

Mackenzie Valley Land and Water Board
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Staff Report

Applicant: De Beers Canada Inc.	
Location: Snap Lake, NT	Application: MV2011L2-0004
Date Prepared: August 19, 2013	Meeting Date: August 29, 2013
Subject: Notice of Modification – Installation of Second Permanent Diffuser	

1. Purpose/Report Summary

The purpose of this report is to present De Beers Canada Inc. (De Beers)'s notification regarding the installation of a second permanent diffuser at the Snap Lake Mine to the Mackenzie Valley Land and Water Board (the Board).

2. Background

- June 7, 2011 – Notice of replacement of treated water pipeline and diffuser received
- July 5, 2011 – Letter received from AANDC Inspector approving replacement of treated water pipeline and diffuser as modification
- July 7, 2011 – Board staff sent letter of acceptance to De Beers
- December 16, 2011 – Construction report for pipeline and diffuser replacement received
- May 16, 2012 – Notice of short-term emergency increase in discharge received
- February 6, 2013 – Request to increase discharge during freshet received
- February 15, 2013 – Request distributed for review
- March 4, 2013 – Review comments due
- March 5, 2013 – Review comments forwarded to De Beers
- March 8, 2013 – Notice of immediate increase in discharge received
- March 28, 2013 – Board staff response to notices of increased discharge
- July 18, 2013 – Notice of installation of second diffuser received

- July 25, 2013 – Notice circulated for review
- Jul 31, 2013 – Notice recirculated for review due to system error
- August 13, 2013 – Review comments due
- August 18, 2013 – Proponent response due
- August 29, 2013 – Notice presented to the Board

3. Discussion

De Beers replaced the original permanent discharge pipeline and diffuser in 2011 to address air entrainment issues. The AANDC Inspector authorized this modification under Part J, item 1 of the previous Water Licence, MV2001L2-0002.

In the spring of 2012, De Beers then notified the Board of a short-term increase in treated water discharge to 50,000 m³/day from 35,000m³/day as an emergency measure in response to increased water volume associated with spring freshet. A temporary floating diffuser was used to accommodate the additional discharge volume. It is unclear how long the temporary diffuser was used for; however, according to the 2012 Annual Water Licence Report, the monthly discharge volume increased by about 250,000 m³ in May, 2012, and although it decreased slightly in June, it remained elevated for the remainder of the year.

In February of 2013, De Beers requested an increased discharge rate of up to 60,000m³/day for up to six-weeks during the 2013 and 2014 freshet events. This request was presented to the Board as a notification, because Board staff determined that the discharge rate is not specifically regulated under the Water Licence. During 2013 freshet, the temporary floating diffuser was again used to accommodate the increased discharge.

Due to increasing inflows to the underground mine, the normal rate of discharge of treated water is expected to increase to 37,000m³/day. Because the discharge rate is already exceeding the 35,000m³/day capacity of the primary permanent pipeline and diffuser, De Beers has continued to use the temporary diffuser beyond the end of 2013 freshet. In its July 18, 2013 submission, De Beers states that the temporary diffuser cannot continue to be used past the fall, so it is planning to replace the temporary diffuser with a second permanent diffuser in September, 2013.

As noted in the July 18, 2013 submission, the design and specifications of the second pipeline and diffuser will be identical to the original permanent diffuser. The proposed construction and monitoring plan are also based on the replacement of the original pipeline and diffuser.

4. Comments

Board staff believes that the proposed installation of a second permanent diffuser is consistent with the terms and conditions of the Water Licence; however, the Inspector has not provided notification of authorization for the modification to the Board, as required under Part J, item 1(d). Without evidence of authorization from the Inspector, the full requirements of Part J, item 1 have not been met, and De Beers can only carry out modifications with written approval from the Board as per Part J, item 2.

As part of this modification to the wastewater discharge facilities, De Beers is proposing to add a fourth monitoring station to SNP Station 2-20, which is situated at the edge of the mixing zone around the diffuser. This requires modification of the SNP. An updated draft of the SNP is attached for the Board's consideration.

