge water, or Snap Lake itself, become non-compliant.</p>	<p>Jan 30: The Nitrogen, TDS and Strontium response plans were submitted to the MVLWB prior to December 31, 2013.</p>	These response plans were submitted as part of an amendment application. It is unclear at this time how the requirements for these response plans might change during the course of the amendment process. As such, the Water Management Plan should be written as a stand-alone document, and should include contingency information related to the

				management of water quality and quantity.
12	3.3.3 Water Management Response Plan	<p>Comment While AANDC understands the concept presented by DBCI regarding the submission of a Monitoring Response Plan once an action level as been triggered as outlined in the draft Adaptive Management guidelines referenced above, it is unclear how the current outline fits into a potential Response Plan based on the information provided in Section 3.3.3. This section should be expanded to provide details on action to be taken in preparation of a Response Plan including anticipated approvals, timelines, details on what types of information would be included, etc.</p> <p>Recommendation AANDC recommends that DBCI expand on information provided related to response planning to enable DBCI to respond sufficiently to any action level triggers. The explanation should include information on timelines and any potential processes that DBCI would anticipate occurring, as well as an outline of the components and information that would be included in any Response Plan as may be required.</p>	<p>Jan 30: The requirements of a response plan are very specific to the parameter or action that has changed. As discussed during the AEMP technical sessions in January and April 2013, to identify and provide action plans for every event that might occur. For this reason once a trend is observed or action threshold exceeded, an technical review is initiated and a plan of action submitted to the Board for stakeholder review. This work is supported by the Geotechnical and Geochemical inspections that take place on an annual basis.</p>	De Beers should submit timelines for the submission of response plans when triggered by Action Levels.

Environment Canada: Sarah-Lacey McMillan

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	Comment (doc) EC cover letter Recommendation		
2	2.1.5. Sewage Treatment	Comment De Beers indicates that sewage will be treated in Membrane Bioreactors (MBR) once the new sewage treatment plant is online in December 2013. Recommendation EC requests clarification, is the new sewage treatment plant in operation?	Jan 30: The new STP was commissioned on January 17, 2014. However, as the plant is brought online faecal levels are higher than normal until such time as the bacteria in the plant are adequately colonized. Effluent from the STP is being treated but not adequately enough to meet our WL limits. To ensure that the effluent meets criteria, Chlorine is being added to kill off faecals that are not treated through the STP process. It can take up to 3 weeks for the bacteria to reach adequate numbers to properly treat the sewage.	The Proponent's response is adequate.

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
5	General File	Comment (doc) ENR Comments and Recommendations Recommendation		
1	Topic 1: Underground Water Inflow- Action Response Level	<p>Comment Comment(s): ENR notes that the proponent has not identified the action levels for volumes of water entering the mine from underground sources. ENR understands that there are complications with respect to water treatment (TDS, maximum discharge etc.) that arise with increased underground water flow.</p> <p>Recommendation Recommendations: 1) ENR requests that the proponent develop action levels and a response framework with respect to underground water management. ENR suggests that the response framework include maximum volumes and thresholds that will trigger action levels.</p>	<p>Jan 30: De Beers notes that this was not a requirement of the Water Management Plan. The TDS and Nitrogen response Plans discuss underground water management. As outlined in the TDS response plan, efforts to control flow from the source are difficult as grouting can cause large scale fall outs and often water finds an alternate path and continues to flow in other areas at the same rate and volume. For this reason a maximum volume threshold for underground water would not be an effective management trigger.</p>	<p>As per Schedule 5, item 1(c), the Proponent is required to develop Action Levels “applicable to the performance of the Water Management Pond with response to geotechnical stability, thermal characteristics, seepage quality and quantity, and run-off.” Although action levels are not required for underground flow volumes, the effects of high underground flow volumes on the function of the Water Management</p>

