



December 2015 Environmental Update for SLEMA Board

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December 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



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 – November 2015

- Production rate: 119.2% of its capacity (112,629 tonnes of kimberlite processed)
- 4,143 m³ of water withdrawn from Snap Lake
- 1,478,259 m³ of treated water discharged into Snap Lake
- 85,193 tonnes of coarse reject and 57,718 m³ of slimes deposited in the North Pile
- 1 reportable spill
 - 1 m³ of thickened slurry leaked on paste line on the berm by Cell D of Starter Cell due to gasket failure
- Water sampled in 6 monitoring stations
 - The monthly average for all parameters met compliance
 - November Toxicity tests were performed on treated effluent from SNP 02-17b
 - Nov. 2: no adverse effects in any tests; however, the algae test was invalid
 - Nov. 16: the algae test was invalid; there were chronic effects on *C. dubia* reproduction
 - Nov. 30: valid algae test showed no adverse effects on algae growth



1.2 Request for Two-Year Extension of Land Use Permit MV2010D0053 and MV2014D0010 (I)

➤ Dated December 1, 2015

- In requesting this extension to the expiry date, De Beers does not request any other changes to the conditions of the permit. The extension of the permit will allow for the continuation mining and associated activities at the Snap Lake Diamond Mine
- De Beers plans to apply for an expansion of the North Pile, and that this will be the appropriate process during which to review any necessary changes to land use conditions



1.2 Request for Two-Year Extension of Land Use Permit MV2010D0053 and MV2014D0010 (II)

- De Beers has notified Aboriginal Parties on the LUP extension through letters submitted on November 17, 2015
 - Łutsel K'e Dene First Nation
 - North Slave Métis Alliance
 - Tłıchq̓ Government
 - Yellowknives First Nation
- No concerns were noted from the Parties



1.3 Notice of Suspension of Operations at Snap Lake Mine

➤ Dated December 4, 2015

- Snap Lake Mine is being placed under care and maintenance effective Friday, December 4, 2015
 - Global diamond markets are experiencing an extended downturn with falling demand and reduced prices
- De Beers intends to maintain a small workforce on the mine site who will be responsible for ensuring Snap Lake Mine continues to meet conditions of the Mine water licence and other requirements



1.4 Request to Withdraw AEMP Design Update from Review

- Dated December 9, 2015
 - As a result of suspending underground mining activities, De Beers anticipated that effluent water quality and quantity would not continue along trends predicted in 2015 as presented during the water licence amendment process. As such, certain aspects of the AEMP Design Plan Update (submitted on October 30, 2015) may no longer be applicable or appropriate
 - De Beers requested that the AEMP Design Plan Update currently under review be withdrawn from the review process. A revised version of the AEMP Design Plan Update will be submitted to the Board for review on January 7, 2016



1.5 De Beers' Responses to ENR's Information Request on AEMP

➤ Dated December 10, 2015

- Provided data of toxicity tests of *Ceriodaphnia dubia* between January 2006 and October 2015
- Prepared to discuss the statistical aspects of the Downstream Watercourse Special Study Plan at the next Snap Lake Working Group meeting in 2016



1.6 Request to Change Management Plan Submission Dates

➤ Dated December 23, 2015

- As a result of suspending mine operations, De Beers requested that the submission dates for a number of management plans and associated reports, as required by the water licence, be deferred to such time as mining operations at Snap Lake Mine are imminently to resume

- Liability Estimate: January 30, 2017

- Strontium Response Plan, Nitrogen Response Plan, TDS Mitigation Implementation Plan: 90 days prior to recommencing mine operations

TDS Mitigation Report: 90 days after recommencing mine operations and every three months thereafter



1.7 Request to Defer Submission of Revised AEMP Design Update

➤ Dated December 23, 2015

- De Beers proposed the following general sequence of activities leading to the coordinated review of the Extended Care and Maintenance (ECM) Plan and AEMP Design Plan Update
 - January 2016 Current Care and Maintenance Plan submitted to Board
 - January – June 2016 Stakeholder Engagement on ECM Plan and AEMP Design Plan Update
 - April – May 2016 De Beers to submit ECM Plan and AEMP Design Plan Update for approval
 - 90 days Board-led review of ECM Plan and AEMP Design Plan Update



1.8 Request to Change Management Plan Submission Dates

➤ Dated December 23, 2015

- As a result of suspending mine operations, De Beers would like the opportunity to review the engagement requirements, the annual cycle of engagement as it may apply to a mine in a care and maintenance status, and allow for further consultation with communities of interest prior to submitting the Engagement Plan for approval. De Beers requested that the date of submission of the Engagement Plan be changed to March 1, 2016



1.9 2015 Downstream Watercourses Water Quality Model

➤ Submitted on December 24, 2015

- “De Beers notes that on December 4 2015, notification was provided to the Board that Snap Lake Mine had suspended mining operations. De Beers will no longer achieve the concentrations or volumes of effluent predicted in this model as it is based upon an operating mine. On this basis, certain aspects may no longer be applicable or appropriate. Upon resuming operations, an updated downstream lakes water quality model may be applicable based upon future conditions of Snap Lake and as such, De Beers considers this model report to be for information purposes only.”



2. Inspection Update

- Inspector – Jamie Steele
- Water Licence Inspection
 - November 18-19, 2015



2.1 Water Licence Inspection

- Inspection conducted on November 18 and 19, 2015, and reported on December 4, 2015
- Inspected the Snow Dump Locations, North Pile West Cell, Landfill, Burn Pit, North Pile Water Management Structures, Airstrip De-icing Facility and Truck Shop Oil Water Separator
- No concerns as a result of this inspection



Snow Dumps – The west snow dump (left photo is located adjacent to Permanent Sump 1 and accepts snow from the west side of the mine site; the east snow sump in located adjacent to Permanent Sump 3 and accepts snow from the east side of the mine site



Construction of the West Cell divider dyke is underway



Construction of Permanent Sump 5 expansion is underway



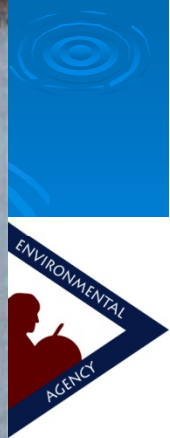
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Landfill was clean. No misdirected waste was apparent



Burn Pit was becoming full and will require a burn in the near future. The Burn Pit contained inert combustible material. No misdirected waste was apparent



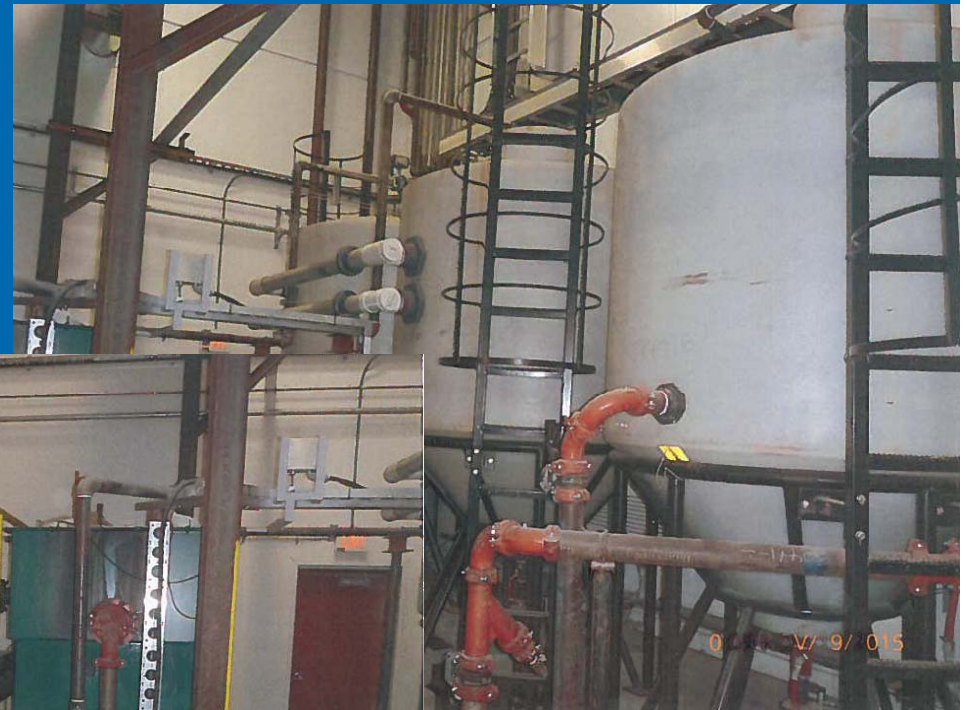
Water level is low and ice is beginning to form in Permanent Sump 4. Ice will be actively managed in this sump throughout the winter



Airstrip de-icing facility is a fully lined area and there is a containment sump for aircraft deicing



Water is collected in the Wash Bay (left photo) and sent to the oil water separator (center photo). Water is run through the oil water separator and the skimmed oil is stored in plastic cubes for burning in used oil furnaces throughout the minesite. Waste water is stored in collection tank (right photo) for reuse in the wash bay. If the tanks become low water is made up from the fresh water system from Snap Lake



3. Regulators' Update – MVLWB (I)

- Organized AEMP Plan Update – Discussion Session on December 2, 2015
 - De Beers and its consultant Golder Associates presented the updated AEMP and answered questions from ENR, Lands Department, EC, LKDFN, YKDFN, NSMA, and SLEMA
- Suspended the current review for the AEMP Design Plan Update until further notice, on December 14, 2015



3. Regulators' Update – MVLWB (II)

- Invited reviewers to comment De Beers' LUP Extension Request on December 15, 2015
 - MV2010D0053 and MV2014D0010
 - Comments due on January 5, 2016
- Invited reviewers to comment De Beers' Engagement Plan Deferral Request on December 24, 2015
 - Comments due on January 6, 2016



4. Aboriginal Update

- No comments from the Aboriginal parties in December 2015



5. Stakeholders' Update

- True North Safaris and Mackay Lake Lodge commented monitoring process on December 2, 2015
- ENR and EC commented on the Waste Management Plan – Hazardous Waste Containment Facility on December 15
- EC commented on the Land Use Permit Extension Request on December 22, 2015



5.1 True North Safaris and Mackay Lake Lodge

- “True North Safaris and Mackay Lake Lodge continue to be concerned about the out put and monitoring process. We would like to be engaged in the monitoring process and ongoing reporting
- We have asked our fishing client for a copy of the picture of the three eyed grayling that was caught on the King River.
- We continue to wish that Snap Lake De Beers would just engage us out of common courtesy and being good neighbours. We can see their lights at night and are clearly down stream.”