The treated-water discharge rate and volume is not regulated under the Water Licence, and although the discharge rate and volume was discussed during the Environmental Assessment, a maximum was not specified. The increased discharge will result in increased loading of parameters of concern into Snap Lake; however, these changes will be addressed directly through an upcoming amendment process.

5. Review Comments

Please see attached review comment summary table.

DFO reviewed the proposal and determined that it is not likely to result in impacts to fish or fish habitat. A letter to De Beers from DFO is attached for the Board's information.

The North Slave Métis Alliance recommended that the monitoring plan for SNP 02-22 include the standard practice of collecting duplicate samples. De Beers responded that duplicate samples would be collected as per the approved Quality Assurance and Quality Control (QA/QC) Plan; however, the description of duplicate sampling in the QA/QC Plan refers to the SNP as a whole and describes collection of duplicates as rotating between the SNP stations. No frequency is described. As such, it is possible that no duplicate samples will be collected at SNP 02-22 during the construction period unless specifically required by the Board.

As per the WL, the sampling pattern and frequency at SNP 02-22 is to be established by DFO, since it is primarily for the purpose of fisheries authorization monitoring. No comments were received from DFO regarding a requirement for duplicate samples.

6. Security

There is no security directly related to this request. Any security considerations should be addressed through the upcoming amendment process for water quality.

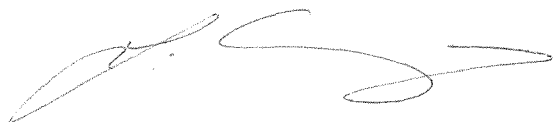
7. Recommendation

Board staff recommends that the Board consider approving the modification as submitted, or with conditions regarding duplicate samples and the QA/QC Plan. If the Board approves the modification, Board staff suggests that the Board also approve the proposed addition of an SNP monitoring station and circulate an updated SNP.

8. Attachments

- Review Comment Summary Table
- Covering Letter - NSMA
- Covering Letter – EC
- De Beers TSS Procedure
- Notice of Modification – Installation of a Second Permanent Diffuser
- Letter from DFO to De Beers – July 29, 2013
- Updated SNP and Figure 3
- Draft Response Letter – Conditional Approval
- Draft Response Letter - Approval

Respectfully submitted,



Lindsey Cymbalisky
Regulatory Officer

Review Comment Table

Board:	MVLWB																
Review Item:	MV2011L2-0004 - De Beers - Snap Lake - Installation of 2nd Diffuser																
File(s):	MV2011L2-0004																
Proponent:	De Beers Canada Inc. - Snap Lake																
Document(s):	Notice of Installation of 2nd Diffuser (9 MB)																
Item For Review Distributed On:	July 31 at 15:25 Distribution List																
Reviewer Comments Due By:	Aug 13, 2013																
Proponent Responses Due By:	Aug 18, 2013																
Item Description:	<p>De Beers has notified the Board that it intends to modify the wastewater discharge facilities at the Snap Lake Mine by installing a second permanent discharge pipeline and diffuser. Please submit comments using the Online Review System by downloading the excel comment table or using the "add comment" button by 5pm August 13, 2013.</p> <p>If you have any questions or comments regarding this modification or using the Online Review System, please contact Jen Potten at jpotten@mvlwb.com or 867-766-7468, or Lindsey Cymbalisy at lindsey@mvlwb.com or 867-766-7471.</p>																
General Reviewer Information:	<p>This request was also distributed to the following organizations by fax:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Organization</th> <th style="text-align: left;">Contact Name</th> <th style="text-align: left;">Contact Position/Title</th> <th style="text-align: left;">Email/Fax</th> </tr> </thead> <tbody> <tr> <td>Fort Resolution Métis Council</td> <td>Trudy King</td> <td></td> <td>(867)394-3322;</td> </tr> <tr> <td>Hay River Metis Council</td> <td>Wally Shuman</td> <td>President</td> <td>(867)874-4472;</td> </tr> <tr> <td>NWT Metis Nation</td> <td>Tim Heron</td> <td>NWTMN IMA Coordinator</td> <td>(867)872-2772;</td> </tr> </tbody> </table>	Organization	Contact Name	Contact Position/Title	Email/Fax	Fort Resolution Métis Council	Trudy King		(867)394-3322;	Hay River Metis Council	Wally Shuman	President	(867)874-4472;	NWT Metis Nation	Tim Heron	NWTMN IMA Coordinator	(867)872-2772;
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Fort Resolution Métis Council	Trudy King		(867)394-3322;														
Hay River Metis Council	Wally Shuman	President	(867)874-4472;														
NWT Metis Nation	Tim Heron	NWTMN IMA Coordinator	(867)872-2772;														