				Pond would be evident in the monitored parameters associated with the other action levels that are required.
2	Topic 2: Magnitude of Effect- Action Response	<p>Comment Comment(s): The proponent's states on pg. 43: "The magnitude of an effect is determined by comparing reference areas, background values, or benchmark values for water quality and quantity". However, the proponent does not define the threshold criteria that will be used or the statistical variance measurements that trigger the action response framework.</p> <p>Recommendation Recommendation(s): 1) The proponent must define what statistical, or alternative, measurements that constitutes an unacceptable change and provide it within the action levels.</p>	Jan 30: Please see De Beers response to AANDC11.	The Proponent's response to AANDC 11 refers the reviewer to the Response Plans. As noted above, the Water Management Plan should be a stand-alone document.
3	Topic 3: Section 3.3.1.2 Thermal Characteristics	<p>Comment Comment(s): ENR notes that the proponent has not provided an action level based on thermal characteristics. ENR understands that the North Pile will require permafrost aggradation, based upon the current design, for closure to reduce water seepage. As this is a closure concern, action levels should be established for the North Pile to ensure that its performance is in accordance with the design for closure.</p> <p>Recommendation Recommendation(s): 1) ENR requests that the proponent develop action levels for the North Pile with respect to thermal characteristics as per the design requirements.</p>	Jan 30: De Beers notes that the North Pile and its thermal characteristics are intentionally not discussed in the scope of the Water Management Plan. The comment is noted and may be captured in future iterations of the North Pile Plan.	The comment is noted and will be considered separately in reviewing future iterations of the North Pile Plan.

4	Topic 4: Section 2.1.5 Sewage Treatment	<p>Comment Comment(s): ENR notes that the proponent may incinerate sewage waste as an alternative method to landfill disposal. It must be demonstrated that the incinerator is capable of handling sewage waste. The proponent must also demonstrate that the sewage sludge is dewatered to levels that meet the batch requirements of the manufacturer while meeting the Canada Wide Standard (CCME) for dioxins, furans and mercury. Typically, portable batch waste Incinerators are designed to incinerate Class I/II and III waste types only. Type I, II and III waste are defined as different combinations of rubbish, garbage and refuse. These classifications are devised in order to meet specific heating values to enable this unit to operate as it was intended, which will minimize harmful emissions. Sanitary based waste streams are not Type I, II, and III waste, and ENR does not support the use of any mobile batch waste incinerators to treat wastes they are not designed for.</p> <p>Recommendation Recommendation(s): 1) ENR recommends that the proponent develop an alternative disposal method other than the incineration of sewage waste. Alternatively, the proponent must demonstrate that the incinerator is specifically designed for the disposal of sewage waste. The proponent must also demonstrate through formal emissions testing that the device will meet the CWS for Dioxins and Furans and Mercury (CCME) emissions when batched with sewage as per manufacturers recommendations (provided in writing).</p>	<p>Jan 30: Waste is primarily disposed of in the land fill, however, if the need existed, incineration is an accepted alternate disposal method. De Beers has a letter from the vendor, dated January 8, 2013, that guarantees the incinerator is both capable of meeting emissions standards, as per the Land Use Permit, and can accept sewage waste. Stack testing has been tentatively scheduled in May/June 2014.</p>	Proponent provided adequate response.
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North Slave Metis Alliance: Matt Hoover

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	<p>Comment (doc) 2014_JAN_23_NSMA_SNAP_WATER_MANAGEMENT_COVER</p> <p>Recommendation</p>		
2	Snap Lake Water Management Plan, Section 2.1.5 - Sewage	<p>Comment It is stated by the Proponent that "Solids produced during sewage treatment are caked and pressed in the filter press to remove additional water. Dewatered solids are bagged and usually land filled, however, on some occasions they may be incinerated." In this respect, the NSMA is wondering what concern, if any, is given to fecal contamination in the</p>	<p>Jan 30: After the bacteria has digested the raw sewage, water is removed leaving a paste like substance.</p>	It is not clear from the Proponent's response what situations would