5.2 ENR Comments on the Waste Management Plan – Hazardous Waste Containment Facility

- ENR does not support the dilution of hydrocarbon contaminated soils, where heavily contaminated soils are mixed with lightly contaminated soils and then sampled as an annual batch
- ENR Recommends that
 - DeBeers provides greater detail regarding how soils entering the facility will be remediated and sampled to ensure they are representative
 - DeBeers outlines how it will ensure that contaminated soils are not diluted on an annual basis as they enter the facility



5.3 EC Comments on the Waste Management Plan – Hazardous Waste Containment Facility

- No comments at this time



5.4 EC Comments on the Land Use Permit Extension Request

- No comments at this time



6. Agency's Activities

- IEMA, EMAB and SLEMA hosted the Annual Holiday Open House on December 9, 2015
- Core Group Meeting held on December 16
 - The Inspector presented his site inspections in the past few months
 - De Beers staff updated the environmental activities and Care and Maintenance
 - ENR staff exchanged ideas with SLEMA board on De Beers' Care and Maintenance



7. SLEMA Reviews

- 2015 AEMP Design Plan
- Care and Maintenance
- SLEMA Modeling Update
- Land Use Permit Extension



7.1 2015 AEMP Design Plan

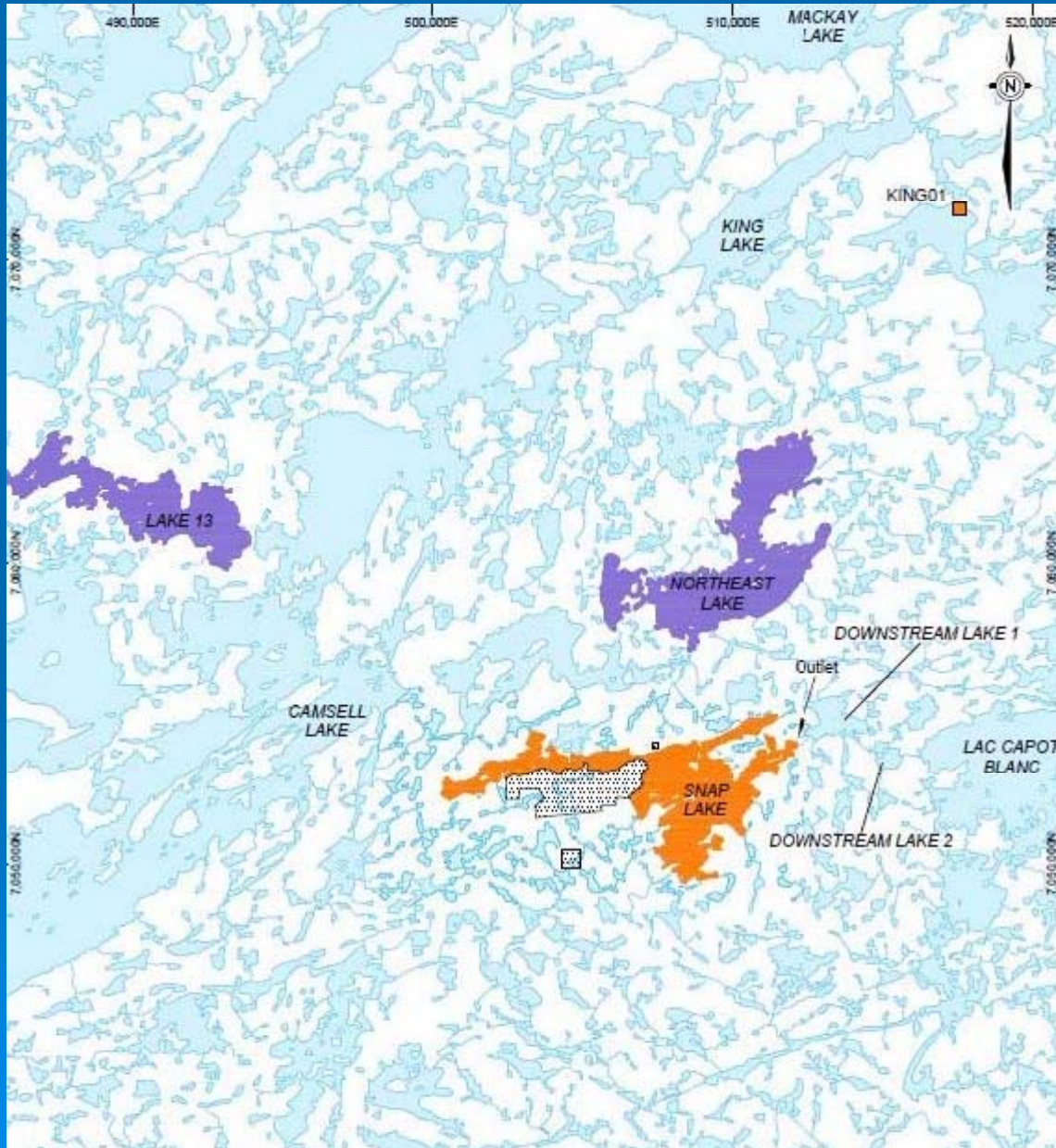
- The original Aquatic Effects Monitoring Program (AEMP) for the Snap Lake Mine (Mine) was implemented in 2005 and updated in 2013.
- The present 2015 AEMP Design Plan is provided based on the most recent (2015) Water Licence, specifically: methods and analyses for water, toxicology, and plankton were re-examined and updated; and, the Response Framework for assessing the overall results of AEMP monitoring was updated for toxicology, plankton, and water
- The 2015 Design Plan update provides refinements, not major changes



