Appendix C2

2016 Water Management Report and Plan

AGNICO EAGLE

MEADOWBANK GOLD MINE

2016 WATER MANAGEMENT REPORT AND PLAN

MARCH 2017
VERSION 01

EXECUTIVE SUMMARY

Agnico-Eagle Mines Ltd. Meadowbank Division (AEM) is operating the Meadowbank Gold Mine (the Mine), located on Inuit-owned surface lands in the Kivalliq region approximately 70 km north of the Hamlet of Baker Lake, Nunavut. The mine is subject to the terms and conditions of both the Project Certificate issued in accordance with the Nunavut Land Claims Agreement Article 12.5.12 on December 30, 2006, and the Nunavut Water Board Water Licence No. 2AM-MEA1525 issued on July 23, 2015.

This report presents an updated version of the Water Management Plan 2015 and provides a revised site-wide Water Balance. The revised Water Balance determines the demand and storage requirements of water over the life of the mine. The storage strategies and required transfers will be discussed at large. Certain concepts within the water balance, including pit flooding, remain at the conceptual stage for now and will be further detailed in the Final Mine Closure and Reclamation Plan to be submitted one year prior to final closure in accordance with the current Type A Water License.

The necessity of this particular water management update follows changes in the observed natural pit water inflows, updated tailings deposition parameters, mine and milling life schedule and production rate, tailings management and pit backfilling strategies.

The principal additions to this update are:

- The optimization of the flooding activities which now aim to reduce the impact on wall stability and are planned according to the more refined design of the reflooding infrastructure;
- The tailings deposition parameters used for the model following the results of the 2016 bathymetries analysis;
- The Central Dike seepage status update;
- Reporting on the 2016 Phaser Lake dewatering and the mining of Phaser Pit in 2017-2018.

The 2016 Water Management Plan also includes the 2016 Water Quality Forecast Update (Appendix C), the 2016 Freshet Action Plan (Appendix D) and the 2016 Ammonia Management Plan (Appendix E).

The Water Management Plan will be updated on a yearly basis as required by the Nunavut Water Board Water License 2AM-MEA1525.

Recommendations obtained during the 2015 Meadowbank Annual Report Review have been included in the 2016 Water Management Plan. These recommendations and requirements are outlined below:

- Include in the water quality forecast report a summary table or graph that will compare total vs dissolved concentrations for key parameters in the mill effluent and at ST-21, and total suspended concentrations, to demonstrate that most of the suspended particles do settle out readily in the TSF.
- Include in the water quality forecast, a more detailed analysis of the changes in TDS in the mine water from Portage Pit and Goose Pit with the objective to assess a mass loading that will account for the changes in TDS. The updated water quality forecast model will evaluate the mine water from Portage and Goose pit on a monthly time step basis based on this loading. Since the mine water from Portage and Goose Pits are transferred to the South Cell TSF, the evaluated mine water quality and loading from each pit will be taken into account in the water/mass balance around the South Cell TSF.
- Update the water quality forecast report to ensure that all footnotes are properly referenced in the table.
- Evaluate the mine water from Portage and Goose pit on a monthly time step basis. The potential loading from the leaching of contaminants from the exposed pit walls will also be evaluated and included in the model of the water quality forecast model.
- Clarify the source of the Total N equivalent guideline shown as a Canadian Council of Ministers of the Environment (CCME) guideline in Table 4-2 and identify what this refers to in the water quality forecast model.
- In Table 4-2 of the water quality forecast model, ammonia is shown as (NH3) (ionized) which is contradictory (the ionized form is NH4); clarify what form the predictions are for.
- Clarify whether pH changes can be modeled for the pit water, or if pH adjustment will be done for any treated water prior to release or reconnection to surface waters.
- In Section 2.3.1.5, 2.3.1.7 and Section 2.4 of the Freshet Action Plan, reference is made to TSS management, with notification being made to the Department of Fisheries and Oceans (DFO) in the event of TSS discharge. This falls under ECCC's purview; the notification information needs to be amended to ECCC for TSS-related issues in waterbodies.
- Highlight the measurement that exceeds the CCME WQGs for each sample taken in ST-19 and ST-20 in the tables annexed to the report.
- In the water quality forecast model reassess the silver concentrations used in the model based on the latest mill effluent samples taken in 2016.