	Smith Landing First Nation	Andrew Wanderingspirit	Chief	(867)872-5154;
Contact Information:	Jen Potten 867-766-7468 Lindsey Cymbalisy 867-766-7471 Rebecca Chouinard 867-766-7459			

Comment Summary

Proponent General File(s)				
ID	Proponent General File Comment			
1 (doc)	TSS Sampling procedure			
Environment Canada: Jane Fitzgerald				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
1	General File	Comment (doc) EC letter - EC is unable to provide comments at this time Recommendation		N/A
GNWT - Environment and Natural Resources: Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
5	General File	Comment (doc) ENR Comments Recommendation		The letter consists of the comments listed below.
1	Topic 1: Plume Characterization Study	Comment Comment(s): The proponent indicates that the issues of air entrapment are predicted to be rectified; however a study of the design and plume characterization has not been carried out since the modifications of the primary diffuser. Recommendation Recommendation(s): 1) The proponent should clarify within the document all rationale for predicting that the entrapment has been rectified; and 2) The proponent should indicate design changes to the diffuser	Aug 19: Air entrapment was occurring upstream of the diffuser and associated pipe;	The Board believes De Beers' response is satisfactory.

	<p>model that were incorporated into the new design for the second diffuser to ensure that air entrapment does not occur again.</p>	<p>changes to the configuration of piping leaving the WTP and replacement of valves that allowed air to enter the system have rectified the issue of air entrapment based on visual observations. No design changes were required to the diffuser itself. A plume study will be conducted following construction and placement of the second diffuser and any necessary adjustments made based on the findings of that plume study. As well the following activities were taken: - Two eccentric reducers will be installed with small side orientated to bottom. This allows connection of</p>	
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			<p>the 400 mm HDPE pipe to the short 250 mm HDPE throttling section to minimize points of air accumulation. This detail is part of the previous Golder design on existing submerged outfall. This conceptual design is based on the assumption that no additional engineering analysis and/or modelling (e.g. hydraulics, transient, and diffuser dispersion) has been performed for the new diffuser pipeline and outfall system. - In addition 3 air/vacuum valves will be installed to eliminate as much air as possible when the line is operating in full flow, pressure mode. The air valves will be located at each major gradient change. - Also, in</p>	
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			<p>the water treatment plant, the inverted U on the pH tank discharge will be removed and replaced with an automatic control valve. - The pH tank level is currently maintained at levels above the syphon break, which avoid draining and filling of the outfall line. - The air control device on the current diffuser are working effectively and the second diffuser will incorporate the same design. From surface observation, there is no indication of air release.</p>	
2	Topic 2: Total Discharge Volume into Snap Lake	<p>Comment Comment(s): Due to the increased water demands that were not anticipated this second diffuser is required. The proponent has not indicated if there will be additional diffusers required as the Site continues to grow or if the current installation will allow for DeBeers to meet their future discharge requirements.</p> <p>Recommendation Recommendation(s): 1) Please clarify (based on the current water model) if this will be the only additional diffuser required or if future amendments and additional diffusers will be needed.</p>	<p>Aug 19: The proposed second diffuser will allow for discharge throughout the year, replacing the floating diffuser which was placed on the ice and only</p>	<p>The Board believes De Beers' response is acceptable for the purposes of this modification. Further details</p>

