



March 2013
Environmental Update
for SLEMA Board

Zhong Liu
March 31, 2013

Outline

1. Mine Update
2. Inspection Update
3. Regulators' Update
4. Aboriginal Update
5. Stakeholders' Update
6. Agency's Activities
7. SLEMA Reviews



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 – February 2013

- Production rate: 98.5% of its capacity (86,838 tonnes of kimberlite processed)
- 3,537 m³ of water withdrawn from Snap Lake
- 940,357 m³ of treated water discharged into Snap Lake
- 79,988 tonnes of coarse reject and 56,195 m³ of slimes deposited in the North Pile; no paste deposited in the North Pile
- 2 spills (1 reportable)
- Water sampled in 6 monitoring stations
 - The monthly average for all parameters met compliance



1.2 Spill Reporting in March 2013

- No spill reports were received in March 2013



1.3 Follow-up of Annual Forecasting of Whole Lake TDS

- De Beers committed to submitting a technical memorandum to the MVLWB in February 2013, on January 9, 2013
- SLEMA sent a follow-up e-mail to De Beers on February 28
- De Beers Responded on February 28
 - Both the MVLWB and De Beers agreed that it would be included in the Water Licence 2012 Annual Report
 - There would be two years of modeling as an addendum to that report



1.4 AN Pad – Technical Memorandum

- Dated March 5, 2013
 - In response to the Inspector's report dated December 20, 2012
- A follow up to the ARKTIC Solutions Memorandum of August 31, 2012



1.5 Notification – Immediate Discharge Increase Required

➤ Dated March 8, 2013

- Notification of the commencement of water discharge through the second diffuser
 - De Beers is using the diffuser to properly manage and treat the increased inflow and to lower the amount of stored water underground to make room for 2013 freshet
 - A series of actions has been taken to manage the water flows



1.6 Responses to SLEMA Inquiry about Paste Deposition and Underground Spills (I)

- Dated March 12, 2013 via e-mail
- Paste Deposition
 - De Beers is currently undergoing underground trials with a 2-3% cement component. Paste has also been deposited in the North Pile on a semi continuous basis. De Beers will submit an update after getting conclusive results of this test work



1.6 Responses to SLEMA Inquiry about Paste Deposition and Underground Spills (II)

➤ Underground spills

- It is very difficult to recover spills in the underground once they take place as it is an incredibly wet zone
- De Beers must rely on the Mine Settling Sump (MSS) and sampling at SNP 02-01 to monitor the effectiveness of the MSS
- De Beers can't ascertain volumes of oil and material from the MSS as it is skimmed and is a composite of materials on the surface and also forms as a processed kimberlite/hydrocarbon mulch at the bottom of the MSS that has to be mucked out (it has been carried out once since it's creation). The material was actually processed to recover diamonds at that point



1.7 Closure Options and Research Workshop

- March 13, 2013
- Participants
 - Staff from De Beers and Arktis Solutions (Consultant)
 - Staff from MVLWB, AANDC, DFO, EC
 - Staff from YKDFN, LKDFN, DKDFN, NSMA
 - Staff from SLEMA
- De Beers/Arktis Solutions presented the update for the closure options and reclamation research, followed by questions and discussion
- De Beers will submit the Interim Closure and Reclamation Plan in May 2013 for review



1.8 Wildlife Effects Monitoring Program Update

- Dated March 15, 2013
- Submitted to SLEMA
 - An update to the Wildlife Effects Monitoring Program (WEMP), following a review of current wildlife monitoring results at the mine, and at other diamond mines in the region



Changes to the current WEMP (I)

- Removal of aerial surveys for caribou during the northern migration, annual raptor nest use and productivity surveys, and wolf den use surveys in the study area
- Modification to the caribou aerial survey design to assess a zone of influence
- Replacement of surveys for bear sign with a regional hair snagging program to monitor grizzly and black bears



Changes to the current WEMP (II)

- Replacement of wolverine surveys for snow tracks with a standardized hair snagging program
- Systematic surveys of wildlife interactions with the site, waste management areas, and the winter access road
- Action levels to guide adaptive management for habitat loss and direct Mine-related wildlife mortality



1.9 Response to SLEMA Concern on Air Entrainment in the Diffuser

➤ Dated March 21, 2013

- De Beers' maintenance staff inspected the outfall line to Snap Lake on September 19, 2012 and through observation it was apparent that an air valve was acting as a significant source of air entrainment into the line. It was concluded that the vacuum-breaking function of this valve was the source of entrained air flowing to the diffuser
- The valve was isolated from the system by being placed in the off position and a significant improvement in performance was observed immediately
- Air entrainment is no longer a concern



1.10 Responses to Inspection Reports Dated October 2 and November 15, 2012 (I)

- Date March 25, 2013
- The Inspector was concerned about the exceedances of effluent quality criteria (EQCs) set out in Part F of the Water Licence
 - De Beers responded that EQCs apply only to Water and Waste entering the Receiving Environment and not within the Project boundary set out in the Environmental Assessment Report