	Treatment, pg 10.	<p>environment and how it is decided if dewatered solids are bagged or incinerated.</p> <p>Recommendation Please explain the precautionary steps that are used to deal with human sewage in a way that prevents potential contamination and</p>	<p>This is then pressed to form cakes which are disposed of in the landfill. Cakes are left to naturally breakdown and run off is captured the North Pile water collection system. Water is then piped to the WTP and E. Coli is tested for monthly at this station. If by chance there occurred a situation by which solids from the STP were not able to be disposed of in the landfill De Beers would use the incinerator as an alternative. This would likely involve a rare occurrence. Details on Sewage management are discussed in the Waste Management Plan. In addition, SHE-OP 0026, appended to the Waste Management Plan details the</p>	<p>prevent disposal of the STP solid waste into the landfill. If water quality in the Water Management Pond is a determining factor in the final disposal location of the STP solid waste, this link should be clearly presented in the Water Management Plan; otherwise, disposal of this type of waste is primarily detailed in the Waste Management Plan. As noted in the Proponent's response, this waste may impact the quality of the water discharged from the Water Management</p>
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			process for handling sewage.	Pond to the receiving environment. While E. coli is monitored at the final discharge point (SNP 02-17), there is no EQC set for E. coli. While E. coli have been present in some of the samples from this station, naturally-occurring sources of E. Coli to the Water Management Pond are likely present.
3	Snap Lake Water Management Plan, Section 2.1.6 - North Pile Water Control Structures, pg 11.	<p>Comment The proponent states that sump dewatering maintains water levels at "minimum practicable levels at all times".</p> <p>Recommendation Later in the document the word "practical" is used instead in this context. Please clarify/ edit this minor detail if necessary.</p>	<p>Jan 30: Both terms "practical" or "practicable" are in reference to maintaining sumps at minimal levels. The sumps have to retain enough water to provide circulation for the pumps which is practical and the process of</p>	The Proponent's response is adequate.

			maintaining minimal elevations is always being practiced.	
4	Snap Lake Water Management Plan, Section 2.1.6 - North Pile Water Control Structures, pg 11.	<p>Comment There is some confusion in the paragraph describing pump sequencing, and how sump management relates to nitrogen concentrations and levels in both the sumps themselves, and the WMP.</p> <p>Recommendation The NSMA seeks elaboration and clarification on how observational selection is used to manage pump operation, and how nitrates are dealt with should their levels register high in the WMP while at the same time sump levels are higher than "minimum practicable levels" which would necessitate dewatering as mentioned in comment 5. This is still unexplained later in the document in 2.4.2, pg 20.</p>	<p>Jan 30: Normally sumps are pumped based on the level of water in the sump. The pumping of a sump is also subject to the level of the Water Management Pond and nitrate levels in both the pond and sumps. Selecting the sump to pump is observational as daily pumping is based on an internal sump dashboard. The sumps are kept at a low level, although De Beers notes that the Water License requires the sumps be maintained 1 meter below design criteria.</p>	Please refer to AANDC 2.
5	Snap Lake Water Management Plan, Section 2.1.9 - WTP/ TWTP, pg 13.	<p>Comment It is explained that the temporary WTP can be expanded using additional filters, and mentioned that further capacity expansions are underway to offset additional underground flows.</p> <p>Recommendation The NSMA would like the Proponent to further delve into these planned expansions, and explain specifically if the expansion is to the temporary WTP, WTP, both, or in addition to existing facilities, and</p>	<p>Jan 30: The temporary water treatment plant is expanded during freshet by adding additional filters to</p>	The Proponent's response is adequate.

		what this expansion is planned to consist of.	increase pumping capacity. The Water Treatment Plant is currently undergoing an expansion with the addition of 2 modular plants located adjacent to the WTP to increase pumping capacity due to increased underground flows.	
6	Snap Lake Water Management Plan, Section 2.1.9 - WTP/TWTP, pg 13.	<p>Comment The process of water treatment for the Project is explained, but in an overly simplified and out of order way (IE: pH balancing is mentioned after discharge).</p> <p>Recommendation The NSMA recommends that the Proponent create a bulleted list or table in this section that shows each step of water treatment and discharge into Snap Lake, and explains how each step contributes to meeting water quality guidelines prior to release to Snap Lake. This detail may be accessible in the AEMP, however, it is a reasonable request given the context and existing information in the Plan.</p>	Jan 30: Water in treatment plant goes through flocculation (addition of ferric and polymers), sand filters and if necessary is pH adjusted through the additional of ammonia to ensure criteria are met. A flow diagram of the WTP will be added to future iterations of this document.	Proponent commits to add a flow diagram of the WTP to future iterations of this document.
7	Snap Lake Water Management Plan, Section 2.3.2 - WTP/TWTP, pg 17.	<p>Comment In regards to the construction of IL6 ditch as the result of the overtopping of Temporary Sump 4 the NSMA has several inquiries regarding locations and designs that are unanswered or unclear in the Appendix 1 map.</p> <p>Recommendation The NSMA requests a map to reference not only the location of IL6, Sumps, and cells, but also WTP's, basic piping, intake and</p>	Jan 30: De Beers agrees this will be done in a future iterations of this document.	Proponent agrees to add a map to reference the location of IL6, Sumps, cells, WTPs, basic

