



March 2015
Environmental Update
for SLEMA Board

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March 31, 2015

Outline

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



Acronyms

- AANDC – Aboriginal Affairs and Northern Development Canada
- AEMP – Aquatic Effects Monitoring Program
- ARD – Acid Rock Drainage
- DFO – Fisheries and Oceans Canada
- CCME – Canadian Council of Ministers of the Environment
- CEQG – Canadian Environmental Quality Guidelines
- EC – Environment Canada
- ENR – Department of Environment and Natural Resources, GNWT
- EQC – Effluent Quality Criterion
- 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
- SSWQO – Site-Specific Water Quality Objective
- TDS – Total Dissolved Solids
- WEMP – Wildlife Effects Monitoring Program
- WTP – Water Treatment Plant
- WMP – Water Management Pond



1.1 Mine Update – February 2015

- Production rate: 102.2% of its capacity (90,179 tonnes of kimberlite processed)
- 13,241 m³ of water withdrawn from Snap Lake
- 1,283,147 m³ of treated water discharged into Snap Lake
- 72,821 tonnes of coarse reject and 48,427 m³ of slimes deposited in the North Pile
- 2 Reportable spills
- Water sampled in 10 monitoring stations
 - The monthly average for all parameters met compliance



1.2 Spill Reporting in March 2015

Spill Number	Date	Location	Waste Spilled	Amount (L)	Cause
15-043	February 11	Portage 1	Diesel	378	Fuel driver lost control of the vehicle, striking a rock, resulting in dislodged fuel line from the saddle tank
15-050	February 15	Sewage Treatment Plant	Sewage/ greywater	1000	Operator unable to verify the closure of the valve before attempting to disconnect the hose
15-078	March 2	Under the camp kitchen	Sewage/ greywater	5000	The main 6 inch sewer line had come apart at a rubber coupling
15-094	March 15	Southeast ditch of the North Pile	Thickened slurry	300	Leak on the paste line to the North Pile due to line wear

1.3 De Beers' Responses to SLEMA's Request for Updating Status of Sampling at SNP 02-18

- SLEMA requested De Beers to update the status of SNP 02-18 sampling on March 2, 2015
- De Beers responded on March 5
 - Even if mid-winter sampling is not a requirement of the water licence, DE Beers attempted to conduct the SNP 02-18 sampling program in January and February 2015. However, the extreme cold weather resulted in the cancellation of the program
 - The next planned SNP 02-18 sampling will be conducted in May 2015



1.4 Nitrate Levels at SNP 02-02

Low Action Level Triggered

- Notice dated March 19, 2015
 - Nitrate levels elevated at SNP 02-02 (North Pile drainage collection ditch) during November and December 2014, triggering response under the North Pile Management Plan
 - Technical Memorandum titled Response Framework Geochemistry Review by Golder Associates attached



1.5 Explosive Storage

- Notification dated March 23, 2015
 - De Beers received approval from the Chief Inspector of Mines to store explosive magazines approximately 685 meters from the West Cell perimeter road workings, 16 m apart. The magazines will be approximately 850 m from Snap Lake



1.6 Grout Curtain Installation and Piezometer/thermistor Installation West Cell

- Notification dated March 25, 2015
 - De Beers intended to carry out piezometer and thermistor instrumentation and grout curtain installation for the West Cell Phase I Construction commencing in April 2015
 - Similar in design and purpose to the grout curtain for the East Cell perimeter water control structures
 - The grout curtain is a low-permeability barrier that will reduce the inflow of water from Snap Lake into the sump
 - Best practices and mitigation measures will be employed throughout the execution of this program to limit impacts to the environment



1.7 Annual WEMP and WWHPP

- Submitted on March 30, 2015
 - 2014 Annual Wildlife Effects Monitoring Program Report
 - 2014 Annual Wildlife and Wildlife Habitat Protection Report



1.8 2014 Annual Closure and Reclamation Plan Progress Report

- Submitted on March 31, 2015
 - The objective of this annual report is to summarize the closure and reclamation activities conducted during 2014