1.10 Responses to Inspection Reports Dated October 2 and November 15, 2012 (II)

- De Beers contracted Golder Associates to provide a third part review of the seepage characteristics and regional variability. The review identified that the natural background levels and variability are higher than licence EQCs
- Elevated Total Suspended Solids (TSS) and total metals were likely due to the Waterra sampling method used to collect water samples. This method often disturbs the sediment at the bottom of the standpipe and therefore the sample is not representative of the water quality. Measures are taken to provide a better sampling



1.10 Responses to Inspection Reports Dated October 2 and November 15, 2012 (III)

- “De Beers respectfully requests that the Inspector’s direction be deemed as complete. Understanding the methods of sampling as well as the terminology of “receiving environment”, “project” and the range of natural variability in the region demonstrates that it is unnecessary to capture and/or treat seepage and groundwater.”



1.11 Analysis of Environmental Effects on Wildlife, 1999 to 2012

- Submitted on March 27, 2013
- The report includes a full analysis of monitoring data gathered from 1999 to 2012



1.12 Response to SLEMA Comment Dated March 22, 2013

- Dated March 31, 2013
- SLEMA requested to be involved in the design of the WEMP report
- De Beers responded that the report was due on March 31 and could not be changed at this late stage, and comments and recommendations by SLEMA would be continue to be encouraged and considered, as in the past
- De Beers has considered and incorporated the comments and recommendations SLEMA provided in 2012



2. Inspection Update

- AANDC Inspector – Patrick Kramers
- No Inspection Reports received in March 2013



3. Regulators' Update

- No decisions were made by the MVLWB



4. Aboriginal Update

- No comments received from the Aboriginal groups in March 2013



5. Stakeholders' Update

- DFO Commented on Plume Characterization Study Report, on February 22, 2013
- AANDC Commented on De Beers request on Increased Discharge during 2013 Freshet, on March 4
- Proposed Change to the SNP Rainbow Trout Early Life Stage (ELS) Toxicity Testing
 - ENR Commented on March 11
 - EC Commented on March 11
 - AANDC Commented on March 11



5.1 DFO Comments on Plume Characterization Study Report

- Dated February 22, 2013
 - DFO's main concern was the extent of the zone of the turbulence to determine how much habitat compensation was required. That's now been sorted out with DeBeers supporting the lake trout movement study
 - No comments or concerns at this time



5.2 AANDC Comments on Increased Discharge during 2013 Freshet (I)

➤ Dated March 4, 2013

- AANDC is not opposed to De Beers discharging effluent in order to control water on-site, particularly if this is required during the freshet period.
- AANDC stresses that discharge must meet the Effluent Quality Criteria
- AANDC believes a better option would be to have additional water storage to accommodate times of higher water on-site as would be expected during spring thaw



5.2 AANDC Comments on Increased Discharge during 2013 Freshet (II)

- AANDC recommends that DeBeers develop a contingency in the event that effluent discharge during the freshet period does not meet EQC and could not be discharged
- AANDC recommends that DeBeers monitor water quality and mixing under ice during this period to assess conditions and ensure that water quality is safe for aquatic life



5.2 AANDC Comments on Increased Discharge during 2013 Freshet (III)

- AANDC recommends that toxicity testing of effluent and water at the edge of the mixing zone be assessed during this period of increased discharge to ensure conditions are safe for fish
- Weekly samples of discharge for EQC (as mentioned above) should be sent to the laboratory under "rush" or "emergency" protocols thereby shortening turnaround times



5.3 ENR Comments on Proposed Change to the SNP Rainbow Trout Early Life Stage (ELS) Toxicity Testing

- Dated March 11, 2013
- No comments or recommendations at this time



5.4 EC Comments on Proposed Change to the SNP Rainbow Trout Early Life Stage (ELS) Toxicity Testing

- Dated on March 11, 2013
- No concerns with the changes. However, if there is evidence of chronic toxicity in the suite of tests, it is recommended that this be revisited



5.5 AANDC Comments on Proposed Change to the SNP Rainbow Trout Early Life Stage (ELS) Toxicity Testing (I)

- Dated on March 11, 2013
- The 70-day Rainbow Trout ELS test should be performed from July-September 2013, as indicated by the company
- The decision to change the SNP requirement to a shorter duration (30-day or 7-day) test could be made following review of the results of the 2013 Rainbow Trout ELS toxicity test



5.5 AANDC Comments on Proposed Change to the SNP Rainbow Trout ELS Toxicity Testing (II)

- DeBeers should investigate the potential for the ELS toxicity testing to occur at the site. This may reduce the logistical costs of shipping the water to southern laboratories
- In order to support the requested change to the SNP, DeBeers should run a Toxicity Identification Evaluation (TIE) if there is a failure in any of their standard chronic toxicity tests during 2013. Note, understanding the source of the toxicity may indicate how it could influence fish and what life stage would most susceptible to the exposure