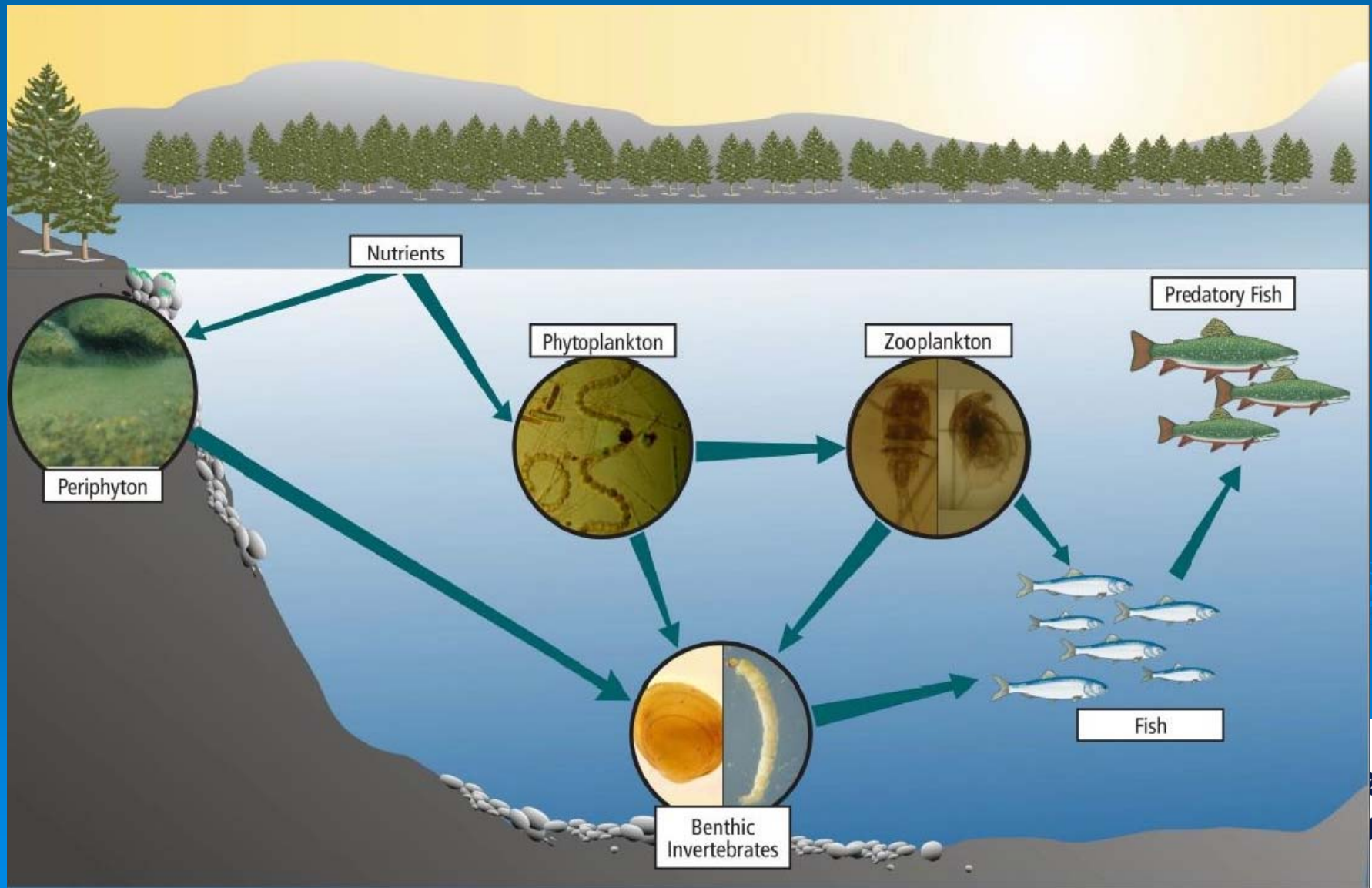
Zone of Influence



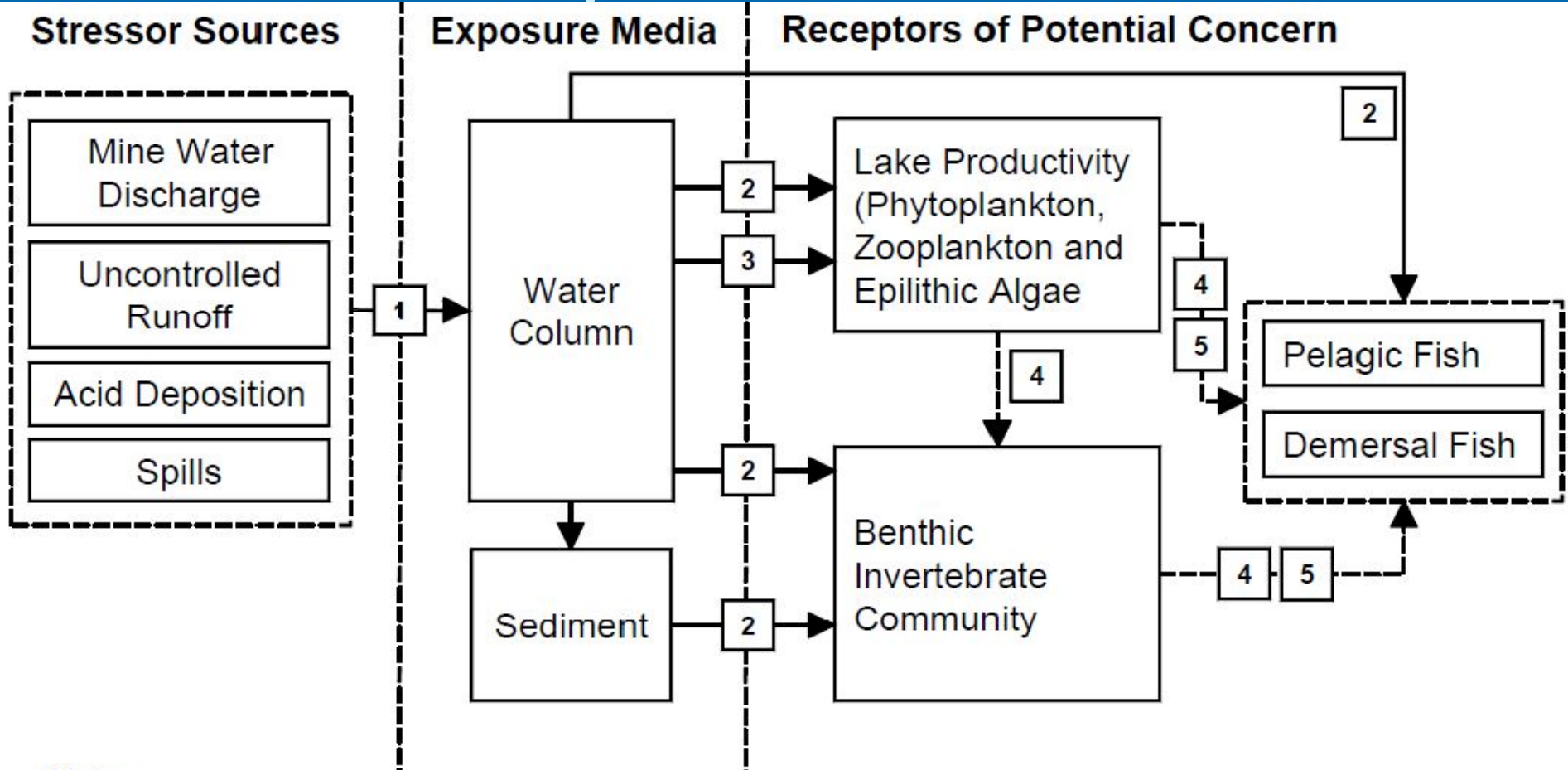
AEMP Study Area



Concept Site Model (I)



Conceptual Site Model



Notes:

1. Loading of TDS, nutrients, metals and acidifying substances
2. Potential direct toxicity or physical habitat change (sedimentation, dissolved oxygen)
3. Potential nutrient enrichment, or altered balance of nutrients
4. Potential indirect effect due to change in food supply
5. Potential change in tissue chemistry

AEMP Components (I)

- Site characterization, supporting environmental variables
- Water quality
- Sediment quality
- Toxicity
 - The toxicity assessment will be a separate AEMP component, rather than being reported as part of the water quality component
- Plankton

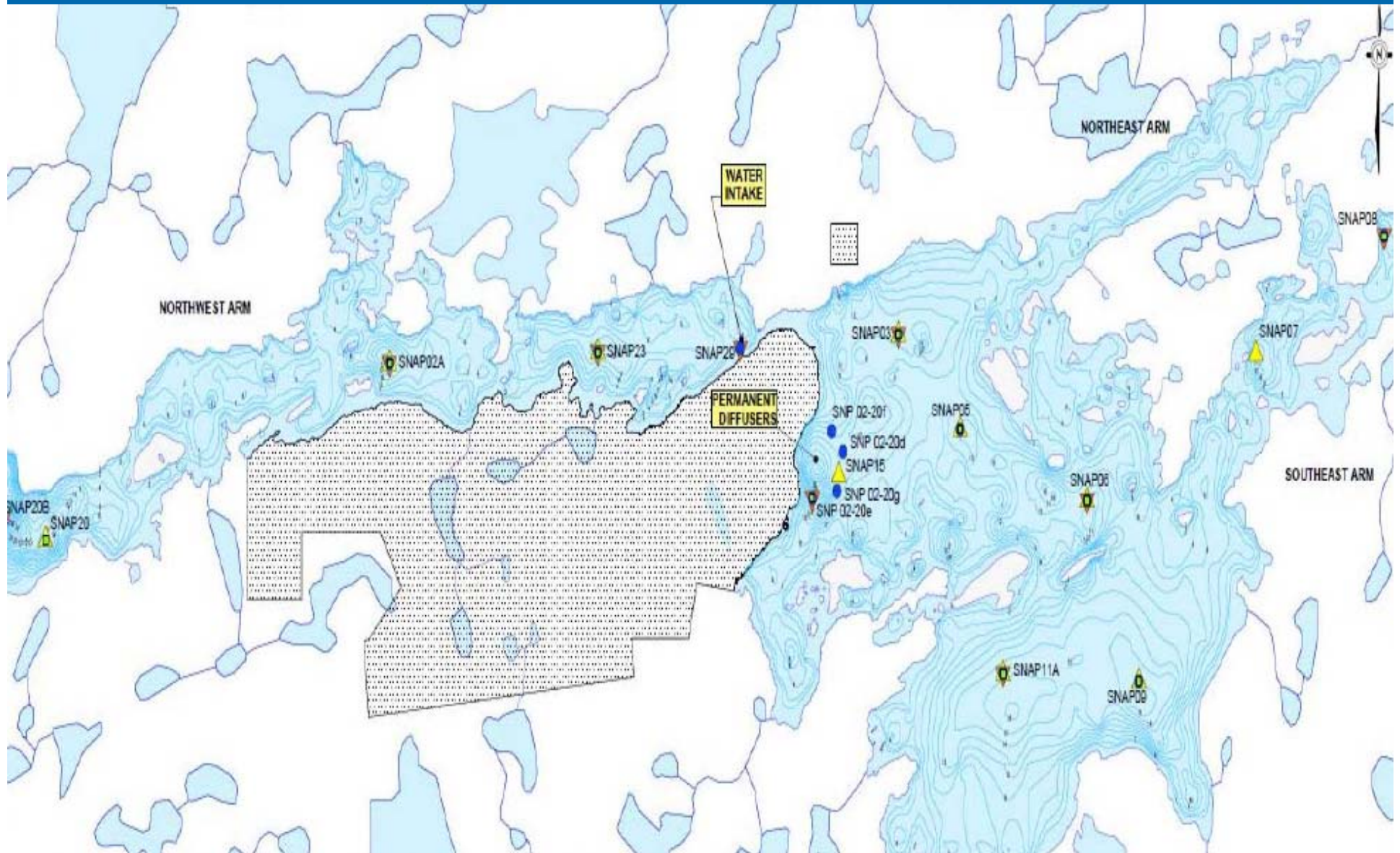


AEMP Components (II)

