



May 2018 Environmental Update for SLEMA Board

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May 31, 2018

Outline

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



Acronyms

- AEMP – Aquatic Effects Monitoring Program
- ARD – Acid Rock Drainage
- DFO – Fisheries and Oceans Canada
- ECCC – Environment and Climate Change Canada
- ECM – Extended Care and Maintenance
- ENR – Department of Environment and Natural Resources, GNWT
- EQC – Effluent Quality Criterion
- GNWT – Government of the Northwest Territories
- INAC – Indigenous and Northern Affairs Canada (formerly Aboriginal Affairs and Northern Development Canada [AANDC])
- MVEIRB – Mackenzie Valley Environmental Impact Review Board
- 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 – April 2018

- The Snap Lake Mine remained in suspended operations (Extended Care and Maintenance)
 - 568 m³ of water withdrawn from Snap Lake
 - No treated water discharged into Snap Lake
- No reportable spills
- Water sampled in 4 monitoring stations
 - SNP 02-15, 02-16i, 02-18, and 02-20
 - Whole Lake Average of Total Dissolved Solids concentrations (calculated) in April 2018 is 403 mg/L, lower than that in April 2017



- Dated May 10, 2018
 - Spillways between the cells of the North Pile will be completed as necessary this summer



1.3 AEMP Response Plan for Plankton

➤ Submitted on May 29, 2018

- A Low Action Level for nutrient enrichment in the plankton community was triggered under the Response Framework in the approved 2013 AEMP Design Plan Update for Care and Maintenance, during the 2017 AEMP
- Technical Memorandum is provided
 - 2017 AEMP – Response Plan for Plankton Community Low Action Level Trigger



2. Inspection Update

- Inspector – Tracy Covey
- Water Licence Inspections
 - Inspected on April 27, 2018, and reported on May 7
 - Inspected on May 11 and reported on May 18



2.1 Water Licence Inspection on April 27, 2018

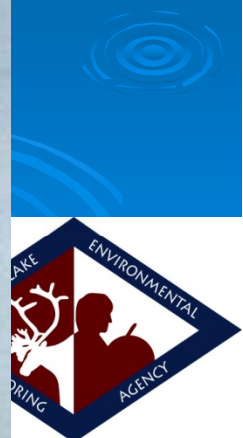
- Reported on May 7, 2018
 - Inspected the North Pile, Sumps and ditches, Dam 1 of the Water Management Pond, all active fuel tanks, Water Treatment Plant, Waste Transfer Area, Burn Pit and Landfill
 - No environmental risks noted



Efforts to remove ice to maximize storage capacity and facilitate pump intakes in Sump 5



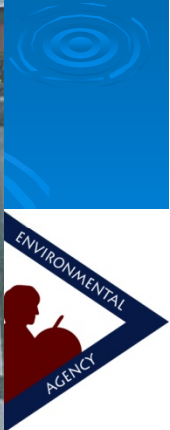
A dewatering-well has been maintained to enable de-watering of Sump 1 when the forthcoming freshet arrives



Snow Pack monitoring was being conducted through the minesite



Commissioning work ongoing at the WTP to install the Reverse Osmosis component



Minor evidence of drips was observed at the refueling area (which should be contained by the underlying concrete platform)



2.2 Water Licence Inspection on May 11, 2018

- Reported on May 18, 2018
 - Inspected the North Pile, Sumps and ditches, Dam 1 of the Water Management Pond, all active fuel tanks, Water Treatment Plant, Waste Transfer Area, Burn Pit and Landfill
 - No environmental risks noted



Ponded water and remaining snow pack in Cell 5 of the East Cell



05/11/2018



New seepage was evident, apparently flowing in to
Sump 5 from the IL6/West Cell area



De-watering well (East end of Sump 5)



The automated monitoring system for the RO component and other components of water treatment was recently tested and commissioned



Chemical treatment/use in the new Microfiltration (MF) unit of the RO system



3. Regulators' Update – MVLWB (I)

- MVLWB staff commented the Water Licence 2017 Annual Report on May 2, 2018
- Invited reviewers to submit comments on Permit Amendment Application (MV2017D0032), on May 14
 - Comments due on May 31
- Invited reviewers to submit comments on Aquatic Effects Monitoring Program 2017 Annual Report, on May 28
 - Comments due on July 11