		outfalls. The map in Appendix 1 is of low quality and content.		piping intake and outfalls in future versions of the document.
8	Snap Lake Water Management Plan, Section 2.4.3 - WTP/ TWTP, pg 21.	<p>Comment Small amounts of treated water are said to be used for dust suppression on site, but still fresh water is being used for these purposes as well.</p> <p>Recommendation The NSMA encourages the use of treated water on site with the end goal of reducing the amount of water removed from the lake system.</p>	Jan 30: De Beers agrees this will be done in a future iterations of this document.	Proponent agrees to use only treated water for dust suppression on site.
9	Snap Lake Water Management Plan, Section 2.5 - Table 2-3, pg 23-28.	<p>Comment Units are absent from Column Q7 "Seepage from Snap Lake" in the Table.</p> <p>Recommendation Add units where missing.</p>	Jan 30: De Beers agrees this will be done in a future iterations of this document.	The Proponent has agreed to revise the Plan as recommended.
18	Snap Lake Water Management Plan, Section 2.7.1.8 - Conclusion, pg 32.	<p>Comment The Conclusion section lists responsibility, accountability and "diligent following of procedures" as the essential components of surface water management.</p> <p>Recommendation It would be beneficial to include training and education in this section, with required training described somewhere in the Surface Water Management Protocols.</p>	Jan 30: STP operator training is detailed in the Waste Management Plan appendices by SHE-OP. All WTP operators undergo on the job training and training by Vendors when new equipment was installed. For the surface water management protocols, it is difficult to list qualifications and	Proponent's response is adequate.

			education as it varies widely by activity and responsibility.	
19	Snap Lake Water Management Plan, Section 3.3.1.1 - Geotechnical Stability, pg 47.	<p>Comment Medium and high action thresholds are still listed as "TBD".</p> <p>Recommendation The NSMA encourages the proponent to further define all categories where action levels remain "TBD" prior to a low action level being reached in order to clearly mitigate the potential for environmental impacts and demonstrate their commitment to the transparent use of Action Levels.</p>	<p>Jan 30: Please see De Beers response to AANDC 12</p>	<p>As per the WLWB's Draft Guidelines to Adaptive Management – A Response Framework for Aquatic Effects Monitoring, setting low action levels is required. It is acceptable to set medium and high action levels as part of the response plan that must be developed when a low action level is reached.</p>
Snap Lake Environmental Monitoring Agency - SLEMA: Zhong Liu				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	<p>Comment (doc) Comment Letter on January 23, 2014</p> <p>Recommendation</p>		
2	General Comment	<p>Comment The Plan provides enough information for surface water management, but it is lacking information on underground mine water management.</p> <p>Recommendation It is recommended that De Beers provide related</p>	<p>Jan 30: The TDS and nitrogen response plans provide further details on</p>	<p>As noted in other responses, the Water Management</p>

		information for review.	underground water management, since it is these constituents of underground water that require management action. These plans will be referenced in a revised version of this plan.	Plan should be a stand-alone document, since it is unclear how these response plans will be addressed through the amendment process. Underground mine water is a component of the water management system and should be addressed in the Water Management Plan.
3	Section 2.1.6, page 12	<p>Comment Inland Lake 6 should be added into Table 2-1 if it is not considered part of the PS5.</p> <p>Recommendation Revision is required.</p>	<p>Jan 30: IL6 is hydraulically connected to PS5 through a channel in the road and the water which reports to IL6 will report to PS5. It is included in the PS5 calculation. De Beers also notes that IL6 ditch is not designed to provide excess</p>	<p>The Proponent's response is acceptable; however, this distinction should be clarified in the Plan.</p>