- Continue to present the water quality forecast including the treatment option as part of the Water Management Plan.

DOCUMENT CONTROL

Version	Date (YM)	Section	Page	Revision
1	March 2014	ALL	-	Revision for the 2012 Water Management Plan (by SNC) according to the updated Life of Mine and water management strategies
2	March 2015	ALL	-	Revision for the 2013 Water Management Plan (by AEM) according to the updated Life of Mine and water management strategies
3	October 2015	ALL	-	Update of sections according to Water License renewal conditions
4	March 2016	ALL	-	Revision of the 2014 Water Management Plan (by AEM) according to the updated Life of Mine and water management strategies
5	March 2017	ALL	-	Revision of the 2015 Water Management Plan (by AEM) according to the updated Life of Mine and water management strategies

Prepared By: Engineering and Environmental Departments

Approved by:_______________________

Jamie Quesnel - Environment Superintendent Nunavut

____

Erika Voyer - Environment General Supervisor

____

Pierre McMullen – Engineering Assistant Superintendent

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Agnico-Eagle Mines Ltd. (AEM) has been operating its Meadowbank Gold Mine since 2008, officially beginning production in 2010. The mine is located approximately 70km north of the Hamlet of Baker Lake, Nunavut. The mine is subject to the terms and conditions of both the Project Certificate issued in accordance with the Nunavut Land Claims Agreement Article 12.5.12 on December 30, 2006, and the Nunavut Water Board Water Licence No. 2AM-MEA1525 issued on July 23, 2015.

This report presents an updated version of the Water Management Plan 2015 and provides a revised site-wide water balance that determines the demand and storage requirements of water over the life of the mine (LOM). The storage strategies and required transfers will be discussed at large. Certain concepts within the water balance, including pit flooding, remain at the conceptual stage for now and will be further detailed in the Final Mine Closure and Reclamation Plan which is to be submitted one year prior to mine closure in accordance with the Type A Water License.

The necessity of this particular water management update follows changes in the observed natural pit water inflows, updated tailings deposition parameters, mine and milling life schedule and production rate, tailings management and pit backfilling strategies.

Runoff values and pit inflows for the Vault, Portage and Goose area were determined from the review completed by SNC Lavalin in March 2013. Those run off values will be verified and revised with field observations.