			<p>discharged prior to ice-off. It is not expected that this second diffuser will be discharging at full capacity over the next few years- discharge will be similar to that from the floating diffuser, about half of its full capacity. Thus, this second diffuser is expected to provide all necessary additional capacity through the life of the mine. Based on the current hydrogeological model predictions, the outflows would reach up to 70,000 m³/day. Two permanent diffusers should be adequate to meet this demand, since both diffuser are design for 35,000m³/day. Note that these predictions are based on current</p>	<p>related to discharge water quantity and quality are expected to be discussed during an upcoming amendment.</p>
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			information at the time of design.	
3	Topic 3: Field Method and Laboratory Analysis	<p>Comment Comment(s): The proponent has not indicated whether a duplicate analysis will be conducted as per industry accepted best practices; also, the proponent has not provided its operating procedure for gravimetric Total suspended solids (TSS).</p> <p>Recommendation Recommendation(s): 1) The proponent should conduct duplicate analysis as per industry accepted best practices to verify the reproducibility of field sampling and laboratory testing. Each sample-duplicate pair should be evaluated using relative percent difference method when concentrations are greater than or equal to the laboratory reportable detection limit. The proponent should amend its sampling methodology and QA/QC policy to include duplicate analysis; and 2) The proponent should highlight the on-site method used for TSS (EPA Method 160.2 or equivalent) including all deviations, if any, from the standard method. The proponent should also indicate the equipment used on-site, the type of filters used (match weight, disposable etc.) the oven temperature (ensuring logs are tracked as per ISO 17025 (Laboratory ISO)), the Certified Reference Material (including the manufacturers target value) and weighing methodology as per laboratory best practices.</p>	<p>Aug 19: 1) De Beers agrees to collecting duplicate samples as per the Approved QAQC plan. 2) Please see attached Standard operating procedure for sampling and processing TSS. This document is a component of the approved Quality Assurance and Quality Control Plan.</p>	<p>The TSS method was provided as requested. The Board notes that, as per the WL SNP, the pattern and frequency of monitoring at SNP station 02-22 is to be established by DFO, and no comments on the proposed monitoring program were received from DFO. The Board also notes that the QA/QC Plan includes rotating duplicate sampling for the SNP program, which includes this station</p>

			<p>when active, that the construction period will be of short duration, and that a useful random duplicate sampling program would be difficult to design given the proposed sampling program. The Board has determined that the duplicate sampling described in the QA/QC Plan should be implemented as per De Beers' response; however, no additional duplicate sampling will be required by the Board for</p>
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				the construction period. Duplicate analysis should be described in the next revision of the QA/QC Plan.
4	Topic 4: Spill Contingency Plan	<p>Comment Comment(s): The proponents Spill Contingency Plan is not in compliance with the AANDC Spill Contingency Guidelines (INAC 2007) and is not specific to the construction task.</p> <p>Recommendation Recommendation(s): 1) The proponent must abide by the overall site spill contingency plan previously approved by the Board. However, as the proponent has chosen to adopt a construction specific spill contingency plan it must be composed in accordance with the AANDC Spill Contingency Guideline (INAC 2007) found here: http://www.aadnc-aandc.gc.ca/eng/1100100024236/1100100024253#aB3 In addition, supplemental information is provided in the GNWT Spill Contingency Planning and Reporting Regulations found here: http://www.justice.gov.nt.ca/PDF/REGS/ENVIRONMENTAL%20PROTECTION/Spill_Conting_Plan_and_Report.pdf If clarification or further information is needed please contact the GNWT Environment and Natural Resources (ENR) Environment Division directly to aid in the development of the Plan.</p>	<p>Aug 19: The Environmental Protection Plan attached to the regulatory submission for increased discharge at the diffuser is not intended to replace the approved Spill Contingency Plan for the minesite approved by the MVLWB. Rather it provides further detail as to mitigation measures in relation to fish and fish habitat due to the nature of the work. The Spill contingency plan as approved and posted on eth Board</p>	<p>As noted by De Beers, the EPP attached to the submission does not replace the approved SCP, and the Board does not believe that it conflicts with the approved SCP. The proponent is expected to adhere to the approved Spill Contingency Plan (SCP) during the proposed construction activities.</p>