1.9 2014 Water License Annual Report

- Submitted on March 31, 2015
 - Addressed the annual reporting requirements under Water License MV2011L2-0004



2. Inspection Update

- Inspector – Jamie Steele
- Land Use Permit Inspection for MV2014D0010
 - January 14 and February 11, 2015

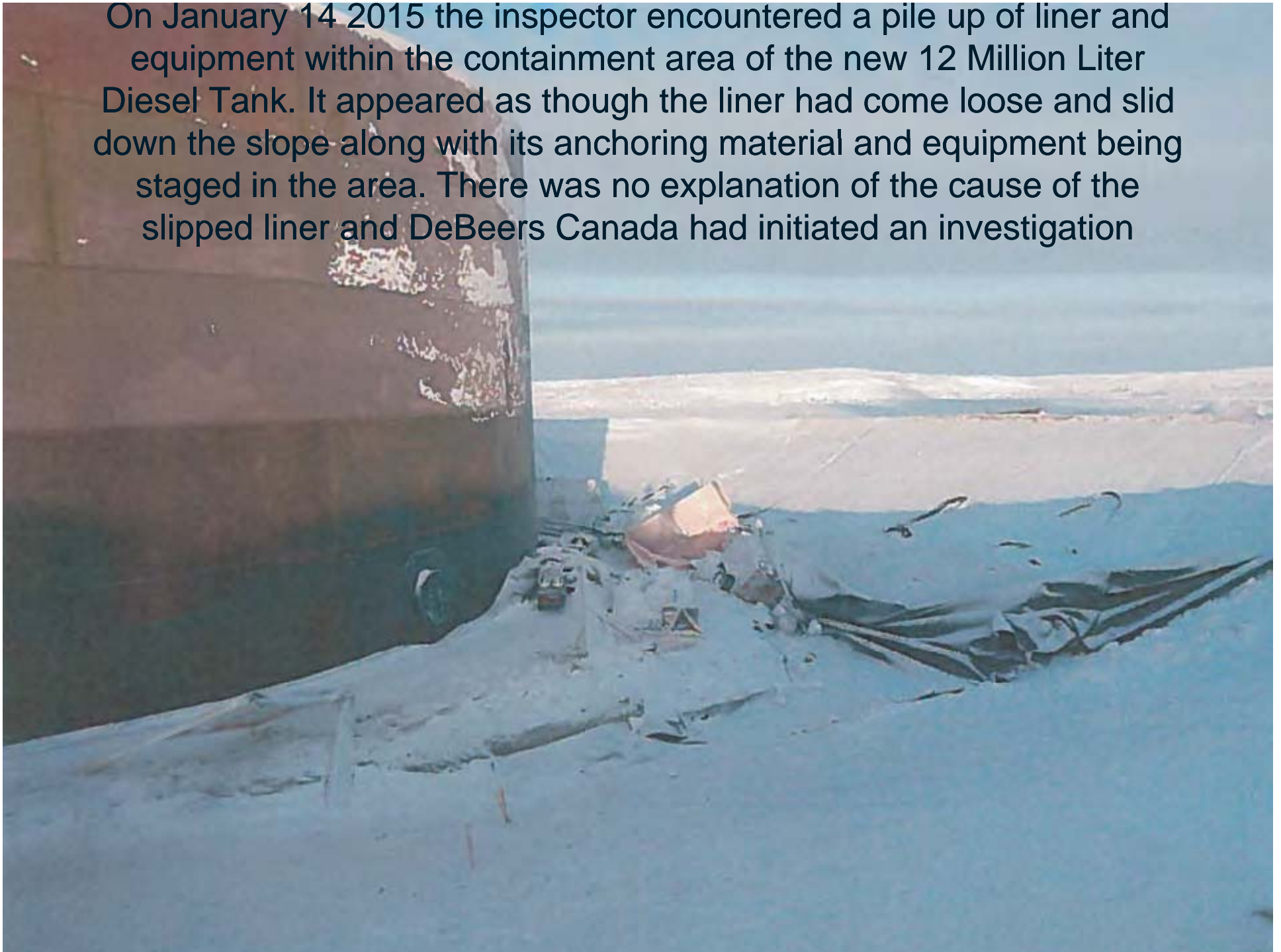


2.1 LUP Inspection

- Dated January 14 and February 11, 2015
- Inspected the Bulk Fuel Storage 12 million Liter Tank Farm
 - Liner repairs and installation
- No concerns were identified during this inspection but
 - “A detailed report on the findings from the investigation initiated due to the liner slippage identified on January 14th 2014 is still outstanding. The inspector requests that the report be forwarded as soon as it becomes available”