- Benthic invertebrates
- Fish health
- Fish community
- Fish tissue
- Fish tasting
- Special studies
 - Littoral zone study
 - Picoplankton study
 - Downstream watercourses study



Sampling Stations



Schedule

Component	2013		2014		2015		2016		2017	
	IC	OW	IC	OW	IC	OW	IC	OW	IC	OW
Site Characterization and Supporting Environmental Variables	√	√	√	√	√	√	√	√	√	√
Supporting Environmental Variables - Trend Analysis							√			
Water Quality – SNP	√	√	√	√	√	√	√	√	√	√
Water Quality – AEMP	√	√	√	√	√	√	√	√	√	√
Depth-Integrated Nutrients		√		√		√		√		√
Plankton - Phytoplankton, Zooplankton, Chlorophyll a and Chlorophyll c		√		√		√		√		√
Sediment Quality - SNP		√		√		√		√		√
Sediment Quality – AEMP						√				
Toxicity – SNP (end of pipe and in-lake)	√	√	√	√	√	√	√	√	√	√
Benthic Invertebrates		√				√				
Fish Health						√				
Fish Community		√						√		
Fish Tasting		√		√		√		√		√
Annual AEMP Report	√		√		√		√		√	
AEMP Four-year Re-evaluation Report										√
AEMP 2017 Design Plan										√

AEMP = Aquatic Effects Monitoring Program; SNP = Surveillance Network Program; IC = ice-cover conditions; OW = open-water conditions.



Comments from the Environmental Analyst

- There are no major changes but refinements in the updated AEMP Plan
 - There might be major changes in two years
 - AEMP Re-evaluation Report due on November 1, 2017
 - AEMP Design Update due on November 1, 2017
- No concerns are raised



7.2 Care and Maintenance

- De Beers announced on December 4, 2015 that Snap Lake Mine is being placed under care and maintenance effective Friday, December 4, 2015
 - De Beers said it will keep an eye on market conditions over the next year to determine the viability of the mine, but Kim Truter (CEO of De Beers Canada) said it's unlikely it will come back given the markets.
 - "The market collapse has happened so fast, it's made the operation unviable for many years to come,"



Care and Maintenance

- Care and Maintenance is the status of a mine when it undergoes a **temporary closure** (*Guidelines for the Development of Closure and Reclamation Plans for Advanced Mineral Exploration and Mine Sites in the Northwest Territories, November 2013*)
- Care and Maintenance is a mining industry term used to describe conditions on a mine site where it has stopped production, but kept in the condition to possibly reopen at a later date (CBC, December 4, 2015)



Temporary Closure

- As defined in the Closure Guidelines, Temporary Closure occurs when an advanced mineral exploration or mining operation ceases with the intent of resuming activities in the near future. Temporary closure could be due to an unplanned closure or a planned closure of certain facilities in a complex mining project
 - During temporary closure, proponents must maintain all operating facilities and programs necessary to protect humans, wildlife, and the environment, including necessary environmental monitoring



Past Events of Care and Maintenance in Snap Lake Mine

- During the Advanced Exploration Project (AEP) for Snap Lake Mine, In late 2001, the mine went into care and maintenance mode. Pumping equipment was removed and the mine was allowed to flood. The mine remained in care and maintenance until completion of permitting in mid-2004
- In 2009, the site went into care and maintenance mode due to the global economic downturn. Operational activities resumed in the same year and in 2010 a production ramp up at Snap Lake occurred, with associated staffing level increases



Interim Closure and Reclamation Plan (July 2013)

- Section 7. Temporary Closure describes
 - Goal and objectives
 - Activities
 - Continue water and waste management, environmental monitoring
 - Monitoring, maintenance, and reporting
 - the same as the required monitoring procedures completed during operations as required by the current Water License, Fisheries Authorization, Land Use Permits, and Environmental Agreement
 - Contingency program
 - Schedule
 - Expected duration of the shutdown could range from a few weeks to several years



Comments from the Environmental Analyst (I)

- The underground mine will not be flooded, mine water will be managed and treated as before, during the temporary closure
 - SNP, AEMP, Downstream Special Study
- No extra environmental impacts are expected during the temporary closure period



Comments from the Environmental Analyst (II)

- The temporary closure may last one year, then De Beers will make a decision
 - Either reopen the mine or sell the mine
 - Or continue care and maintenance
 - Or shut down the mine permanently
- SLEMA may have to prepare for the review of the Final Closure Plan in 2016 if De Beers decide to shut down the Snap Lake permanently