3. Regulators' Update – MVLWB (II)

- The Board, on May 24, 2018, required that De Beers update the 2017 Annual Water Licence Report by June 22, 2018, to include the outstanding information required by Part B, Schedule 1, condition w (v), which states:
 - A comparison of monitoring results to the predictions of the groundwater and site Water models, including the results of any model calibration and/or updates that were conducted



3. Regulators' Update – MVLWB (III)

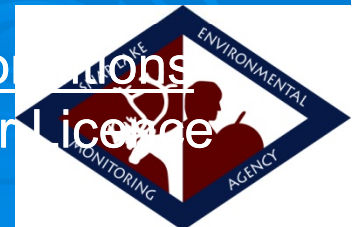
- MVLWB staff commented the Request to Amend LUP MV2017D0032 on May 30, 2018
- Invited reviewers to submit comments on AEMP Response Plan - Low Action Level for Nutrient Enrichment in the Plankton Community, on May 31
 - Comments due on July 10



3.1 MVLWB Staff Comments on the Water Licence 2017 Annual Report

- The Licence conditions referenced in the sections throughout the 2017 Annual Water Licence Report are incorrect when compared to the actual Licence conditions, beginning on Page 23. For example, Licence condition 'Schedule 1, Part B, item 1R' requires: "A summary of all Construction activities conducted in accordance with Part D of this Licence...". However, pages 24-28 the Annual Report reference condition R1 as: "A summary of materials deposited in the North Pile Facility..." which is actually Licence condition 'Schedule 1, Part B, condition 1U'. This continues throughout the rest of the Annual Report

- Board staff recommend De Beers ensure all Licence conditions are properly referenced throughout future Annual Water Licence Reports



3.2 MVLWB Staff Comments on the Request to Amend the LUP MD2017D0032 (I)

- Please indicate how De Beers envisions Condition 52 to be amended based on the proposed monthly site visits during care and maintenance (as outlined in the Extended Care and Maintenance Plan, version 3), to ensure environmental protection



3.2 MVLWB Staff Comments on the Request to Amend the LUP MD2017D0032 (II)

- Part E, condition 5 of Licence MV2011L2-0004 requires Weekly inspections of all structures designed to contain, withhold, retain, or divert Water or Waste. However, the Extended Care and Maintenance Plan requests monthly site visits from October to prior to freshet
 - Board staff recommend De Beers outline how they plan to adhere to Part E, condition 5 of the Licence MV2011L2-0004, while carrying out monthly site visits during the winter months



4. Aboriginal Update

- No comments received in May 2018



5. Stakeholders' Update

- The Inspector commented the Water Licence 2017 Annual Report on May 1, 2018
 - A few editing issues are identified
- ECCCC and ENR commented the Water Licence 2017 Annual Report on May 2
- ECCCC, ENR and the Inspector commented the Request to Amend the LUP MD2017D0032



5.1 ECCC Comments on the Water Licence 2017 Annual Report

- ECCC recommends that the Proponent clarify the number of nitrate exceedances and identify actions which can be taken in 2018 to prevent further exceedances
- Ongoing monitoring and evaluation of WMP water quality is recommended in the report; however results for SNP 02-14 WMP only have data for January, April, May and June (pdf page 81). Under the terms of the Water Licence, sampling is required at least quarterly (or weekly when pumping to the treatment plant)
 - ECCC recommends that the Proponent advise whether sample results are available for the last two quarters of 2017



5.2 ENR Comments on the Water Licence 2017 Annual Report (I)

- ENR recommends that DeBeers report on all parameters, including Extractable Petroleum Hydrocarbons, for which monitoring is required, as per Part F, Item 8, of the Water Licence
- ENR recommends for monitoring results to be provided for all SNP monitoring stations, including SNP 02-16j, SNP 02-17, SNP 02-19 and SNP 02-21, as enumerated in Annex A, Part A, of the Water Licence