			website was created in accordance with the AANDC Spill Contingency Guidelines.	
MVLWB: Lindsey Cymbalisky				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
1	Water Treatment	<p>Comment The covering letter states that the diffuser will be attached to a "portable water treatment plant," however, a portable water treatment plant is not discussed in the attached submission, nor is it visible in the figures attached to the submission.</p> <p>Recommendation Please clarify whether the portable water treatment plant referenced in the covering letter has been/will be installed in addition to the existing water treatment plant. Please describe the treatment process in the portable treatment plant, the connection between the existing and portable treatment plants, and the long-term plan for water treatment at the increased rate of discharge.</p>	<p>Aug 19: The second diffuser will be connected to the existing pH tank in the main water treatment plant. Initially the pH tank will be supplied by the main water treatment plant as well as a pilot portable water treatment plant. This pilot plant utilizes a high rate clarification process combined with sediment filtration. - The results and the performances of the pilot plant will inform the long-term planning for expanded treatment</p>	<p>The Board believes that De Beers' response is acceptable for the purposes of this modification. Discharge water quality and quantity is expected to be the subject of an upcoming amendment application.</p>

			capacity. SLM is investigating solutions to separate and minimize turbidification of underground water at source to alleviate the requirement for TSS removal.	
2	Sections 5.3 and 5.5 - Laboratory analysis of TSS	<p>Comment Section 5.3 states that a sub-sample of the higher turbidity sample from each of the five stations will be analyzed for TSS on site as well as sent to Taiga Laboratories for independent analysis; however, section 5.5 states that only ten percent of the water samples analyzed for TSS will be sent to Taiga. It is unclear what samples the statement in section 5.5 is referring to.</p> <p>Recommendation Please clarify how many of the samples and blanks will be sent to Taiga for independent analysis.</p>	<p>Aug 19: During construction there will be twenty samples taken each day , two samples at each of the five stations twice a day. Of each station, the sample with the highest turbidity will be selected for further TSS testing. Those ten selected samples will then be divided(subsamples) and so every day during construction, the ten samples will be sent to Taiga for TSS analysis. The second set will be kept and analysed at the Snap Lake lab. According to</p>	The Board believes that De Beers' response provides the required clarification.

			standard accepted QA/QC practices (S 5.5), there will be travel blanks sent along with the "actual" samples. The travel blanks will be 10% of the actual, so that will be 1 travel blank per day during construction.	
North Slave Metis Alliance: Eric Binion				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
1	General File	Comment (doc) NSMA COVER LETTER Recommendation		N/A
2	Section 2.4, Pg 6	Comment In the report it is stated that "In previous sampling, the majority of fish captured in the vicinity of the embankment were Lake Chub." Recommendation The NSMA recommends clarifying if this statement is referring to baseline information, or following the installation of the first diffuser.	Aug 19: This statement refers to the time period following installation of the first diffuser	The Board believes that De Beer's response is acceptable.
3	Section 2.4, Pg 6	Comment It is speculated in the proposal that Lake Trout are not thought to congregate near the mine site, however, Lake Trout feed extensively on Whitefish, Grayling, Stickleback, and Sculpins (as noted by the DFO). The report states that "[t]he constructed minewater embankment area is suitable for spawning, nursery, rearing and foraging by small-bodied fish species and for foraging of largebodied fish species of Snap Lake (Golder 2008 a, b 2011)." Although Lake Trout may not use the constructed embankment habitat for spawning to date, the use of this habitat by other species may play an important roll in fall Lake Trout spawning occurring during the time of construction. Recommendation The NSMA recommends further monitoring of species present and successful habitat use prior to and following installation of the diffuser.	Aug 19: Monitoring of fish species present in Snap Lake was completed during the Environmental Assessment for the mine. As well fish	As noted in De Beers' response, the modification proposal was reviewed by DFO to determine