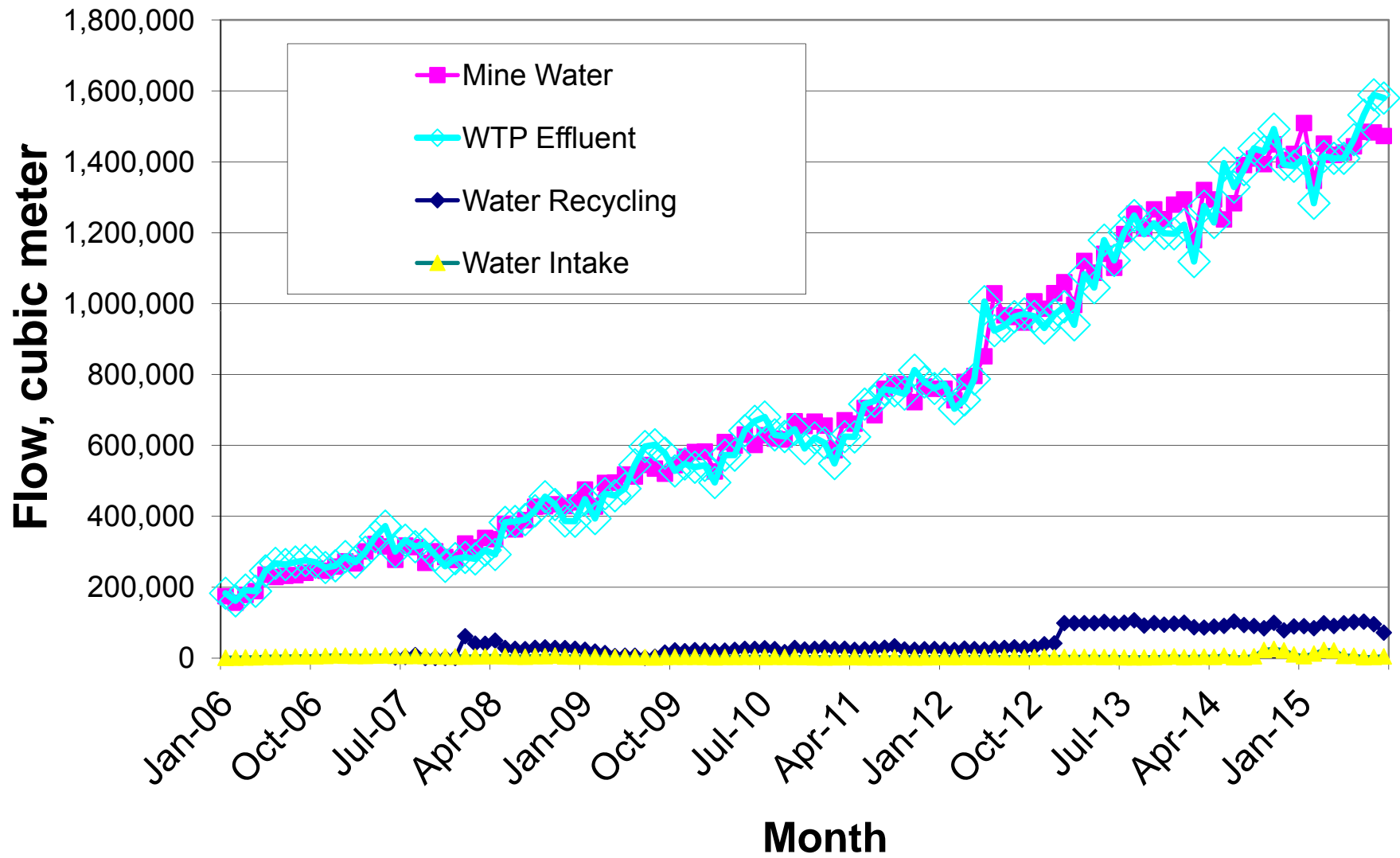


7.3 SLEMA Modeling Update

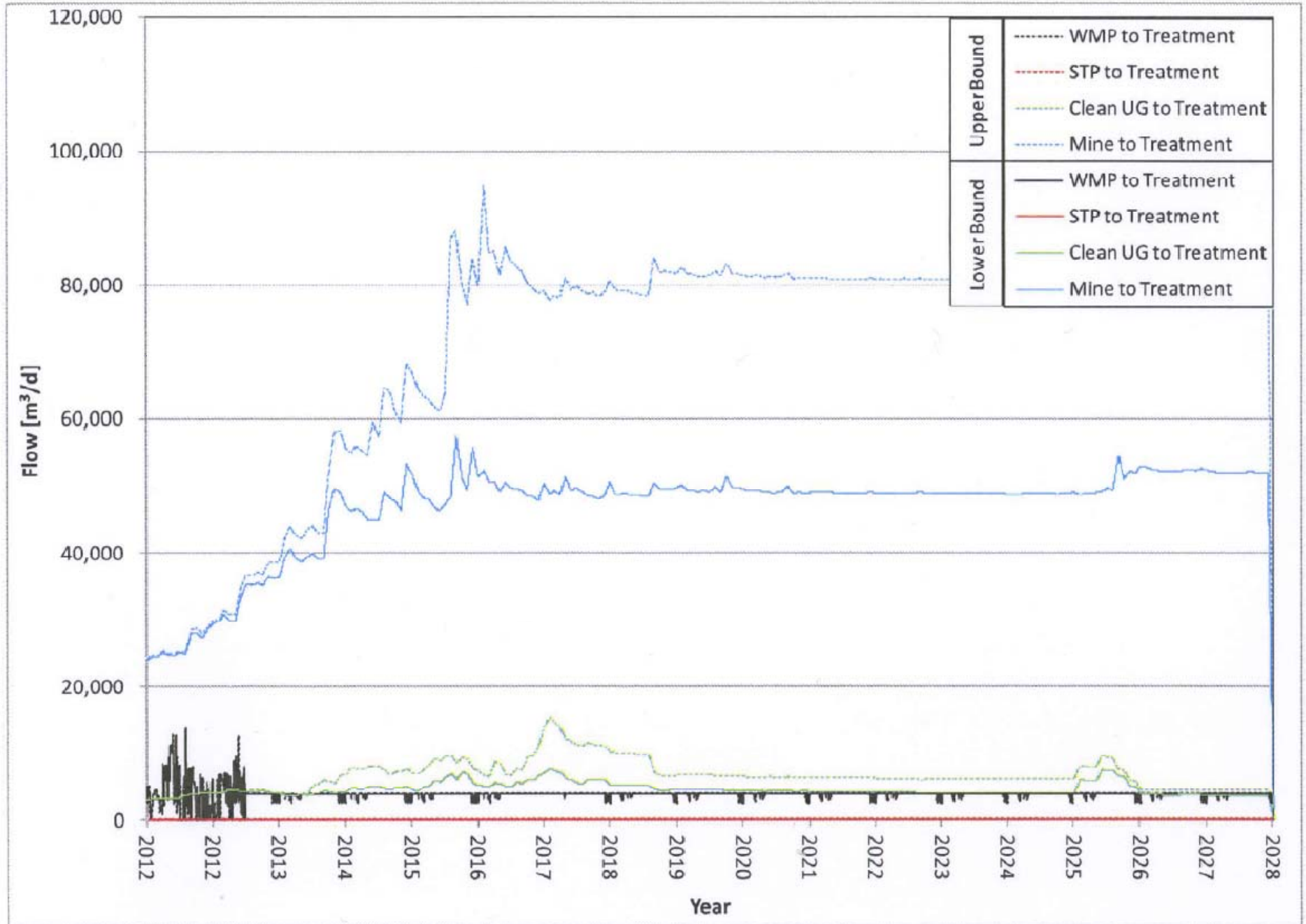
- SLEMA model was calibrated with data up to September 2015
 - Correlation co-efficient: 0.998
- Back test results indicate that TDS levels in Snap Lake (SNP 02-18, whole lake average) may have been above 350 mg/L from January to May 2015

TDS in mg/L at Stations	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015	Jul 2015	Aug 2015	Sep 2015
SNP 02-18, predicted	338.8	354.6	364.6	375.2	386.4	392.3	337.0	317.9	322.9	327.4
SNP 02-18, observed						425		333	332	329
SNP 02-20, observed		370.0	386.8	404.5	429.5	427.4	349.5	338	341.5	339