5.2 ENR Comments on the Water Licence 2017 Annual Report (II)

- ENR recommends that DeBeers adopt the care and maintenance recommendations regarding best management practices and monitoring of the Snap Lake mine site, proposed in the 2017 Geotechnical Site Inspection of the North Pile Facility and Water Management Ponds Dams Report and the Geotechnical Instrumentation Monitoring Program Summary Report by Arktis



5.2 ENR Comments on the Water Licence 2017 Annual Report (III)

- DeBeers Snap Lake Mine provided its 2017 water quality sampling results, including those from various Surveillance Network Program (SNP) stations in Appendix I in a PDF format. However, the utility of this data is limited by third parties in its current format (i.e. pdf)
 - ENR encourages the use of a standard metadata template. Metadata sets the context for the water quality data, providing a description of data that was collected as part of a water quality sampling program and includes field conditions and a description laboratory analyses conducted



5.3 ECCC Comments on the Request to Amend the LUP MD2017D0032

- ECCC has reviewed in accordance with its mandate and doesn't have any comments at this time



5.4 ENR Comments on the Request to Amend the LUP MD2017D0032 (I)

- ENR continues to support De Beers' plan to submit a Final Closure and Reclamation Plan in 2019
- It is recommended that mobilization costs be based on the equipment list provided in Table A.6 of the Financial Security Estimate (Arktis, 2018) and known costs for mob/demob that De Beers will have available to them. This may result in a lower cost for mob/demob than what is in the 2018 estimate



5.4 ENR Comments on the Request to Amend the LUP MD2017D0032 (II)

- To resolve errors and clarify the components of the mobilization costs, ENR recommends that De Beers include the following considerations for their mob and demob costs: • Mobilization to/from regional center (e.g. Edmonton) to Yellowknife; • Winter ice road tariff from Yellowknife to/from Snap Lake; • Number of machine loads where equipment must be delivered on more than one transport truck due to weight or size restrictions;; • Use of appropriate unit costs or lump sums to account for other logistical considerations, such as mechanics required to assemble/disassemble equipment for transport



5.5 Inspector Comments on the Request to Amend the LUP MD2017D0032 (I)

- If the Board chooses to adopt the section 19(1) of the Petroleum Products and Allied Petroleum Products Regulations, consideration should also be given to adopting clauses 19(2), 20/21(in some form)
- Consider adding a condition indicating inventory reconciliation measures
- Given the proposed zero occupancy, the Inspector proposes that all the LUP condition created treat all tanks the same and require monthly inspections (for clarity)



5.5 Inspector Comments on the Request to Amend the LUP MD2017D0032 (II)

- De Beers requests that the submission of an ICRP (condition 71) be replaced with a requirement to submit a Final Closure Plan submitted on the same date as a submission for renewal of a new water licence. The submission of a FCP on the *same date* as a renewal for a new water licence would appear to be problematic. If we are to successfully develop terms/conditions in a WL which will meet objectives of a FCP, a FCP needs to first be approved
 - Complete the Final Closure Plan approval process in order to initiate the WL renewal process



5.5 Inspector Comments on the Request to Amend the LUP MD2017D0032 (III)

- Provide a copy of a map to the Inspector/GNWT Lands Administration showing the extent of the proposed quarry expansion vs. the existing Snap Lake Leasehold boundaries



6. Agency's Activities

- Sent comment letter on the Water Licence 2017 Annual report to the MVLWB on May 1, 2018
- Sent comment letter on De Beers' Request to Amend the Land Use Permit MV2017D0032 to the MVLWB on May 31



7. SLEMA Reviews

- Request to Amend the Land Use Permit MV2017D0032
- Preliminary Data Analysis for Water Quality at the North Pile and Water Management Pond



7.1 Request to Amend the Land Use Permit MV2017D0032

- Initially submitted on March 12, 2018, and resubmitted on April 17. De Beers requested that
 - The Board amend condition 52 of the water license to align with requirements in the Storage tank systems for Petroleum Products and Allied Petroleum Products Regulations
 - The submission of an internal closure and reclamation plan not be required and be replaced by a Final Closure Plan to be submitted the same date as a submission for renewal of a new water license be submitted



Background (I)