On January 14 2015 the inspector encountered a pile up of liner and equipment within the containment area of the new 12 Million Liter Diesel Tank. It appeared as though the liner had come loose and slid down the slope along with its anchoring material and equipment being staged in the area. There was no explanation of the cause of the slipped liner and DeBeers Canada had initiated an investigation



On February 11th 2015 the inspector did a follow-up inspection on the 12 Million Liter Tank farm installation. The area associated with the pile up of liner from the January 14 2015 inspection had been cleaned up and any potentially damaged liner had been replaced with brand new materials and tied into a new key trench at the top of the berm



3. Regulators' Update

➤ MVLWB

- Invited reviewers to submit comments on AEMP Low Action Level Triggered for Aesthetic Drinking Water, on March 3, 2015
 - Comments due on April 1
- Invited reviewers to submit comments on Emergency Response Plan, on March 9
 - Comments due on April 16



4. Aboriginal Update

- No comments received from Aboriginal parties in March 2015



5. Stakeholders' Update

- Environment Canada (EC) and Environment and Natural Resources (ENR) commented the Thallium and Cesium in Fish Tissue Response Plan on March 5, 2015
- EC and ENR commented AEMP Action Level Exceedence (C. dubia) Table of Contents on March 9



5.1 EC Comments on the Thallium and Cesium in Fish Tissue Response Plan (I)

- EC recommends the Response Plan include a table to summarize the cesium and thallium sampling schedule and statistical results to date for all sample types (including effluent, water, sediment, fish tissue) for reference, baseline, and operational data. Provide raw data as a separate appendix
- EC recommends the Response Plan include a table to summarize future sampling schedule and plans for all relevant sample types for reference and operational data



5.1 EC Comments on the Thallium and Cesium in Fish Tissue Response Plan (II)

- EC recommends that the Proponent develop an expanded sampling plan that would enable evaluation of cesium and thallium concentrations throughout the aquatic receiving environment, including invertebrates and aquatic plants
- EC recommends that future versions of this Response Plan includes updated modelling of cesium and thallium load to Snap Lake



5.1 EC Comments on the Thallium and Cesium in Fish Tissue Response Plan (III)

- EC recommends that the Proponent continue to incorporate current research findings into future versions of the Response Plan, particularly with respect to fate and toxicity of these chemicals



5.1 EC Comments on the Thallium and Cesium in Fish Tissue Response Plan (IV)

- In response to the question – Will these concentrations harm the fish? the response provided is: No, these are not metals with high toxicity. Fish remain healthy in Snap Lake. De Beers checks fish health every three years; there have been no changes to fish health
- According to Environment Canada, scientific literature suggests that thallium is one of the more toxic metals, with adverse effects on living organisms comparable to those of mercury and lead. EC recommends modifying this answer, as it contradicts current scientific literature. Consideration should also be given to the high bioconcentration factors for thallium (discussed previously), and potential implications for fish



5.1 EC Comments on the Thallium and Cesium in Fish Tissue Response Plan (V)

- In response to the question – Will these concentrations harm humans eating fish? The Proponent's response is: No, these concentrations will not harm humans eating fish. Although there are more data for thallium than for cesium, there is no evidence of harm to humans at these concentrations. Concentrations of thallium are well below fish tissue guidelines. Fish are safe to eat in Snap Lake
- As there are currently no CCME fish tissue guidelines available for either cesium or thallium, it is unclear which fish tissue guidelines are referenced above. EC recommends that the Proponent provide clarification