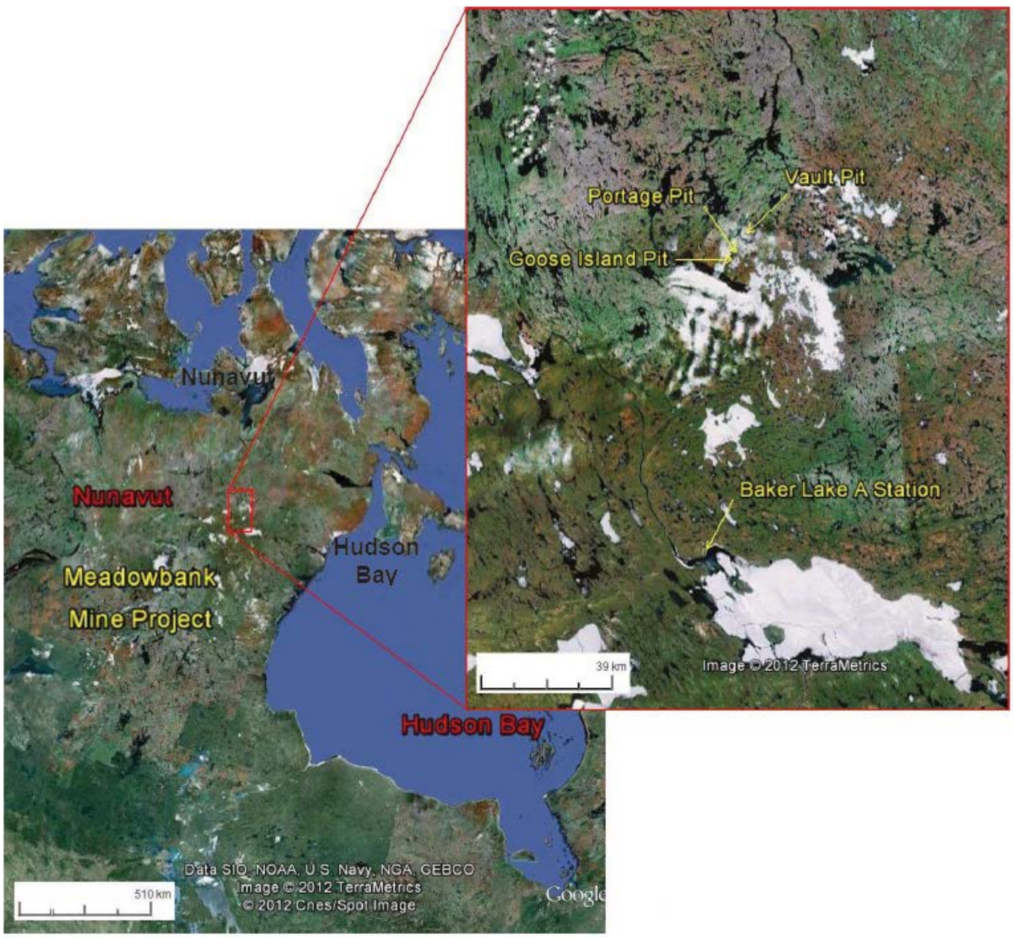
This report also addresses the recommendations from the NIRB following their review of the 2015 Annual report. These recommendations and requirements are included in this report; refer to the executive summary of this report for the specific list. The Water Management Plan will be updated on a yearly basis as required by the Nunavut Water Board Water License 2AM-MEA1525.

2 BACKGROUND INFORMATION

2.1 SITE CONDITIONS

The location of the Meadowbank mine site is shown below in Figure 2.1. A close-up is also provided to show the location of the Baker Lake A Station used to obtain meteorological data.

Figure 2.1: Portage Pit area map



Source: Google Earth Pro, 2012

2.1.1 Climate

The Meadowbank region is located within a low Arctic Eco climate described as one of the coldest and driest regions of Canada. Arctic winter conditions occur from October through May, with temperatures ranging from +5°C to -40°C. Summer temperatures range from -5°C to +25°C with isolated rainfall increasing through September (Table 2.1).

Table 2.1: Estimated average monthly climate data – Baker Lake

Month	Max. Air Temp. (°C)	Min. Air Temp. (°C)	Rainfall (mm)	Snowfall (mm)	Total Precip. (mm)	Lake Evap. (mm)	Min. Relative Humidity (%)	Max. Relative Humidity (%)	Wind Speed (km/h)	Soil Temp. (°C)
January	-29.1	-35.5	0	6.9	6.9	0	67.1	75.9	16.3	-25.5
February	-27.8	-35.2	0	6.0	6.1	0	66.6	76.5	16.0	-28.1
March	-22.3	-30.5	0.0	9.2	9.2	0	68.4	81.4	16.9	-24.9
April	-13.3	-22.5	0.4	13.6	14.0	0	71.3	90.1	17.3	-18.1
May	-3.1	-9.9	5.2	7.7	12.8	0	75.7	97.2	18.9	-8.0
June	7.6	0.0	18.6	3.1	21.7	8.8	62.6	97.2	16.4	2.0
July	16.8	7.2	38.6	0.0	38.6	99.2	47.5	94.3	15.1	10.5
August	13.3	6.4	42.8	0.6	43.4	100.4	59.2	97.7	18.4	9.3
September	5.7	0.9	35.2	6.7	41.9	39.5	70.8	98.6	19.3	3.6
October	-5.0	-10.6	6.5	22.6	29.1	0.1	83.1	97.4	21.4	-2.8
November	-14.8	-22.0	0.2	16.2	16.4	0	80.6	91.1	17.9	-11.7
December	-23.3	-29.9	0	9.4	9.5	0	73.3	82.7	17.7	-19.9

Note: Data from Baker Lake A station is available from 1946 to 2011. During this period, the data quality is good, with the exception of years 1946 to 1949, and 1993 which were removed from the compilation.