- De Beers announced on December 14, 2017 that
 - “As a result of the on-going evaluation of Snap Lake Mine since 2015, De Beers will now begin preparation for the Final Closure of the Snap Lake Mine. De Beers intends to file a Final Closure and Reclamation Plan in 2019 after conducting additional engagement with our community partners and finalization of engineering studies”
 - “De Beers requests to not file an ICRP in January of 2018 but will instead focus efforts on completion of FCRP and licence application for 2019”
- De Beers intended to transition the site to zero permanent occupancy from the onset of freeze up (circa October) and prior to freshet each year while in the Extended Care and Maintenance state



Background (II)

- On February 22, 2018 the MVLWB **deferred its decision** on De Beers' Extended Care and Maintenance Plan (ECMP), version 2, and associated Management Plans, because **Condition 52**, which requires an **examination of all Fuel Storage Containers and Tanks a minimum of once per day**, and to repair all leaks immediately, directly contradicted information presented in the ECMP version 2 (periods of zero-occupancy from near freeze up to prior to freshet). In addition, the Board deferred decision on De Beers' request to not file the Interim Closure and Reclamation Plan (ICRP), version 4 because this submission is required by Permit **Condition 71**. Therefore, De Beers is requesting to amend the LUP MV2017D0032



Comments from the Environmental Analyst (I)

- Monthly inspections of fuel storage containers and tanks are acceptable for Snap Lake Mine only if reasonable measures are taken during the periods of zero occupancy at the mine site. It is recommended that the MVLWB provide clear directions in the amended Land Use Permit on remote monitoring



Comments from the Environmental Analyst (II)

- De Beers' request on deferral of the submission of the Interim Closure and Reclamation Plan is acceptable, i.e. the submission of an interim closure and reclamation plan is not required and will be replaced by a Final Closure Plan, which will be submitted the same date as the submission for renewal of its water license



7.2 Preliminary Data Analysis for Water Quality at the North Pile and Water Management Pond

- De Beers will be in pursuit with Passive Water Management/Treatment in the future if applicable
- De Beers also will be planning for the possibility of direct discharge of untreated seepage from surface facilities into the environment
- The prerequisite of doing so is that water quality at the sumps of the North Pile and the Water Management Pond (WMP) must meet the Effluent Quality Criteria, and maintain for a years



Potential Pollution Sources: WMP and Sumps of the North Pile (June 3, 2017)



Monitoring Stations

- SNP 02-02 is North Pile drainage collection ditch north of Water Management Pond
 - Monitored the aggregate water collected from the five sumps around the North Pile
- SNP 02-14 is Water Management Pond (stilling well near the pump house)
 - Monitored the sump water and other runoff into the WMP
- SNP 02-17B is Final Combined Water Treatment Plant and Sewage Treatment Plant effluent that is discharged via a diffuser into Snap Lake



Initial Identification of Parameters of Concern

- Current Water Licence Effluent Quality Criteria are used to evaluate the potential of wetland treatment for the North Pile seepage and runoff