5.1 EC Comments on the Thallium and Cesium in Fish Tissue Response Plan (VI)

- IC_x is defined in the Plan as the “external concentration that has an inhibitory effect on x% of tested organisms”
- This is not quite accurate – it should say: “external concentration that has an inhibitory effect of x% to a specific endpoint (e.g. mean growth or mean reproduction) in the tested organisms” (i.e. the mean response is reduced by x%, not a response being seen in x% of organisms. The definition provided is the EC_x, which is a quantal measurement, and would refer to an all-or-nothing effect (e.g. mortality, lack of fertilization) on x% of the test organisms. EC recommends correcting the definition



5.2 ENR Comments on the Thallium and Cesium in Fish Tissue Response Plan (I)

- ENR requests that De Beers clarify whether information exists regarding cesium and thallium for other lower trophic levels. If so, has an increase been observed within any groups?
- If no information exists, ENR recommends that this sampling be added as a component of source investigation as it is possible that these organisms may be undergoing an increased uptake of thallium and cesium as a result of water and/or sediment increases that may be occurring below the detection limit. Information on cesium and thallium in these components of the food chain may also provide annual information on how cesium and thallium are behaving in Snap Lake biota (i.e. fish tissue studies typically occur on a three year cycle, while investigation on benthics or plankton could occur more frequently)



5.2 ENR Comments on the Thallium and Cesium in Fish Tissue Response Plan (II)

- ENR requests De Beers provide information, including any constraints, on the potential to utilize lower detection limits for thallium and cesium to better define trends within Snap Lake
- ENR requests De Beers consider if there is an avenue by which cesium and thallium may actually become more biologically available through processes associated with increased hardness (e.g. exclusion of uptake of various parameters by aquatic species in Snap Lake results in an increased uptake of others, different plankton species may have increased ability to take up cesium and thallium, etc.)



5.2 ENR Comments on the Thallium and Cesium in Fish Tissue Response Plan (III)

- ENR requests that De Beers provide additional rationale regarding the relevance of the higher thallium concentration and toxic related effects as noted above



5.3 EC Comments on AEMP Action Level Exceedence (C. dubia) Table of Contents

- EC “has no comments to provide at this time”



5.4 ENR Comments on AEMP Action Level Exceedence (*C. dubia*) Table of Contents (I)

- ENR recommends that Section 2.2 be limited to site-specific information on the development of the *C. dubia* low action level at Snap Lake. Should a contrast with other mining operations in the NWT be provided, it would be best placed in a separate section.
- ENR recommends that De Beers should include a section regarding the development of action levels at Snap Lake at the edge of the mixing zone. This section should address concerns and potential toxicity associated with hardness in the effluent vs. hardness in the immediate receiving environment (i.e. mixing zone). This may be reason for the different toxicity related results



5.4 ENR Comments on AEMP Action Level Exceedence (*C. dubia*) Table of Contents (II)

- ENR recommends that a summary review of correlations between *C. dubia* toxicity and other factors be expanded beyond TDS and metals to include any work that has been completed to find potential correlations between noted instances of toxicity and other parameters as noted above
- ENR recommends that De Beers distinguish between any results which can be deemed “observational” and those for which have supporting statistical analyses. As well, a definition of “adverse effects” should be provided for review and linked to the discussion and results



5.4 ENR Comments on AEMP Action Level Exceedence (*C. dubia*) Table of Contents (III)

- GNWT recommends that De Beers clarify the frequency at which random responses occur during toxicity testing with *C. dubia* and how these rates of random responses relate to the results encountered specific to Snap Lake
- GNWT supports the proposed submission date of April 30th, 2015
- ENR recommends that any conclusions and recommendations should be based on adequate investigation and be rationalized and justified



6. Agency's Activities (I)

- SLEMA believed that TDS level at SNP 02-18 might exceed the current water licence limit of 350 mg/L because TDS level in SNP 02-20 in January was 370 mg/L. As a result, on March 2, 2015, SLEMA requested De Beers to update the status of SNP 02-18 sampling
 - TDS level in SNP 02-20 in February was 387 mg/L



