



October 2012
Environmental Update
for SLEMA Board

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Outline

1. Mine Update
2. Inspection Update
3. Regulators' Update
4. Stakeholders' Update
5. SLEMA 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 – September 2012

- Production rate: 87.8% of its capacity (82,930 tonnes of kimberlite processed)
- 2,878 m³ of water withdrawn from Snap Lake
- 606,966 m³ of treated water discharged into Snap Lake
- 67,169 tonnes of coarse reject and 35,668 m³ of slimes and 20,691 m³ of paste deposited in the North Pile
- 1 spills (1 reportable)
- Water sampled in 9 monitoring stations
 - The monthly average for all parameters met compliance



1.2 Spill Reporting in October 2012

Date	Location	Waste Spilled	Amount (L)	Cause
October 10	Process plant	Water	2,000	Loss of pumping ability due to a power surge



1.3 Responses to the Inspector's Request on Repairs of SP3

➤ Dated October 1, 2012

- The Inspector requested information on Perimeter Sump 3 on September 26
- De Beers responded
 - A summary of repair work will be completed
 - Work is currently underway to complete. As well to reduce the likelihood of future spills, SP3 will be operated at or below its design elevation



1.4 ALS (Laboratory) and Late Reporting of Laboratory Result for August 2012

➤ Dated October 3, 2012

- Addressed to De Beers from ALS
- ALS apologized for the failure on the part of ALS to complete and forward to De Beers all the laboratory reports for the month of August in time for the required reporting period
 - Communication failures within ALS
 - Protocols established for remedial communication
 - “this situation will not happen again”



1.5 Cement Pad for Incinerator

- Dated October 9, 2012
 - The cement pad, which was to be used as the foundation for our future incinerator, was poured prematurely on September 21
 - Currently nothing has been placed on the cement pad, as De Beers is still researching options regarding the purchase of a new incinerator, which conforms to the appropriate guidelines for air quality



1.6 Closure and Reclamation Plan Proceedings

- Dated October 11, 2012
 - In response to stakeholder concerns in terms of information dissemination at the AEMP Redesign meeting, De Beers proposed the following approach to engaging with communities for the Interim Closure and Reclamation Plan (ICRP):
 - Between December and February meet with individual communities as available to discuss the closure plan with a focus on involving elders
 - The week of February 25, 2013, hold a technical session with Land and Environment staff, federal and territorial government and independent agencies to discuss the community meetings as well as comments on objectives in the ICRP



1.7 De Beers Responses to Inspection Report dated July 27, 2012

- Dated October 18, 2012
- Responded to the Inspection Report dated June 27
 - Operating the WTP using a reduced Turbidity trigger for recirculation from 10 mg/L to 7 mg/L, additional preventative measures implemented to provide assurance that the maximum grab limit of 14 mg/L is not exceeded
 - Naturally elevated levels of copper and zinc, and TSS sampling while the sediment could be disturbed, contributed to non-compliant results
 - Reclamation of the AN pad was completed



1.8 Notification: Cement Pad for PS5

- Dated October 22, 2012
 - “A cement pad, which is to be used as part of the North Pile Insulated Piping and Pump Upgrade project for additional distribution loading required by the pump stations, will be poured in the next week”



1.9 De Beers Responses to Modification Conditional Approval (October 11, 2012)

➤ Dated October 22, 2012

- Cell 1 of the East Cell will have sufficient capacity for landfill until the West Cell is commissioned in several years time. Calculation have determined that the remaining space in the Starter Cell will provide enough area for PK deposition that is taken from the East Cell
- The Domestic Waste and Sewage Management Plan has been updated to reflect the modification



1.10 De Beers Responses to SLEMA Concerns in August 2012 Environmental Update

- Dated October 25 to 30, 2012 via e-mail
 - *Monitoring between the East Cell and Snap Lake shoreline*
 - De Beers has been conducting nitrates monitoring and conductivity along the shoreline of Snap Lake (during summer months), at Bog stations between the East Cell and Snap Lake. To date reporting has remained internal
 - *Is landfarm operational?*
 - De Beers has a landfarm which is bermed and lined. To date the landfarm is not commissioned due to lack of designated manpower to run the cell as needed
 - Comments on deposition sequence and paste definition
 - To be addressed in the revised copy of the North Pile Management Plan



1.10 Responses to SLEMA Concerns in August 2012 Environmental Update (II)

- *Comments on Closure Objectives and the North Pile Management Plan*
 - This Plan is currently being revised since receiving comments back from the original July submission
- *Landfill location*
 - Currently De Beers has been approved to relocate the landfill to Cell 1 of the East Cell. Previous landfill locations have been recorded. Landfill locations will be continued to be recorded for the life of mine. Upon reaching capacity in cell 1 of the East Cell De Beers will relocate the landfill to the West Cell, as per EA
- *Underground Spills*
 - we are currently investigating are the number of underground spills