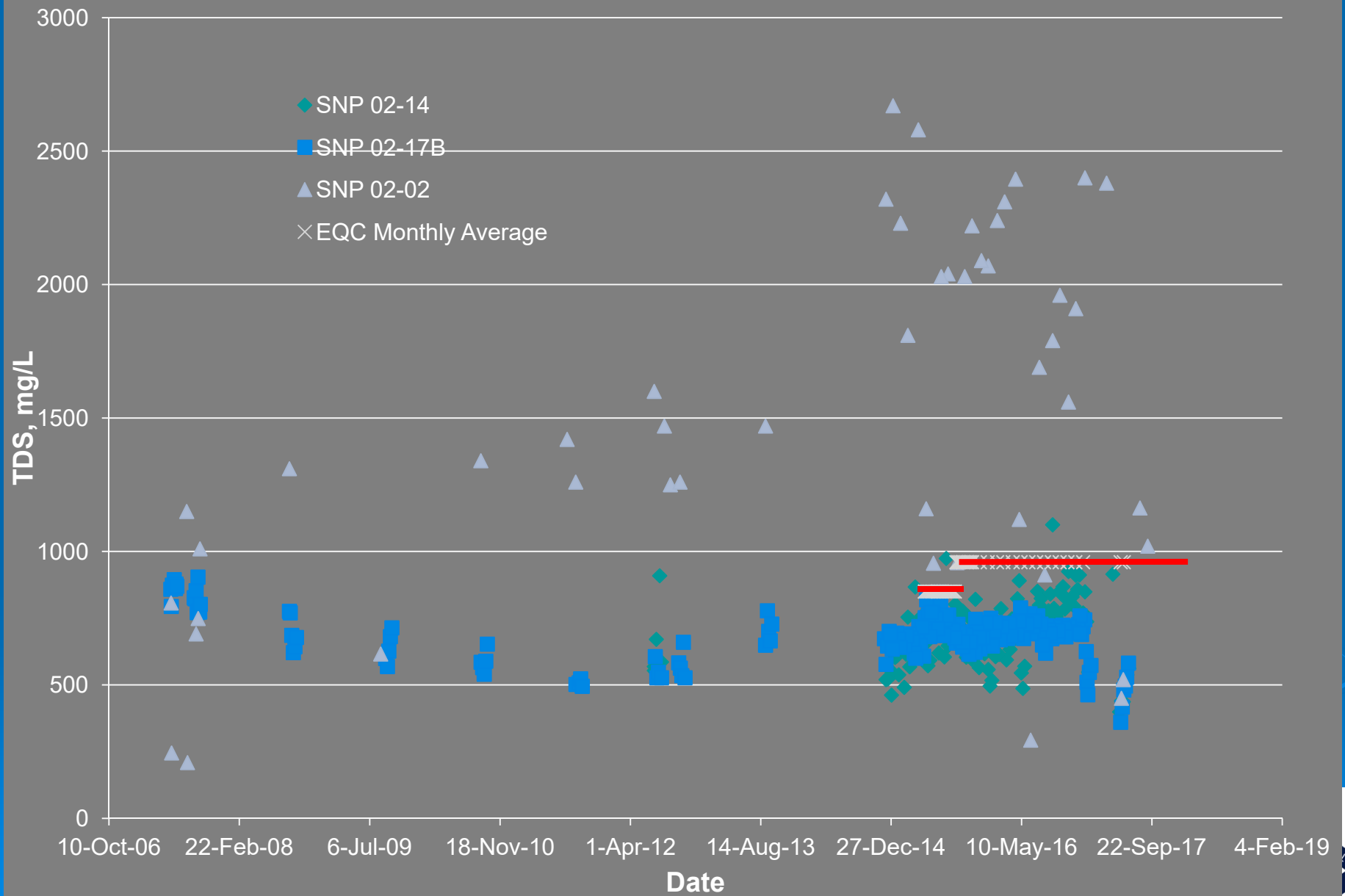
SNP Station		02-02	02-14
Parameter of Concerns	Concentrations above EQC	TDS TSS Nitrate Total Aluminum Total Zinc	TSS Nitrate Total Aluminum
	Concentrations marginally above or close to EQC	Total Copper Total Nickel	