6. Agency's Activities (II)

- SLEMA agreed with De Beers that calculated TDS remains the appropriate indicator of TDS in Snap Lake. However, SLEMA believed that the comparison should be appropriate and consistent. As a result, on March 6, 2015, SLEMA requested that De Beers clarify the potentially inconsistent comparison of De Beers predictions related to Suggestion 2 to the Health Canada's Aesthetic Objective (500 mg/L)
 - Details seen in Section 8.4 of February 2015 Environmental Update



6. Agency's Activities (III)

- SLEMA board members and staff attended the Public Hearing from March 11 to 12, 2015





7. SLEMA Reviews

- Nitrate Levels at SNP 02-02 Low Action Level Triggered



7.1 Nitrate Levels at SNP 02-02

Low Action Level Triggered

- Nitrate levels elevated at SNP 02-02 (North Pile drainage collection ditch) during November and December 2014, triggering response under the North Pile Management Plan
- Golder Associates reviewed the data and recommended six immediate actions, including reassessing thresholds for response

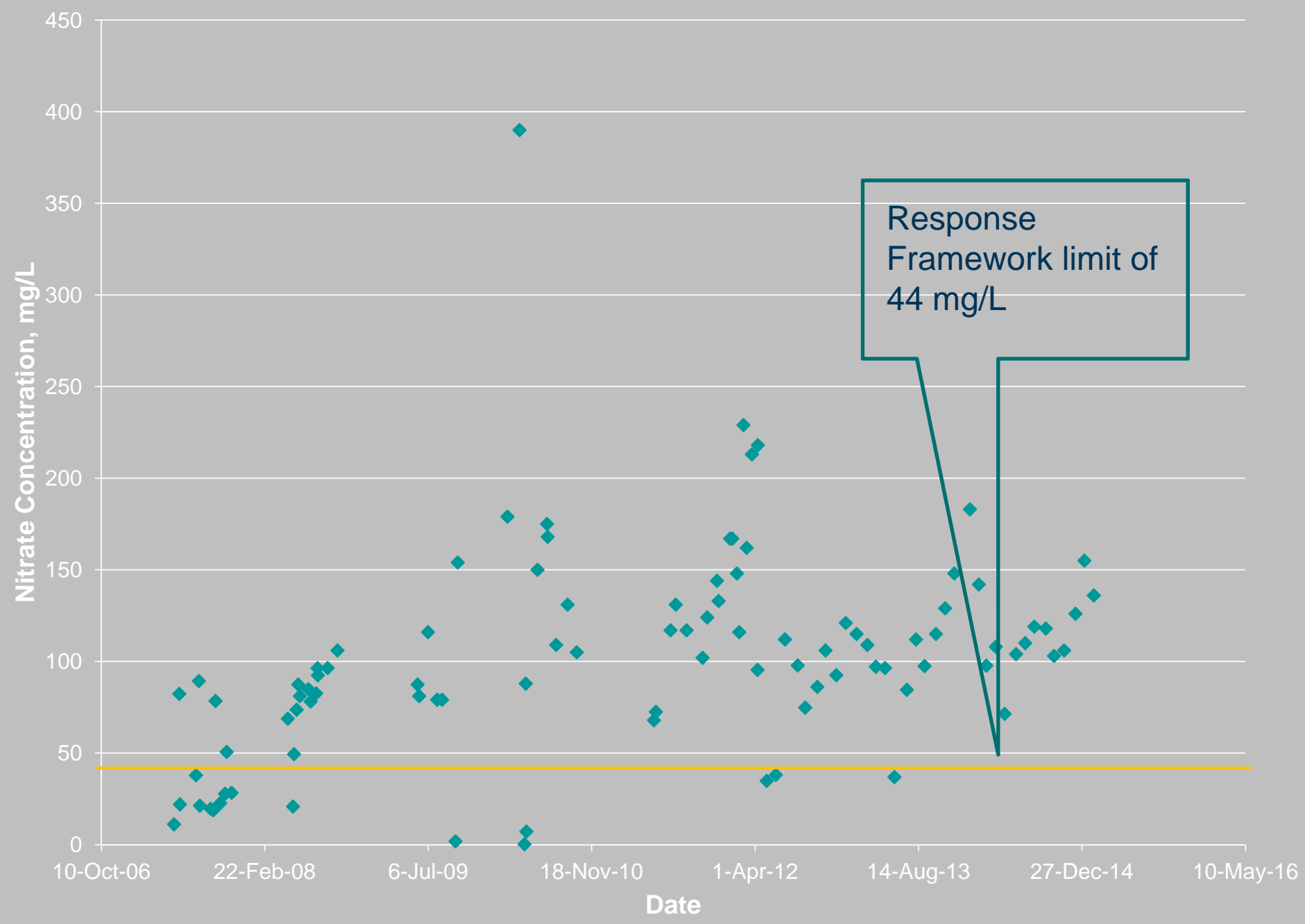


Comments from the Environmental Analyst

- It is agreed upon that the thresholds for response should be reassessed
 - The threshold for Nitrate at SNP 02-02 set in October 2014 is 44 mg/L
 - The Nitrate levels at SNP 02-02 (North Pile drainage collection ditch) has been above 44 mg/L most of the time since 2008



Nitrate Levels at SNP 02-02



8. Water Licence Amendment Application (I)

- Public Hearing held in Dettah from March 11 to 12, 2015
- The transcripts for the public hearing posted to the public registry on March 13
 - No undertakings were recorded at the hearing
 - Interveners are requested to email their closing arguments regarding the November 2014 Amendment Application to Board staff by March 19, De Beers' closing arguments are due on March 24
 - Interveners are requested to email their closing arguments regarding the December 2013 Amendment Application to Board staff by April 27, De Beers' closing arguments are due on May 1



8. Water Licence Amendment Application (II)

- EC and GNWT provided their closing arguments regarding the November 2014 Amendment Application on March 19, 2015
- De Beers submitted their Closing Argument regarding the November 2014 Amendment Application on March 24