			<p>health and population work is completed in accordance with the AEMP approved design plan. Following installation the pipe and ballasts will have a relatively small footprint in terms of habitat. De Beers suggests that follow up fish use of the area is unnecessary based on the impacted area. The DFO commented on the project that if the installation was executed as proposed no adverse impacts to fish and fish habitat would occur.</p>	<p>whether it is likely to result in impacts to fish and fish habitat. DFO concluded that impacts are not likely.</p>
4	Section 2.4, Pg 6	<p>Comment It is claimed that in the De Beers report that "[t]he habitat is not considered spawning habitat for Lake Trout and could be considered low in importance for large-bodied fish species as it is a very small area." It is noted by the DFO that Lake Trout utilize coarse gravel/rubble areas only a few square metres in size.</p> <p>Recommendation The NSMA recommends clarifying that this area has not been a successful spawning habitat for Lake Trout to date, and whether monitoring has or will continue to take place in this respect.</p>	<p>Aug 19: There is no evidence based on work carried out to date in Snap Lake that Lake Trout use this area for spawning. Based on</p>	<p>The Board believes that De Beers' response is acceptable when considered in</p>

			<p>the proposed plan and the commitment to carry out a plume characterization study post installation that DFO has no concerns with Lake Trout spawning habitat impacts within the lake.</p>	<p>conjunction with DFO's review of the proposal.</p>
5	<p>Section 5.2.2, Pg 16</p>	<p>Comment The monitoring frequency states that during construction, sampling stations inside and outside the curtains will be monitored twice daily. It seems impossible under this sampling regime to have the necessary information to halt work should TSS levels be exceeded, as mentioned in Residual Effects, section 4.3 (Pg 14). Recommendation As it can be assumed that sediment mobilization will be highly variable, depending on the stage of construction each day, consider increasing the frequency of TSS sampling to meet your requirement of staying below 14 milligrams/ litre TSS.</p>	<p>Aug 19: The TSS sampling plan remains unchanged from what was proposed and carried out in 2011 when the existing diffuser was replaced. This was sufficient then and will be sufficient now as construction methods have not changed. Experienced personnel will install the second diffuser, they will have all the equipment necessary to carry out the work in a safe and protective manner.</p>	<p>The Board recognizes that the sampling plan allows for the possibility of a delay between the onset of a TSS exceedance and the implementation of response actions; however, the proposed sampling frequency was considered to be sufficient during the previous diffuser</p>

				<p>replacement. Additionally, as per the WL SNP, the sampling pattern and frequency at this location, when active, is to be determined by DFO, since the primary purpose of this station is for fisheries authorization monitoring. DFO did not comment on the proposed monitoring frequency. The Board concludes that there is insufficient rationale for increased sampling requirements.</p>
6	Section 5.4, Pg 18	<p>Comment With only two samples to be taken per day, the construction of time series plots of TSS and turbidity for the evaluation of apparent increasing trends would be a challenging task.</p>	<p>Aug 19: Please see comment above. The</p>	<p>Please see above.</p>

		Recommendation The NSMA recommends increasing sampling frequency to meet project goals.	TSS sampling plan remains unchanged from the approved plan carried out in 2011.	
7	Table 3: Proposed SNP 02-20 Monitoring	Comment The table says that an early life stage toxicity test is for Rainbow Trout (<i>Oncorhynchus mykiss</i>), but earlier the report states several times that the lake contains Lake Trout, (<i>Salvelinus namaycush</i>). Recommendation The NSMA recommends clarifying/editing this difference.	Aug 19: Rainbow Trout and Lake Trout are both salmonids. Rainbow Trout testing provides data relevant to other salmonids as this is a well-accepted, sensitive test species.	The use of Rainbow Trout in the ELS toxicity test is in accordance with common practice and with the current WL.