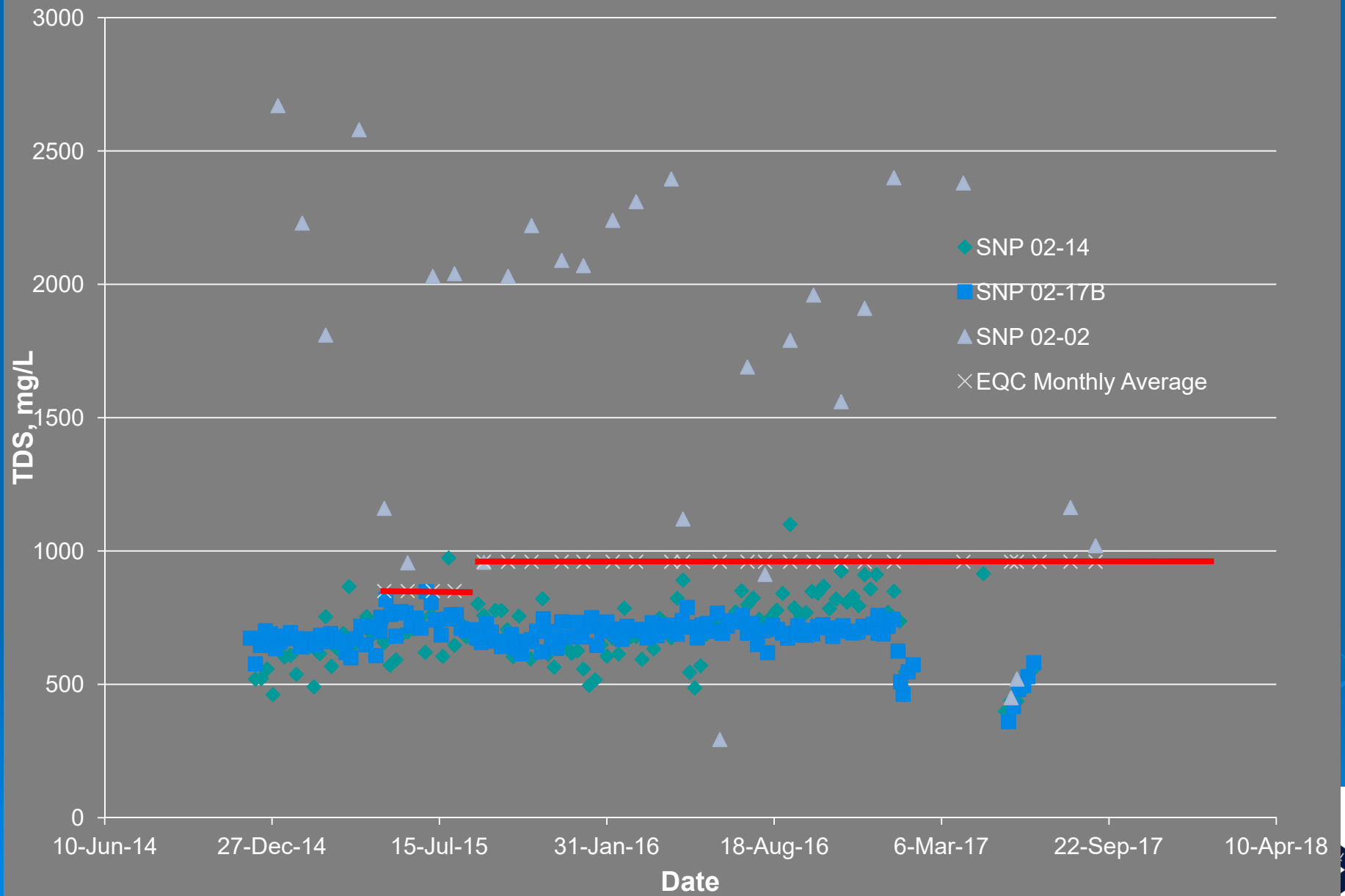
Effluent Quality Criteria (EQC) for Nitrate and TDS

Period	EQC for Nitrate in mg/L, Maximum/Monthly Average	EQC for TDS in mg/L, Maximum/Monthly Average	Note
Apr 2004-May 2012	56/28		MV2001L2-0002
Jun 2012-Dec 2014	44/22		MV2011L2-0004 (Amendment Applications filed in December 2013 and November 2014)
Jan 2015-Apr 2015	(8/4) 44/22		Effective date extended to Jan 2017, in Dec 2014
May 2015-Aug 2015	44/22	1003/850	Interim EQC approved by the Minister on May 4, 2015
Sep 2015-May 2020	17/12	1253/960	Life-of-Mine EQC approved by the Minister on September 10, 2015

