



SLEMA
April 2012
Environmental Update
for the Board

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April 30, 2012

Outline

1. Mine Update
2. Inspection Update
3. Regulator Update
4. Stakeholders' Update
5. Reviews
6. Agency's Activities



Acronyms

- AANDC – Aboriginal Affairs and Northern Development Canada (previous INAC – India and Northern Affairs Canada)
- AEMP – Aquatic Effects Monitoring Program
- ARD – Acid Rock Drainage
- DFO – Fisheries and Oceans Canada
- EC – Environment Canada
- ENR – Department of Environment and Natural Resources, GNWT
- GNWT – Government of the Northwest Territories
- MVLWB – Mackenzie Valley Land and Water Board
- PK – Processed Kimberlite
- SLEMA – Snap Lake Environmental Monitoring Agency
- SNP – Surveillance Network Program
- TDS – Total Dissolved Solids
- WEMP – Wildlife Effects Monitoring Program
- WTP – Water Treatment Plant
- WMP – Water Management Pond



1.1 Mine Update – March 2012

- Production rate: 75.2 % of its capacity (73,478 tonnes of kimberlite processed)
- 3,574 m³ of water withdrawn from Snap Lake
- 728,824 m³ of treated water discharged into Snap Lake
- 51,107 tonnes of coarse reject, 30,137 m³ of slimes and 20,540 m³ of **paste** deposited in the North Pile
- 10 spills (5 reportable)
- Water sampled in 6 monitoring stations
 - The monthly average for all parameters met compliance



1.2 Water Licence 2011 Annual Report

- Water Licence 2011 Annual Report
 - Submitted on March 30, 2012
- Aquatic Effects Monitoring Program 2011 Annual Report
 - Submitted on March 28, 2012



1.3 Responses to Inspector Information Request on Water Management Pond Seepage

- The Inspector requested information about Spill 12-058 on March 16, 2012
- De Beers responded on April 2, 2012
 - Site inspection conducted by a geotechnical engineer on March 1 and 9
 - No visual deformation at the structure following the seep
 - A root cause analysis was submitted on March 21



1.4 Re-assessment of De Beers Existing Certification of Environmental Management System

➤ Dated April 3, 2012

- Conducted by BSI (service provider for independent assessment and management systems certification)
- 206 risks listed
- 4 of them were identified as significant and warranting objectives and programs to be established
- A training program for all staff is planned for 2012
- De Beers is required to review the effectiveness of corrective actions and preventive actions



1.5 Winter Road Close

- Notice dated April 5, 2012
 - The last convoy arrived on site on April 4, and the Snap Lake spur road was deemed closed to traffic



1.6 Annual Waste Inventory

- Submitted on April 17, 2012
 - The inventory includes type, volume and the disposal location within the lease boundary for the period April 28, 2011 to March 31, 2012



1.7 Removal of Snow/Ice Berms and Grubbing

- Notification dated April 23, 2012
 - Removal of Snow/Ice Berms and Grubbing of Temporary Sump 4 starting on April 25



2. Inspection Update

- AANDC Inspector – Tracy Covey
- No Inspection Reports received in April



2.1 Comments on 2011 Mine Reclamation Status Report

- Dated April 2, 2012
 - The report is a vast improvement over previous versions
 - Notable shortcomings need follow-up to ensure compliance
 - Details in the attached comment table



2.2 Late Reporting of Spill Results

- Dated April 19, 2012
 - The reporting to the Inspector of non-compliant sample results were 13, 25 and 11 days after De Beers receipt
 - Required De Beers to provide all sample results to the Inspector within 48 hours of their receipt from the lab. “Failure to do so may lead to further enforcement action”.



Response from De Beers

- Dated April 25, 2012
 - “De Beers strives to ensure that all sample results are submitted in a timely manner”



3. Regulator Update

➤ MVLWB

- Completed the regulatory process for the renewal of the Type A Water Licence MV2011L2-0004 on April 4 and 5, and forwarded to the AANDC Minister for approval on April 13, 2012. Corrections about nitrate and ammonia loading in Part F, Item 9 were made on May 1
- Distributed 2011 Water Licence Annual Report on April 24

Not for Board approval

Comment due date: May 18, 2012



3.1 DFO Update

- On April 17, 2012, DFO issued a letter confirming that De Beer's requirements in Fisheries Act S35 Authorization SC-00-196 specifically related to habitat impacts from the zone of turbulence caused by the diffuser will be met by DeBeers full support of the Alexie Lake telemetry study
 - *Determination of lake trout habitat use in a NWT lake, with a focus on spawning and over-wintering potential* led by Paul Blanchfield



4. Stakeholders' Update

- Comments on 2011 Annual Mine Reclamation Status Report by
 - AANDC on April 10, 2012