Comments from the Environmental Analyst

- The responses are appreciated
- The communication efforts are encouraged to be maintained



2. Inspection Update

- AANDC Inspector – Tracy Covey
- No Inspection Reports for Water Licence and Land Use Permit received in October 2012



2.1 Compliance with Inspector Direction Issued July 10, 2012

- Dated October 1, 2012
 - The Inspector directed, on July 10, De Beers to determine, prior to September 15, 2012, the extent and nature of seepage occurring past Dam 1 of the Water Management Pond
 - De Beers provided information and data on September 14 and 26, which satisfies the requirements of the Direction



2.2 Direction to Capture Seepage from Dam 1 of the Water Management Pond

➤ Dated October 2, 2012

- Water quality data from the base of Dam 1 over the last 6 months indicates that seepage quality is not meeting Water Licence water quality criteria throughout the calendar year
- De Beers is directed to
 - Implement measures to ensure the capture of Dam 1 seepage by April 30, 2013
 - Direct that water to the Water Treatment Plant/WMP for treatment



3. Regulators' Update (I)

➤ MVLWB

- Distributed De Beers request to modify IL6 Ditch for review, on October 4, 2012
 - Due on October 15
- Distributed De Beers responses to stakeholders' comments on Closure Objectives and Board staff comments on October 9
- Approved De Beers request on the Landfill Relocation within the East Cell with conditions, on October 11
 - Landfill area will not lead to future storage capacity issues for Processed Kimberlite
 - De Beers update appropriate plans to reflect the modification



3. Regulators' Update (II)

➤ MVLWB

- Distributed the AEMP Re-evaluation Report for review, on October 18
 - No due date until the AEMP Design Plan is received
- Approved De Beers request on the modification to the Inland Lake 6 Ditch (IL6 Ditch Gate), on October 25



4. Stakeholders' Update

- Comments on the North Pile Risk Assessment by
 - Environment and Natural Resources (ENR), GNWT and
 - AANDC Inspector
- On 16, 2011



4.1 ENR's Comments on the North Pile Risk Assessment

- No comments or recommendations at this time



4.2 AANDC Inspector's Comments on the North Pile Risk Assessment

- No compliance issues
- The inspector should be notified once De Beers is aware of what repairs may be needed and what design improvements are recommended for Perimeter Sump 3
- Two water treatment plants would give more flexibility to the operator to shut down one for maintenance or repair
- Avoid freshet-pre freshet timing window when conducting optimization activities for the water treatment plant



AANDC Inspector's Comments on the North Pile Risk Assessment (II)

- Re-assess the design, location and number of piezometers and thermisters which haven't functioned optimally
- Detail what initiatives are/may be implemented to reduce losses of nitrate within the underground workings (including an overview of initiatives/possible initiatives & a schedule for implementation)
- State which parameters De Beers has initiated studies to develop technically defensible site specific benchmarks for



5. SLEMA Reviews

- AEMP Re-evaluation Report
 - Submitted on October 1, 2012
- Environmental Agreement 2010 Annual Report
 - Submitted on October 2, 2012



5.1 AEMP Re-evaluation Report

- Submitted on October 1, 2012
 - This Aquatic Effects Re-evaluation Report summarizes data obtained under the AEMP for eight years, from 2004-2011, for: water quality; plankton (small animals and plants that live in the water column); sediment quality; benthic invertebrates (small animals without backbones that live in the sediments); and, fish. This Report provides the basis for the AEMP Design Plan, which will be detailed in a subsequent document



Water Quality

- Water quality is changing in Snap Lake as predicted in the EAR. Effluent discharge is now detectable up to about 6 km downstream of Snap Lake. However, at present, these water quality changes do not appear to be causing adverse effects to the health of Snap Lake, nor do they pose a threat to human health
 - Some water quality parameters have increased in Snap Lake since the Mine started operating. Concentrations of total dissolved solids (which is an indication of salinity), nutrients, and some metals have increased in most areas of Snap Lake related to effluent discharged from the Mine



Plankton

- Small changes are happening to communities of plankton (small animals and plants that live in the water column) in Snap Lake as water quality changes. Such changes were predicted to occur in the EAR although at a lower level than is presently occurring; however, they are not affecting the overall health of Snap Lake. The changes are expected to become greater with continued input of nutrients and total dissolved solids from the Mine



Sediment Quality

- Evaluation of trends over space and time in sediment quality did not provide clear evidence of an effect on Snap Lake sediments in areas exposed to treated effluent from the Mine. If potential effects to sediment quality have occurred to date, they have been subtle and not clearly different than natural variability. Thus, they are unlikely to have resulted in adverse environmental effects



Benthic Invertebrates

- Changes have occurred to communities of bottom-dwelling animals in Snap Lake, apparently related to nutrient enrichment and increasing total dissolved solids concentration. The EAR predicted changes due to nutrient enrichment. These changes do not appear to have adversely affected this fish food source
 - The increasing trends in total density, richness, and densities of fingernail clams, snails and some midges in Snap Lake are indicative of mild nutrient enrichment