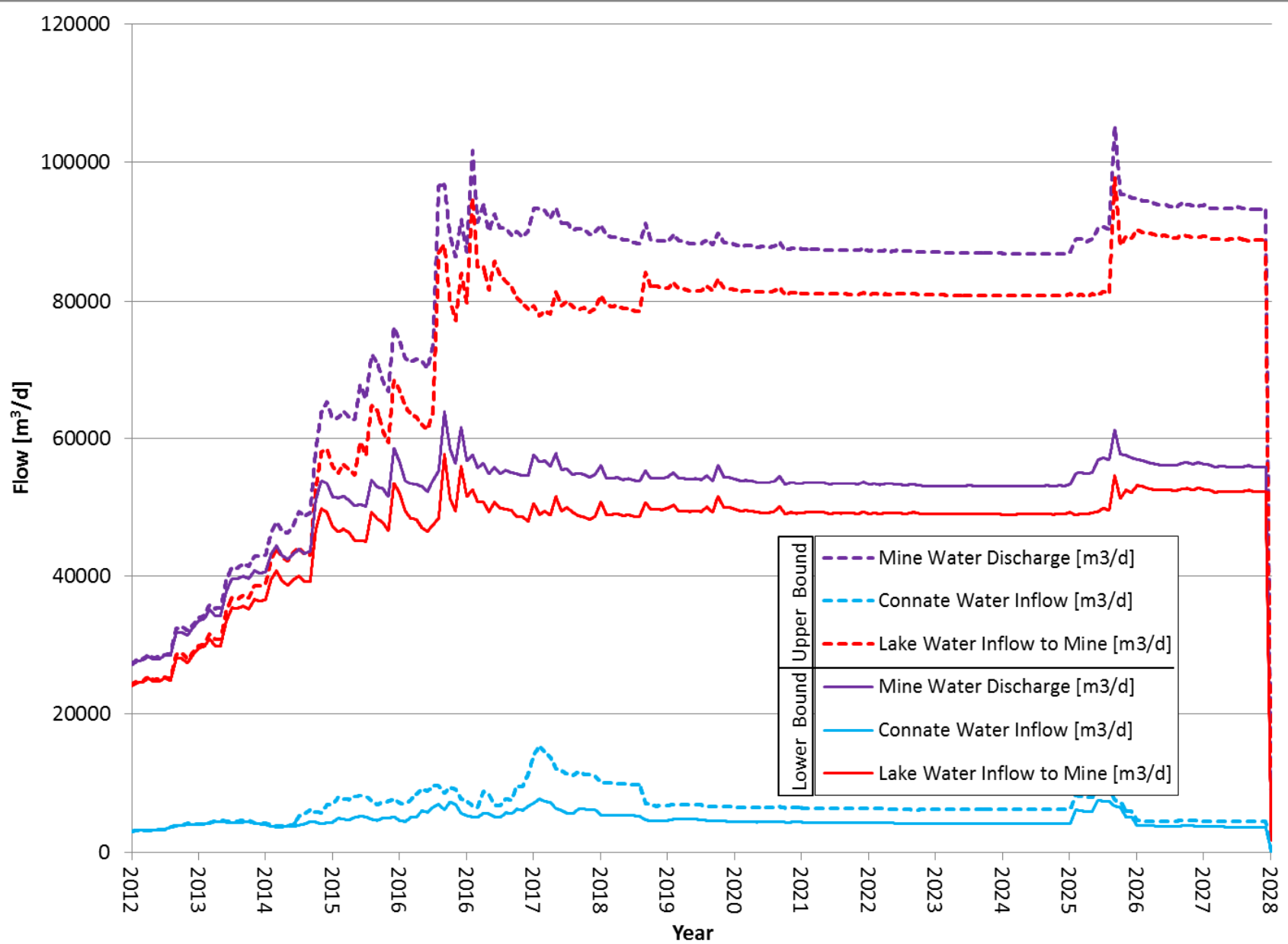
Water Flows at the Mine



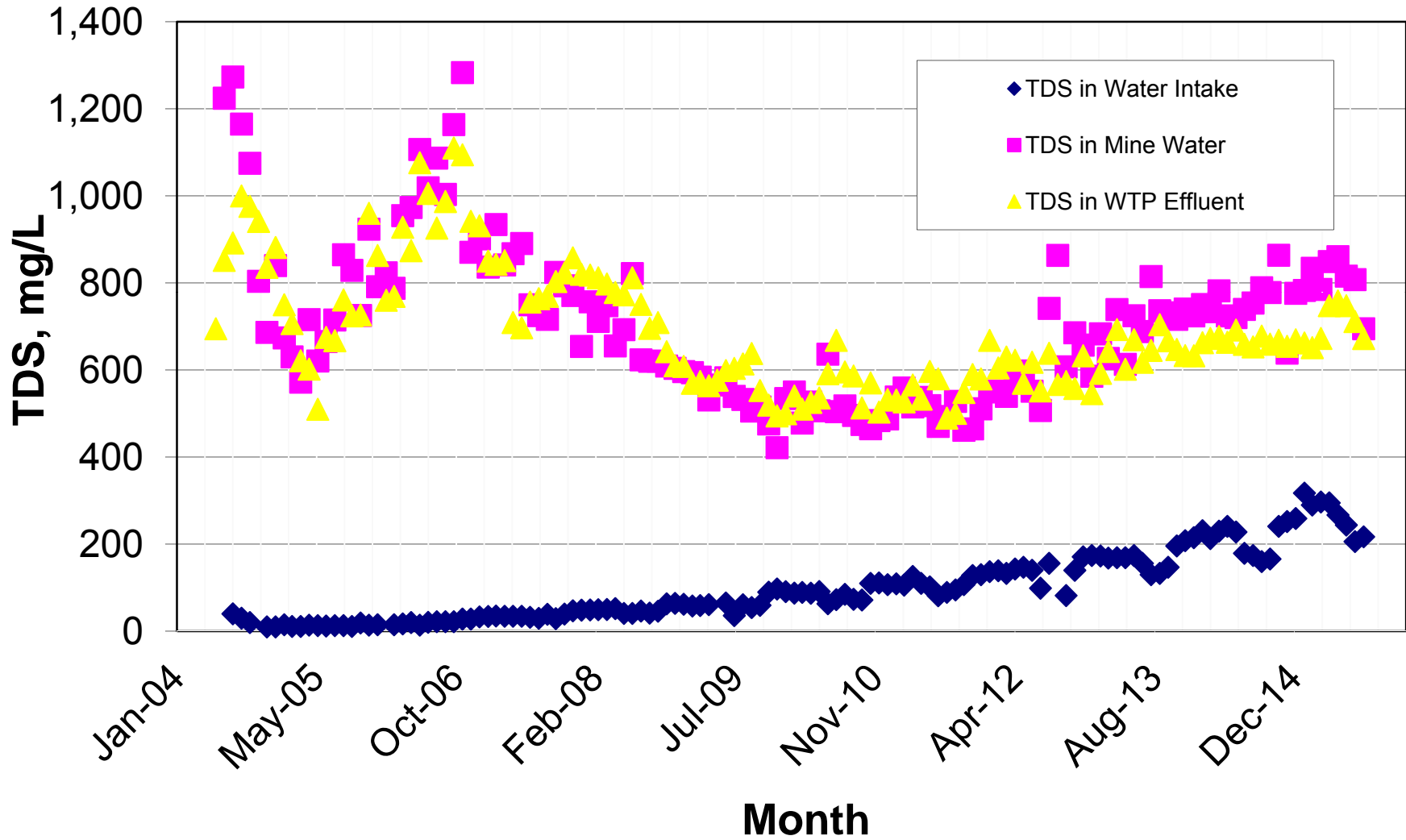
Flow Reporting to Treatment



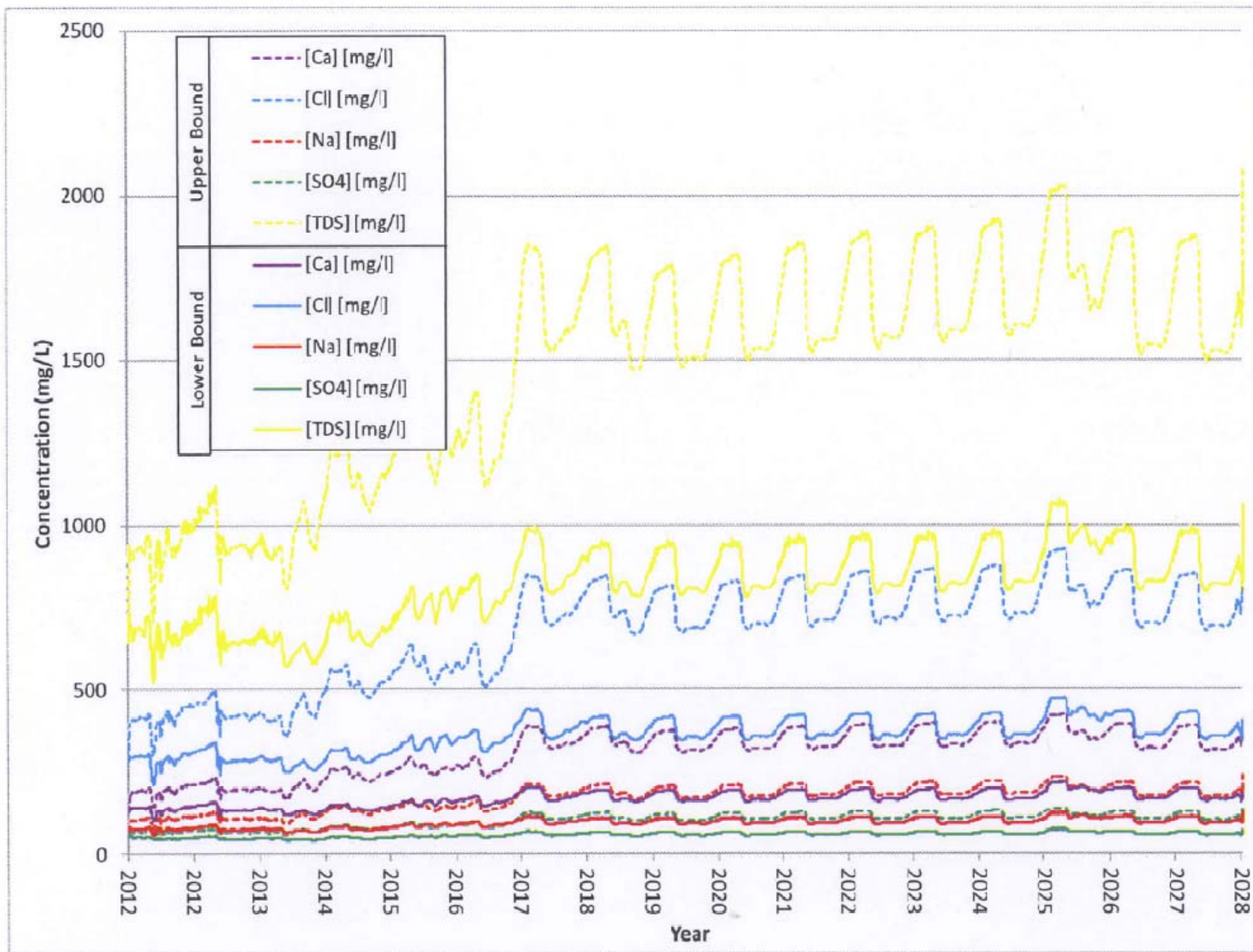
Site Discharge – Upper Bound and Lower Bound