4.1 AANDC Comments on 2011 Annual Mine Reclamation Status Report

➤ Dated April 10, 2012

- “there is minimal discussion or description of how the presence of slurry tailings may influence closure planning and research”
 - Recommendation – include closure planning considerations for a North Pile containing primarily slurry tailings



4.1 AANDC Comments on 2011 Annual Mine Reclamation Status Report (II)

- Research was originally intended to aid in developing a deposition plan for the paste tailings, but paste has not yet been deposited
 - Recommendation – Conduct research to determine how paste tailings deposition will be affected by the interaction of slurry and paste within a cell
 - Cover concept and depth estimates
 - Potential for and impacts of cryoconcentration from all materials
 - Update of water quality model and thermal model predictions
 - Constructability and trafficability of the slurry tailings



5. Reviews

- Water Licence 2011 Annual Report
 - Submitted on March 30, 2012
 - Appendix I 2011 Acid Rock Drainage (ARD) and Geochemistry Monitoring Report and Appendix II 2011 Dam Inspection Report, and AEMP 2011 Annual Report are being reviewed
- Water Licence MV2011L2-0004
 - Distributed on April 13, 2012
- Assessment of Water Management Dams
 - Dated April 27, 2012
- Quarterly Toxicity Results for SNP 02-17
 - Submitted on April 30, 2012



5.1 Water Licence 2011 Annual Report

- Submitted on March 30, 2012
 - The total amount of freshwater removed from Snap Lake during 2011 was 57,118 m³
 - 301,156 m³ of water from the Water Treatment Plant (WTP) was recycled for use in the Processing Plant
 - The total amount of discharge to Snap Lake was 8,470,332 m³ . 8,231,204 m³ from the WTP and 239,128 m³ from the temporary WTP
 - The total amount of treated sewage effluent discharged from the Sewage Treatment Plant (STP) during 2011 was 24,545 m³



Construction activities undertaken in 2011

- Relocation of meta-volcanic rock by South Pit to the North Pile
- Construction of East Cell embankments and ribs
- De-commission temporary camp for shipment on the winter road
- Installed pipe bench for paste line
- Completion of Paste Plant
- East Cell of the North Pile Construction
- Diffuser pipeline replacement



Annual Hydrogeological Modeling in 2011

- Seepage down across the lake sediments and the upwelling connate waters are two of the main sources of flow to the mine workings and the two main sources of TDS to the lake
- The lake outflow flumes show that the lake outflow streams are active for at least part of the winter months
- The flow model was calibrated to the calculated or measured mass loading data and successfully matched the current history of TDS mass loadings from mine water outflows
- The model will continue to be refined in 2012



Comments from the Environmental Analyst

- Section 22 summarizes the sampling activities at each SNP station, but does not summarize the compliance of each station as previous annual reports did
 - Recommendation – to provide compliance summary
- Section 25 summarize 32 events of unauthorized discharge (spill), but some information is out of date, e.g. the volume of 11-391 and 11-469
 - Recommendation – to update Table 25-1



5.2 Water Licence MV2011L2-0004

- Type A
- Effective date: June 14, 2012
- Expiry date: June 13, 2020
- The overall structure of the WL has been changed and a table of contents has been included
 - All management plans, reports, and the security deposit referenced in the main body of the Licence have been moved into the Schedules appended to the Licence



Supporting Documents

- The Renewal is supported by the Reasons for Decision, which has three appendices:
 - Appendix A. Table of Reasons for Each of the Specific Conditions
 - Appendix B. Implementation of Recommendations Related to Adaptive Management from MVEIRB's 2003 Report of Environmental Assessment for the Snap Lake Diamond Project
 - Appendix C. Reasons for Decision for Effluent Quality Criteria (EQC) for the Snap Lake Diamond Mine Renewal Water Licence



Justifications for 8 Years of Water Licence Term

- The term of the Licence is not an enforcement issue
 - If the water quality in Snap Lake approaches the TDS or other WQOs, the Licence can be amended at the appropriate time; it does not require a renewal. Changes have been made to the WL to allow for more active management of the WL through implementation of the various Response Plans
 - In addition, the considerable time and resources involved in a type A WL renewal by all parties involved was also a factor considered in determining the term of the WL



Justifications for the Security Requirements

- De Beer' total security estimate was \$49,932,130. AANDC's total security estimate was \$75,373,336. AANDC and De Beers were not able to agree on the total security amount necessary to address the cost of closure
- The MVLWB decided to maintain the Water Licence related security estimate at \$39,066,247.00
 - Current value of \$39,066,247.00 is adequate to address the water-related liability
 - The Interim Closure and Reclamation Plan (ICRP) will be updated



Effluent Quality Criteria for SNP 02-17(b)

- Except the site-specific water quality objective (WQO) for Chromium, CCME Guidelines for the Protection of Aquatic Life were used to derive EQC
- EQC are set on the basis of meeting WQOs at the edge of the mixing zone (a 200m radius around the effluent diffuser)
- Maximum grab concentrations for EQC are generally double the monthly average concentrations.
- Both achievability at the Mine and consistency with the *Water and Effluent Quality Management Policy* objective of minimizing waste discharge are considered