TDS at SNP 02-14, 02-17B and 02-02



TDS at SNP 02-14, 02-17B and 02-02

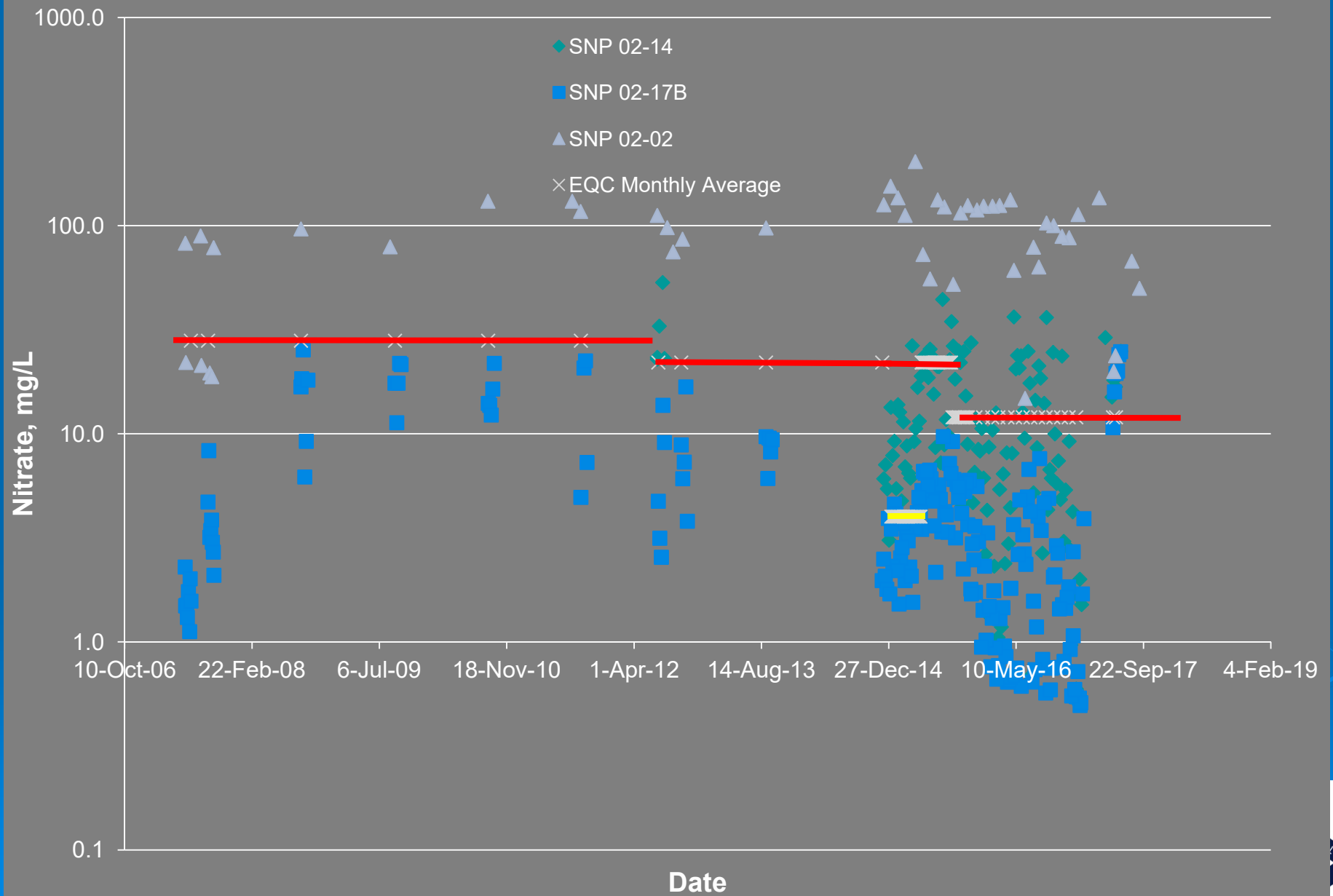


Comments from the Environmental Analyst (I)