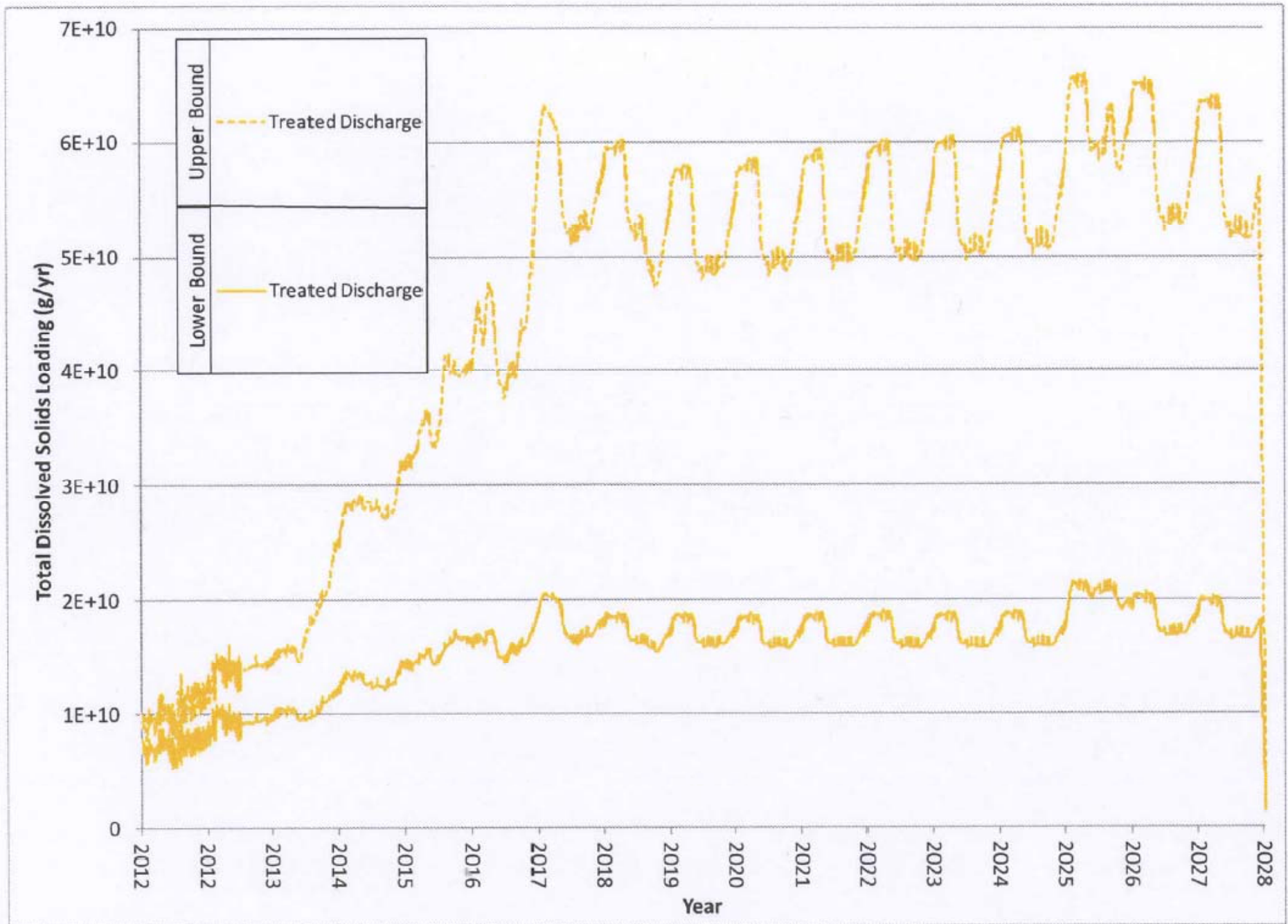
Yearly TDS Analysis



Total Dissolved Solids and Major Ion Concentrations – Treated Discharge



Total Dissolved Solids Mass Load Treated Discharge

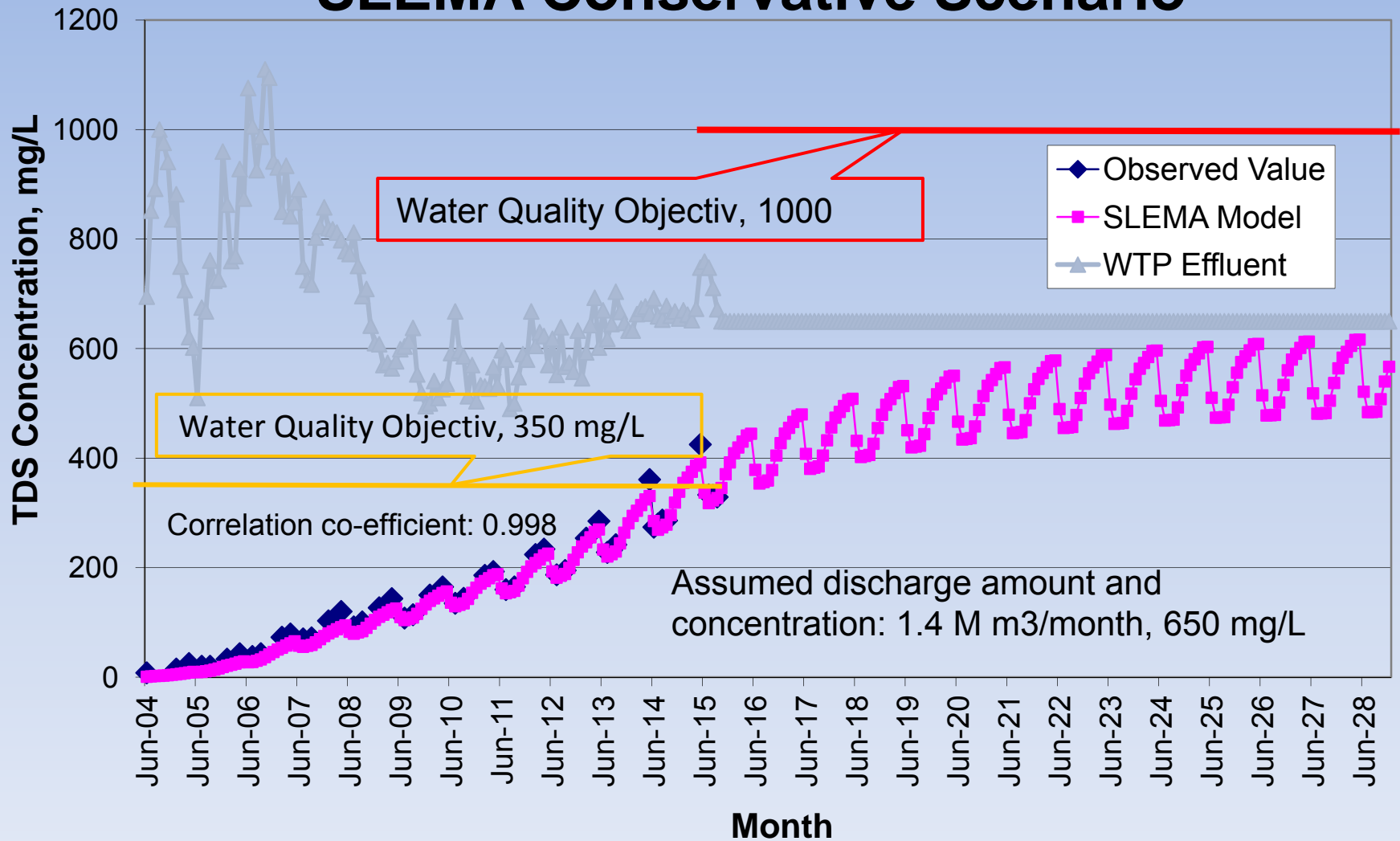


TDS Predictions

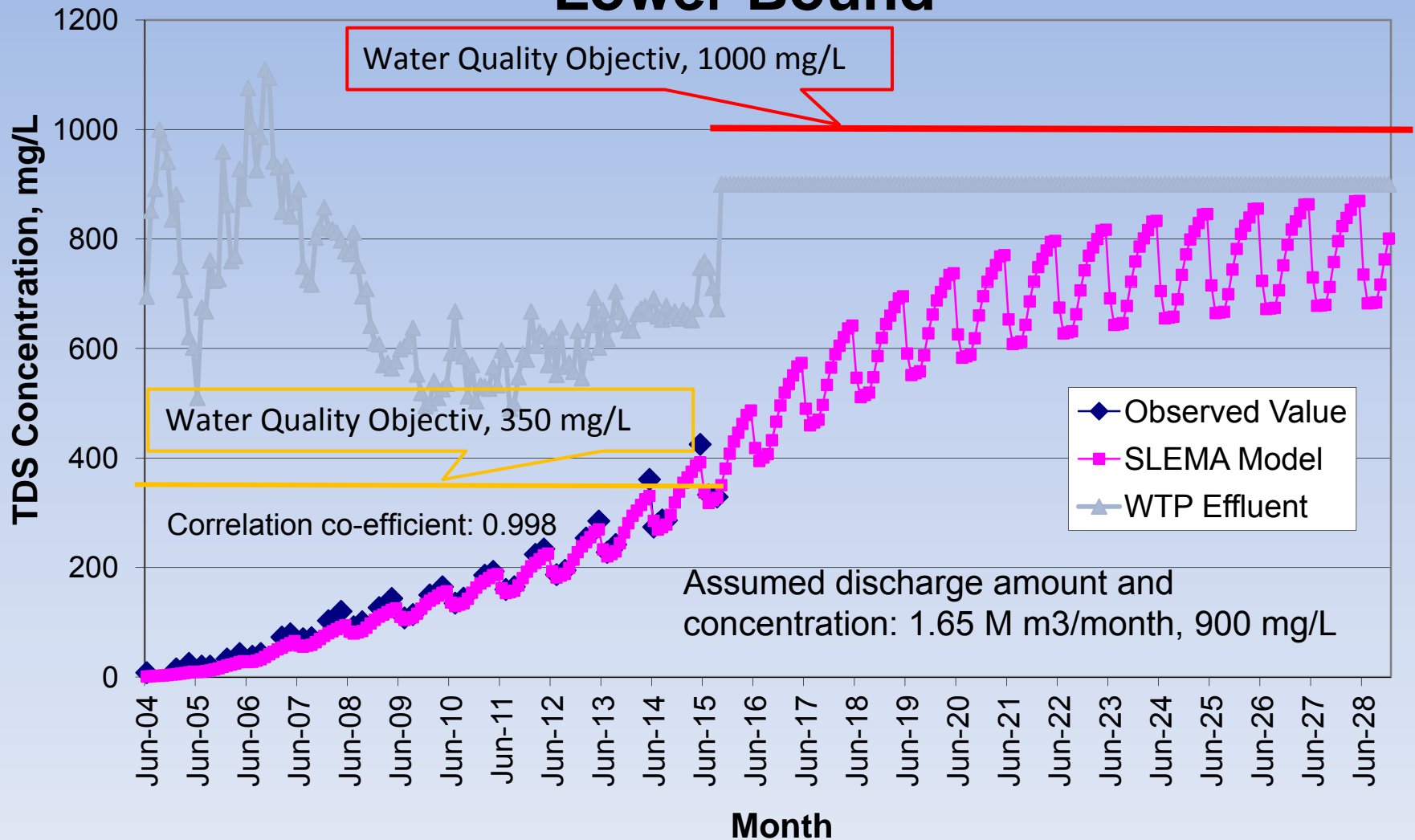
- During the AEMP Design Plan Update – Discussion Session on December 2, 2015, De Beers confirmed that the effluent TDS level will be somewhere in between the lower and upper bounds
- Two scenarios proposed by De Beers (simplified upper bound and lower bound) and two scenarios (conservative and aggressive) proposed by SLEMA were applied into SLEMA modeling prediction for Snap Lake

Scenario	Upper Bound	SLEMA Aggressive	Lower Bound	SLEMA Conservative
Discharge, m3/Month	2,700,000	2,000,000	1,650,000	1,400,000
TDS, mg/L (monthly average)	1,400	960	900	650