Fish Studies

- Fish health, fish population, and fish taste (edibility) are not affected by changes in water and sediment quality in Snap Lake in any consistent or detrimental manner. Predicted effects to fish habitat have been compensated under the *Fisheries Act Authorization*



Qualitative Integration

- Nutrient enrichment appears to be occurring in Snap Lake, rather than chemical toxicity. There appears to be a clear link between nutrient releases to Snap Lake as a result of Mine activities, increases in nutrients, and increases in food for fish. The observed level of nutrient enrichment and associated changes to the food chain in Snap Lake were predicted in the EAR



Updated Effects Predictions

- The original EAR effect predictions for sediment quality, benthic invertebrates, and fish are considered appropriate and thus do not need to be updated. EAR predictions for water quality and plankton related to eutrophication may still be appropriate; however, definitive conclusions are not possible pending resolution of analytical issues in the water quality analyses of the nutrient, phosphorus



Conclusions

- The design of the AEMP from 2004 to 2011 was appropriate and detected Mine-related effects. However, based on lessons learned, some refinement of the AEMP design is merited
- Changes (mainly nutrient enrichment related) have occurred in water quality, sediments, plankton community, benthic community, but they are unlikely to have resulted in adverse environmental effects



Lessons Learned – Challenges (I)

- During construction, flow rates in the mine were greater than predicted. As such, TDS concentrations in Snap Lake increased more quickly than predicted. Additional updates of the EAR water quality model were required to gain an understanding of TDS concentrations within Snap Lake



Lessons Learned – Challenges (II)

- The Northwest Arm of Snap Lake as a reference area for the AEMP is not appropriate. A separate reference lake for the AEMP components (with the exception of fish health) would have been desirable during the initial years of monitoring
- A gradient-type study design for the sediment and benthic invertebrates programs was found to be no longer appropriate
 - to be redesigned as a 'control-impact'-type study



Lessons Learned – Challenges (III)

- The AEMP has limited integration of habitat and air quality information with biological data
- Analytical detection limits (DL) for nutrients were inadequate for detecting low-level concentrations of certain analytes, particularly phosphorus
- It would have been appropriate to conduct integration before the final year of the program



Lessons Learned – Successes

- The AEMP sample collection was successful despite logistical challenges
- The model used to predict Snap Lake water quality in the EAR was appropriate
- Predictions from the EAR are considered appropriate and do not require substantial revision
- The AEMP design was appropriate to answer the key questions and address the hypotheses of the monitoring program
- The fish tasting program was refined
- De Beers initiated and implemented refinements to the AEMP Design annually as required to improve the program



Key Recommendations

- Due to the inherent natural differences in lakes within the region, particularly nutrient concentrations, a multiple reference lake design should be considered
- Shift the focus from spatial and seasonal trends in Snap Lake to temporal changes in Snap Lake and changes downstream of Snap Lake
- A method for integration of the various types of data to evaluate the severity of Mine-related effects should be developed
- Additional effort to incorporate air, climate and hydrology data should occur
- Efforts to collect and incorporate traditional knowledge, beyond fish tasting, should continue



Component Recommendations

- Water Quality – 6 recommendations
 - Sampling stations in the main basin of Snap Lake could be reduced
 - Reduce the number of full-scale programs to one time during open water and once during ice-cover
- Plankton – 7 recommendations
- Sediment Quality – 2 recommendations
- Benthic Invertebrates – 3 recommendations
- Fish – 10 recommendations



Preliminary Comments from the Environmental Analyst

- The AEMP Re-evaluation Report appears to be satisfactory
 - The submission presents detailed information and analysis, and provides input for the AEMP design
 - The recommendations for downsizing part of the water quality monitoring program should be detailed in the AEMP Design Plan, and more justifications should be provided



5.2 Environmental Agreement 2010 Annual Report

- The report submission was delayed due to translation issues, although all of the components required by the Environmental Agreement were complete and had been sent to SLEMA
- SLEMA requested the 2010 Environmental Agreement Annual Report via e-mail since June 2011 and officially received the submission (without translation) on October 2, 2012



Preliminary Comments (I)

- The submission looks like a draft
 - The Table of Contents is for 2009 Annual Report, not for 2010 Annual Report
 - Figure 1-1 is missing
 - Section 4.2 is the same as the one in 2009 Annual Report
 - Table 5-1 shows 11 inspections, but it is said 12 inspections in the Plain Language Summary



Preliminary Comments (II)

- Table 5-1 Summary of Compliance, 2010 is incomplete. The following are missing
 - The areas of the Mine that were inspected during each inspection
 - Summary of De Beers responses to the Inspector requests



Recommendation

- Proofreading is needed before submission



6. Agency's Activities

- SLEMA drafted the 2011-2012 Annual Report