			storage capacity.	
4	Section 2.1.6, page 12	<p>Comment Table 2-1 Volume of Water Containment Structures and Figure 2-2 Wastewater Management are not consistent. Revision is required.</p> <p>Recommendation Revision is required.</p>	<p>Jan 30: De Beers agrees and will rectify in future iterations of this document.</p>	<p>The Proponent has agreed to revise the Plan as recommended.</p>
5	Figure 2-1 Water Balance Schematic Diagram, page 14	<p>Comment The arrow for Q5 should point to the WTP, instead of the WMP; and the note for Q5 is not correct. Only non-compliant sewage effluent will be diverted to the WMP.</p> <p>Recommendation Revision is required.</p>	<p>Jan 30: During installation of the new STP the infrastructure was placed so that all effluent from the STP now reports to the WMP, therefore making the contingency plan for non-compliant water obsolete since it will be normal practice.</p>	<p>The Proponent's response is adequate.</p>
6	Section 2.4.3, page 21	<p>Comment The description on Q19, Q20 and Q21 is not consistent with Figure 2-1.</p> <p>Recommendation Correction is required.</p>	<p>Jan 30: DeBeers agrees and will rectify in future iterations of this document.</p>	<p>The Proponent has agreed to revise the Plan as recommended.</p>
7	Section 2.4.3, page 21	<p>Comment It was mentioned that an inter-lock system linked with turbidity meter, nitrate meter, and chloride meter was or will be installed in the WTP to prevent from any non-compliant discharge. There is no description of the inter-lock system in the Plan.</p> <p>Recommendation Clarification is requested.</p>	<p>Jan 30: The turbidity meter was installed in the WTP during its construction and the nitrate monitoring system was installed in 2012 to aid in management decisions. Both are tied to an interlock system. The chloride</p>	<p>The Proponent has agreed to revise the Plan as recommended.</p>

			meter is installed to aid in management decisions but is not yet tied to the interlock system. DeBeers agrees and will rectify in future iterations of this document.	
8	Section 2.5, Table 2-3, page 23	<p>Comment The stream description is not accurate. For example, Q2 should be raw water to potable WTP, rather than WTP; Q5 should be treated effluent to Snap Lake via WTP, rather than direct discharge to Snap Lake; Q8 should be equal to Q6 plus Q7; Q9 is defined the direct precipitation on the sumps, how about the direct precipitation on the North Pile? What does Process Flows (Q11) mean? Q17=Q28-Q11, what is Q28? In addition, the Plan does not identify some water flows, such as the sump water from the Ammonia Nitrate Storage Pad, and (potentially non-compliant) runoff from the Fuel Tank Farm.</p> <p>Recommendation Revision is required.</p>	<p>Jan 30: It is agreed that revision is required to align Figure 2-1 and Table 2-3, however, not all the items described are in error (i.e. Q5 is correct). Process flows is water from the process plant used in diamond processing. Q28 was added in error. De Beers is of the opinion that water that flows to all sumps and as run off is captured in the diagram as run off and precipitation/freshet flows. As such it is unnecessary to divide these flows into</p>	<p>The Proponent has agreed to revise the Plan as recommended. Please refer to AANDC 3.</p>

			seperate line items.	
9	Table 2-4 Summary of SNP Sampling Stations, page 40	Comment no in-house testing for nitrate and chloride as agreed upon for SNP 02-17? Recommendation Clarification is requested.	Jan 30: This is done as a secondary management measure.	Please update Table 2-4 Summary of SNP Sampling Stations
10	Table 2-4, page 40	Comment SNP 02-18 is also an important station and should be incorporated into Table 2-4, even if it is only the summary of the AEMP monitoring results. Recommendation Revision is required.	Jan 30: De Beers will refer to SNP 02-18 and detail that its sampling frequency and reporting is completed under the AEMP. De Beers will not be repeating this information.	Please include SNP 02-18 into Table 2-4 or provide rationale supporting why it is not included.
11	Section 3.2.1, page 46	Comment Q16, Q17, and Q20 of Table 2-3 are mentioned, and there may be typo error. Q20 is evaporation, not seepage. Q21 should replace Q20 here. Recommendation Correction is required.	Jan 30: De Beers agrees and will rectify in future iterations of this document.	The Proponent has agreed to revise the Plan as recommended.
12	Section 3.3.1.3, page 48	Comment The effluent quality criteria table is a duplicate to the one at page 34. Recommendation Revision is required.	Jan 30: This statement is correct. The table was used in separate references but can be removed since it is duplicated.	The Proponent has agreed to revise the Plan as recommended.