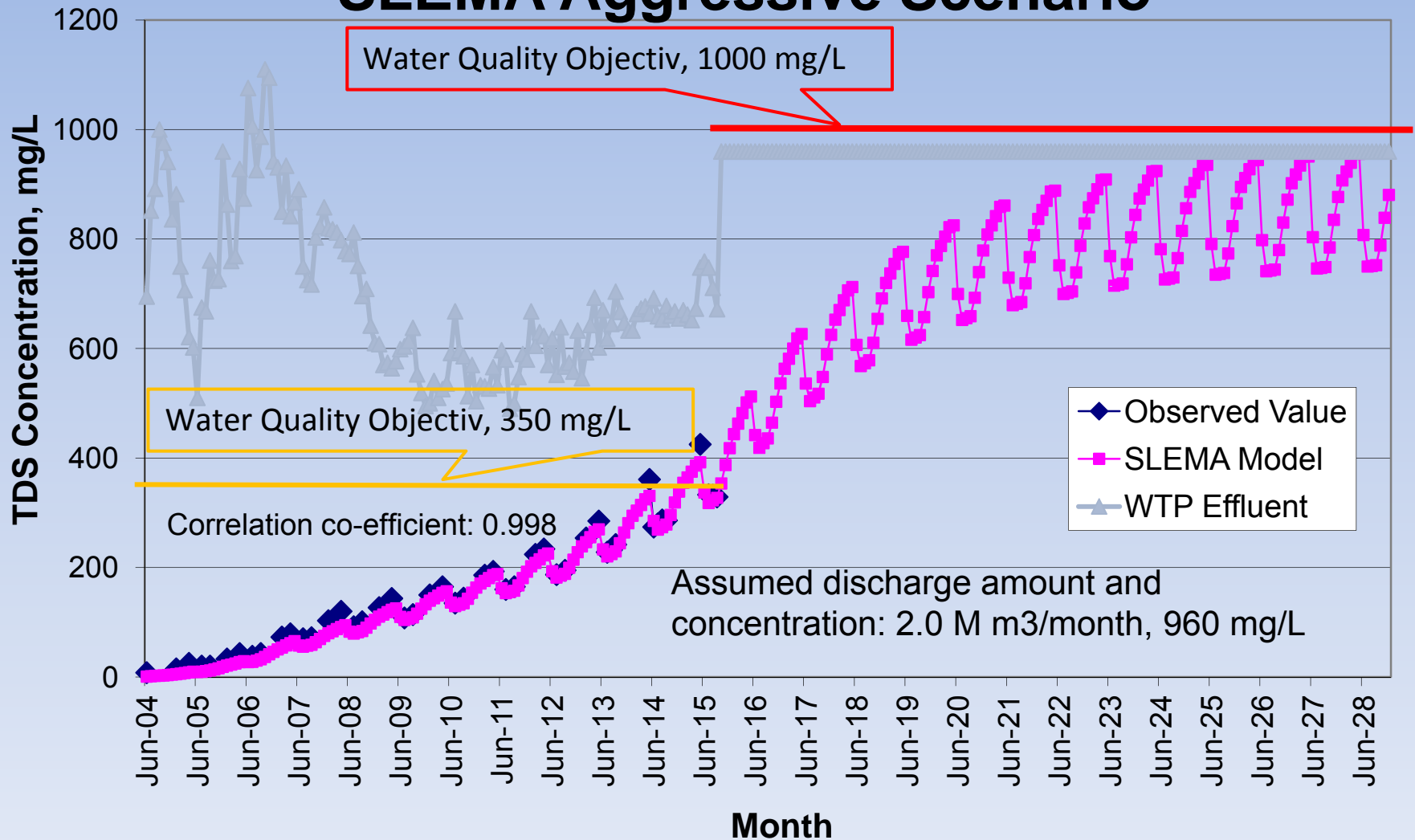
Water Quality Prediction of Snap Lake – SLEMA Conservative Scenario



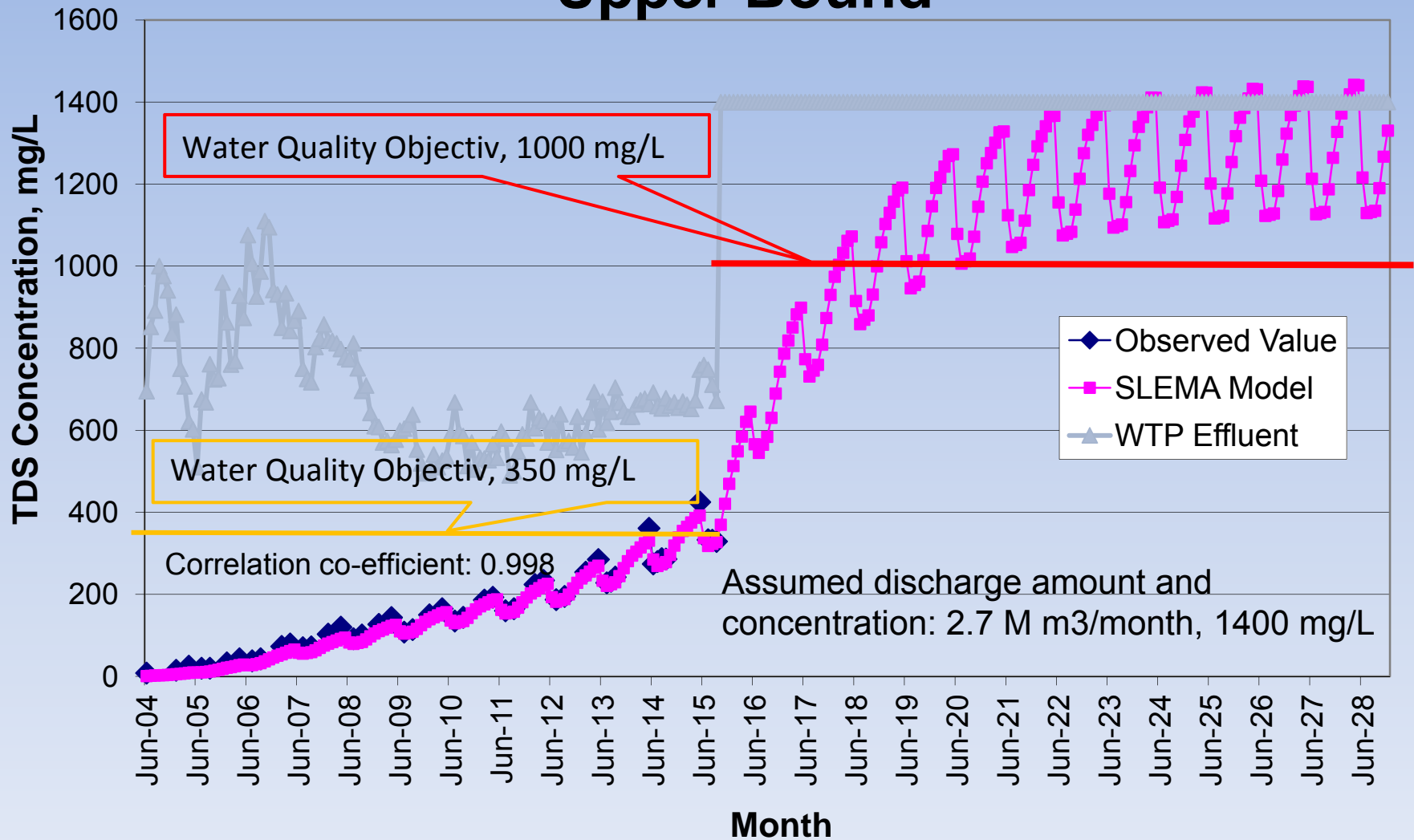
Water Quality Prediction of Snap Lake - Lower Bound



Water Quality Prediction of Snap Lake - SLEMA Aggressive Scenario



Water Quality Prediction of Snap Lake - Upper Bound



Comments from the Environmental Analyst

- TDS levels in Snap Lake are subject to the treated effluent from the Mine
 - If TDS concentrations in the effluent (SNP 02-17B) are lower than the Effluent Discharge Criterion (960 mg/L, monthly average), TDS levels in Snap Lake (SNP 02-18) will remain below 1000 mg/L (new Water Quality Objective)
- Predicted TDS levels in Snap Lake are lower than the Water Quality Objective (1,000 mg/L) under Lower Bound, SLEMA Aggressive and Conservative Scenarios
 - Lower Bound is the most likely scenario



7.4 Land Use Permit Extension

- De Beers requested to extend the Land Use Permits MV2010D0053 and MV2014D0010 for two years on December 1, 2015
- De Beers did not request any other changes to the conditions of the permit. The extension of the permits will allow for the continuation mining and associated activities at the Snap Lake Diamond Mine as specified by the permits' conditions



LUP MV2010D0053 (I)

- The MVLWB approved this Permit, on February 16, 2011, for a period of 5 years commencing February 16, 2011 and expiring February 15, 2016
- This Permit entitles De Beers to conduct the related activities associated with diamond mining and milling production as outlined in the Land Use Application dated October 29, 2010 and the Consolidated Project Description, submitted by De Beers on November 24, 2009



LUP MV2010D0053 (II)

➤ Mining activities

- The extraction of waste rock and ore from the Snap Lake Diamond Mine;
- The development and operation of Site Facilities (including the airstrip);
- The storage of fuel;
- The development and progressive Reclamation of the North Pile;
- The Construction and maintenance of site roads and lay down areas;
- The quarrying of materials from specified areas;
- Maintenance and operation of the winter road to the Snap Lake Mine Site from the Tibbett-Contwoyto winter road, this also includes the winter access road to the Esker quarry site;
- Progressive closure and Reclamation of site components



LUP MV2014D0010

- The MVLWB approved this Permit, on June 19, 2014, for period commencing June 19, 2014 and expiring February 15, 2016
- This Permit entitles De Beers to conduct the following land-use operation at the Mine
 - The storage of fuel; and
 - Construction of Fuel Storage Facilities



Engagement

- De Beers notified the following Parties:
 - Łutsel K'e Dene First Nation
 - North Slave Métis Alliance
 - Tłıchų Government
 - Yellowknives Dene First Nation
- De Beers also followed up with designated representatives of each organization by telephone to explain the request
 - “At that time, no concerns were noted from the aforementioned Parties.”



Comments from the Environmental Analyst

- The suspension of mine operations announced on December 4, 2015 will not affect the LUP extension
 - Under the scenario of Care and Maintenance of the Mine, De Beers also needs the LUPs to be extended to conduct related activities
- No concerns are raised