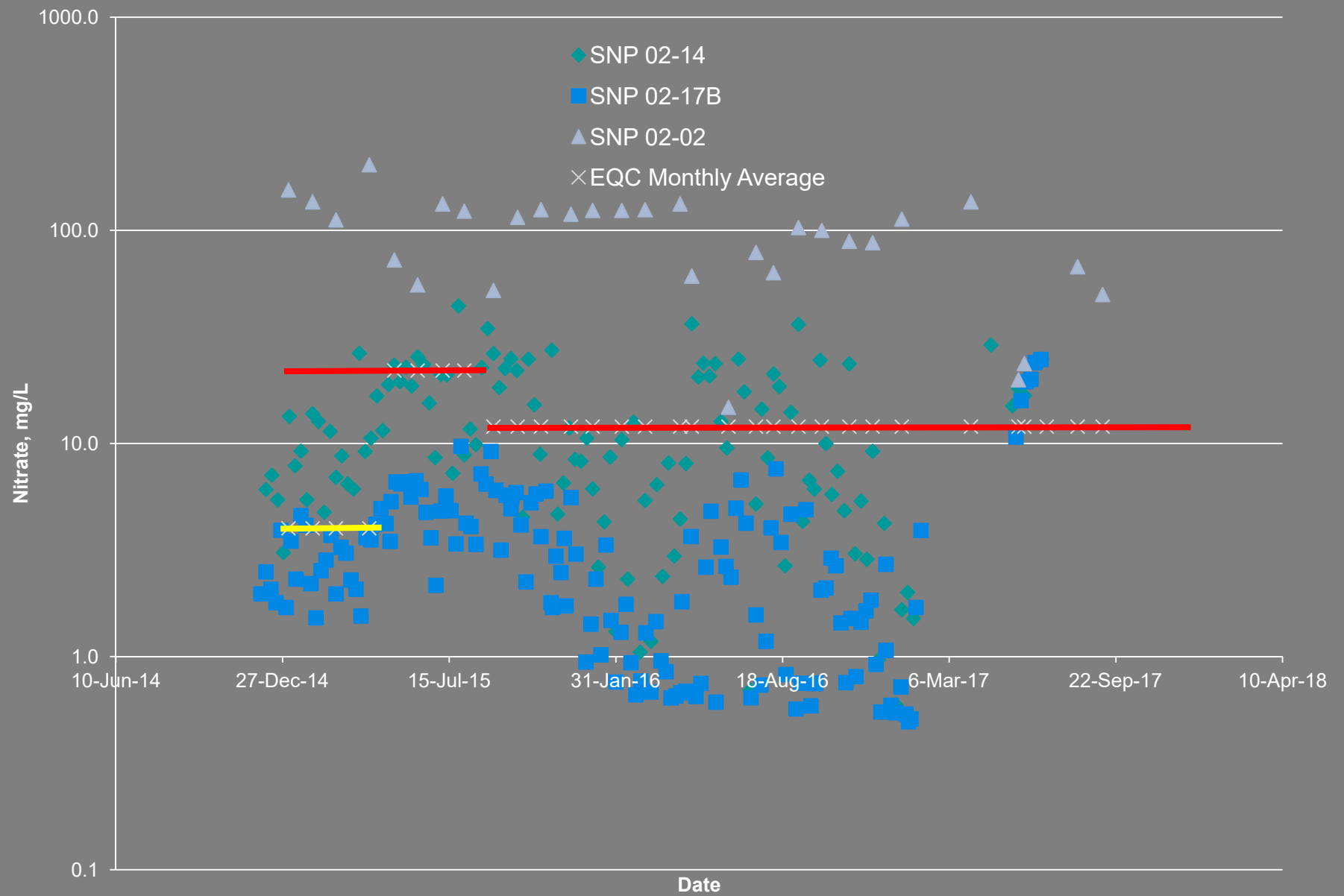
- It is evident that TDS concentrations at SNP 02-02 are always above the EQC, but not for SNP 02-14
- The trend of TDS levels in both monitoring stations are not clear yet due to limited data available after flooding the underground workings
 - Continuous monitoring is required



Nitrate at SNP 02-14, 02-17B and 02-20



Nitrate at SNP 02-14, 02-17B and 02-20



Comments from the Environmental Analyst (II)

- The concentrations of Nitrate are always above the EQC at SNP 02-02, and are sometimes above the EQC at SNP 02-14
- The elevated Nitrate levels at SNP 02-17B (emergency discharge) in May and June 2017 resulted from the Water Treatment Plant lacking in removal capacity of Nitrate
 - Reverse Osmosis Treatment Unit to be installed is a necessary



Comments from the Environmental Analyst (III)

- Wetland Approach may be a potential option for the treatment of the North Pile seepage and runoff. Further research is needed
- Current dataset is not enough to predict accurately when natural flow regimes will be re-established
 - More years of data are needed
 - Water quality in each sump may be different, thus monitoring for each sump is recommended if De Beers did not do so, otherwise, it is requested De Beers provide those sump water quality data and related analysis results