8. Water Licence Amendment Application (III)

- In preparation for the MVLWB to deliberate on the December 2013 Amendment Application, Board staff requested, on March 24, 2015, that De Beer submit two maps identifying the main facilities at the mine site and the water flow path from Snap Lake into Mackay Lake



8. Water Licence Amendment Application (IV)

- The MVLWB invited reviewers to submit comments on De Beers Snap Lake - Draft Water Licence for December 2014 Amendment Application - MV2011L2-0004, on March 30, 2015
 - Due on April 13



8.1 Public Hearing

- Held in Chief Drygeese Center, Dettah from March 11 to 12, 2015
 - Chaired by Willard Hagen
 - Presentations followed by questioning
 - De Beers
 - EcoMetrix
 - GNWT-ENR
 - LKDFN
 - EC
 - DKFN
 - YKDFN
 - Register Speaker: NSMA
 - General Public: Ms. Noeline Villebrun











8.2.1 EC's Closing Comments regarding November 2014 Amendment Application

- The recommendations EC made in its Intervention, as well as presented during the Public Hearing still apply
- In the broader context, EC notes that the increase in TDS in Snap Lake will result in changes in the aquatic ecosystem. It is difficult to predict the extent to which changes will cascade up the trophic levels over the life of the mine, and it would be expected that communities would shift back over a period of time following mine closure



8.2.2 GNWT's Closing Comments regarding November 2014 Amendment Application

- For both the “interim” and “longer term” amendment applications, the Board must ensure that the measures ae stated in EA1314-02 are met
- The interim SSWQO of 690 mg/L TDS, proposed by the GNWT, would be adequately protective of the aquatic ecosystem in Snap Lake



8.2.3 De Beer' Closing Argument regarding November 2014 Amendment Application

- “As stated in the Interim Application, the evidence on which it is based has previously been presented and reviewed in a regulatory process. All intervening parties appear to be in agreement that the SSWQO proposed in the Interim Application will remain protective of the aquatic environment and human health. Therefore, De Beers submits that the Interim Application be granted and respectfully requests that the Board issue its decision by the end of March 2015, as indicated in the Board’s Final Work Plan.”