5.5 AANDC Comments on Proposed Change to the SNP Rainbow Trout ELS Toxicity Testing (III)

- Shorter duration chronic toxicity tests for Rainbow Trout should be performed during the estimated 6 week period of increased discharge during the freshet period
- The MVLWB could consider a change to the SNP requirement following the results of the 70-day ELS toxicity testing in 2013. If a toxicity failure occurs during standard toxicity testing in 2013 (at SNP 02-17 or SNP 02-20), a TIE should be run to determine the cause



6. Agency's Activities

- SLEMA staff attended the Wildlife Monitoring Workshop - Carnivore (ENR) on March 5, 2013
- SLEMA Core Group Meeting held on March 6
- SLEMA staff attended the Closure Options and Research Workshop on March 13
- SLEMA engaged Anne Gunn to review the Analysis of Environmental Effects on Wildlife, 1999 to 2012
- 5 letters were issued out in March 2013
 - <http://www.slema.ca/slema-review-2013/>



7. SLEMA Reviews

- Quarterly Toxicity Results for SNP 02-17
 - Submitted on March 4, 2013
- AN Pad – Technical Memorandum
 - Submitted on March 5



7.1 Quarterly Toxicity Results for SNP 02-17

- Submitted on March 4, 2013
- Water Treatment Plant (WTP) effluent samples taken on January 7 were tested
 - By HydroQual Laboratories Ltd. (Calgary) during January
- Standard biological test methods used
- 4 analysis reports for each samples submitted
 - Algae – inhibitory effects did not occur
 - Ceriodaphnia – no effect occurred
 - Trout – no effect occurred
 - Daphania – no effect occurred



Comments from the Environmental Analyst

- No concerns are raised



7.2 AN Pad – Technical Memorandum

➤ Dated March 5, 2013

- In response to the Inspector's report dated December 20, 2012
 - The Inspector requested a summary memorandum as describe in the ARKTIC Solutions Memorandum dated August 31, 2012



Information Request from the Inspector (I)

- *A review of as-built data to establish the ability of the Sump to capture drainage from the pad*
- *An assessment of whether or not additional surveying will be required*
- *Confirmation of the existing extent of the HDPE liner*



Information Request from the Inspector (II)

- *A review of AN handling operations at the Emulsion Plant to identify any potential activities that could introduce significant amounts of AN into the receiving environment (this should be concluded prior to freshet, 2013, with results forwarded to the Inspector)*
- *A review of water quality results at the Sump, SNP 02-09, SNP 02-09.4 and SNP 02-09.5 to evaluate nitrate and ammonia trends for comparison with the timeline of completed remediation activities in the area*



Report Conclusion (I)

- Review of the original design and as-built construction reports, as well as, current AN handling procedures for the Emulsion Plant area suggested that the excavation of the AN Storage Pad should not impact surface drainage and the capture of potential contact water at the Emulsion Plant Pad and Sump
- The existing spatial extents of the HDPE liner were confirmed at the northern edge of the Emulsion Plant Pad and at the top of the Sump berms on all sides. This area is not a future concern for the release of contact water to the surrounding environment as no storage or handling of AN occurs on the access road based on current operations, and all runoff drains towards the area Sump



Report Conclusion (II)

- At a number of locations, parameters exhibited an increasing trend throughout the summer. It is expected that these concentrations will continue to decrease in 2013. Additional monitoring is recommended to further evaluate successful removal of all contaminant sources
- Findings of the sampling program and review indicated that any effects to Snap Lake from surface water runoff impacted by the Emulsion Plant are a appeared to be negligible



Report Recommendation (I)

- Surface water monitoring at locations to the north of the Emulsion Plant area should continue as per the current SNP design
- A monitoring location further down gradient to the south of the Emulsion Plant area (02-09.4 and 02-09.5) is recommended to provide a better representation of water released from the project to the aquatic environment and confirm that adequate natural attenuation is occurring



Report Recommendation (II)

- Surface water sample collection at all of the SNP locations should avoid areas of stagnant, pooled water as these sites provide a poor representation of runoff and/or seepage water quality at the Emulsion Plant Area
- Planning for revegetation activities at the former AN Storage Pad area should commence to increase stability of disturbed soils



Report Recommendation (III)

- SNP monitoring data should be reviewed at the end of 2013 to further assess performance of the Emulsion Plant Pad and Sump, as well as, the natural attenuation of any residual AN traces existing outside of the Sump catchment area and the potential requirement for further environmental assessment or remediation activities. Results of monitoring will be summarized in the Water License Annual Report submitted in March each year



Comments from the Environmental Analyst

- The technical memorandum is acceptable
- All five recommendations are supported



Communication with De Beers

- The Environmental Analyst asked via e-mail, on March 11, 2013, whether De Beers adopted the recommendation of new monitoring station further down gradient to SNP 02-09.4 and SNP 02-09.5, and planning for revegetation activities at the former AN Storage Pad area
- De Beers responded, on March 12, that a station was established halfway between SNP 02-09.4 /-09.5 and South AN Lake, revegetation was a research item for 2013/14/15