WQO and EQC

Parameter	EQC in mg/L					Average Annual Loading in kg/yr	Water Quality Objective in mg/L
	Maximum Average		Maximum Grab				
	New WL	Current WL	New WL	Current WL	Current WL		
Total Dissolved Solids							350
Total Suspended Solids	7	= 7	14	= 14			5
Ammonia as N	10	n/a	20	= 20		187,000	1.47
Nitrite as N	0.5	< 1	1.0	< 2			0.06
Nitrate as N (up to December 31, 2014)	22	< 28	44	< 56		219,000	3.61
Nitrate as N (from January 1, 2015)	4	n/a	8	n/a		219,000	
Phosphorus						256	
Chloride (up to December 31, 2014)	310	n/a	620	n/a			120
Chloride (from January 1, 2015)	160	n/a	320	n/a			
Fluoride (from January 1, 2015)	0.15	n/a	0.3	n/a			0.12
Sulphate	75	n/a	150	n/a			50
Aluminum	0.1	< 1	0.2	< 2			0.1
Arsenic	0.007	< 0.02	0.014	< 0.04			0.005
Cadmium		0.002		0.001			
Chromium	0.01	< 0.02	0.02	< 0.04			0.047
Copper	0.003	< 0.01	0.006	< 0.02			0.0024
Lead	0.005	= 0.005	0.01	> 0.009			0.001-0.007
Nickel	0.05	= 0.05	0.1	= 0.1			0.025-0.15
Zinc	0.01	= 0.01	0.02	= 0.02			0.03

Comments on EQC from the Environmental Analyst

- In Appendix C (Reasons for Decision for EQC), it is stated that
 - “There was no evidence provided to change the loading limit for ammonia and, therefore, the loading limit remains unchanged from MV2001L2- 0002” (page 7); and
 - “There was no evidence provided to change the loading limit for nitrate and, therefore, the loading limit remains unchanged from MV2001L2-0002” (page 10)
- However, no related conditions about loading limits of ammonia and nitrate appear to be in the Renewal Water Licence
 - Clarification is requested (e-mail sent out on April 26, 2012)



Response from the MVLWB

- E-mail dated May 1, 2012
 - An honest omission
 - Added the loading limits back into the table on May 1



Surveillance Network Program

- SLEMA recommended a few potential locations for SNP 02-18
 - Agreed by De Beers
 - But not added into the SNP
 - Will be sent out for review
- The MVLWB agreed with SLEMA that there was an oversight, and decided to add annual TDS forecasting condition back into the Licence



Comments on the Renewal Water Licence from the Environmental Analyst

- In general, the terms and conditions of the Renewal Water Licence are satisfactory



5.3 Assessment of Water Management Dams

- Dated April 27, 2012
- De Beers retained Golder to perform an assessment of the dams of the Water Management Pond (WMP) following the observations of seepage downstream of Dam 1 on February 29, 2012 and March 30
- A geotechnical engineer visually inspected Dam 1 and assessed related documents



Assessment of WMP Dam 1 (I)

- The structure is considered to be stable
- Seepage from Dam 1 is expected
- The foundation of the dam and the ground beneath the WMP are expected to be thawed
- Monitoring data of piezometers indicated that there is direct hydraulic connection between the WMP and the downstream area



Assessment of WMP Dam 1 (II)

- Seepage downstream of Dam 1 was observed in the past. The promotion of freezing is not considered to have stopped the seepage from the WMP; rather, it resulted in the seepage flowing beneath the ground surface and precluded its observation
- The construction of a seepage collection pond downstream of Dam 1 is considered challenging given the ground conditions in the area



Assessment of WMP Dam 1 (III)

- The preferred option is to lower the water level of the WMP, which is dependent upon the water quality and treatment constraints
- De Beers is exploring the requirements to reclassify seepage events at Dam 1 from “spills” to “seepage events”. From a geotechnical point-of-view, this reclassification is considered to be reasonable



Comments from the Environmental Analyst

- It is recommended that the seepage issue in the WMP be addressed in a technical meeting



5.4 Quarterly Toxicity Results for SNP 02-17

- Submitted on April 30, 2012
- Water Treatment Plant (WTP) effluent samples taken on March 11 were tested
 - By HydroQual Laboratories Ltd. (Calgary) during March
- Standard biological test methods used
- 4 analysis reports for each samples submitted
 - Algae – inhibitory effects did not occur
 - Ceriodaphnia – no significant dose-response was observed for both mortality and reproduction
 - Trout – no effects occurred
 - Daphania – no effects occurred



Comments from the Environmental Analyst

- No concerns are raised



6. Agency's Activities

- SLEMA Wildlife Workshop held on April 11, 2012
- SLEMA Core Group Meeting held on April 12, 2012