The long-term mean annual air temperature for Meadowbank is estimated to be approximately 11.1°C. Air temperatures in the Meadowbank area are, on average, about 0.6°C cooler than Baker Lake air temperatures, and extreme temperatures tend to be larger in magnitude. This climatic difference is thought to be the effect of a moderating maritime influence at Baker Lake.

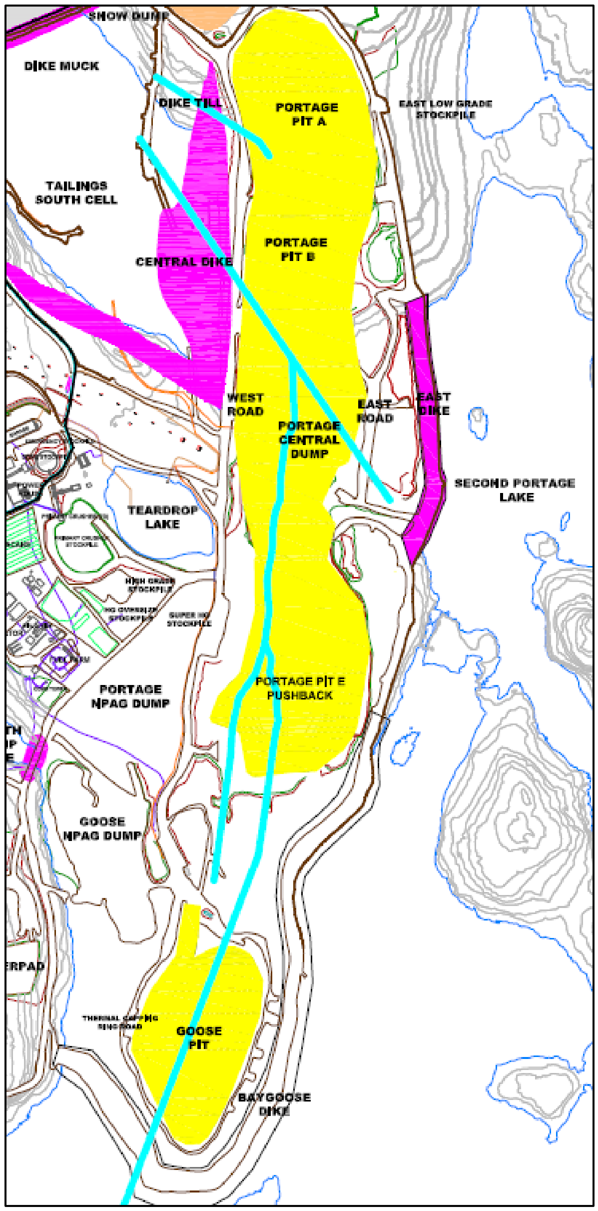
The prevailing winds at Meadowbank for both the winter and summer months are from the northwest. A maximum daily wind gust of 93 km/h was recorded on September 1, 2009. Light to moderate snowfall is accompanied by variable winds up to 70 km/h, creating large, deep drifts and occasional whiteout conditions. Skies tend to be more overcast in winter than in summer.

Table 2.1 presents monthly rainfall, snowfall and total precipitation values for the mine site. August is the wettest month, with a total precipitation of 43.4 mm, and February is the driest month, with a total precipitation of 6.1 mm. During an average year the total precipitation is 249.6 mm, split between 147.5 mm of rainfall and 102.1 mm of snowfall precipitation.

2.1.2 Faults

As shown in Figure 2.2 by clear blue lines, two main faults are inferred in the Portage deposit area and included in the groundwater model (Golder, 2011) used to estimate groundwater inflows and brackish water upwelling to the pits during mine life. These are the Bay Zone Fault and the Second Portage Fault. The Second Portage fault trends to the northwest and is expected to be under the Central Dike and the Tailings Storage Facilities (TSF), roughly parallel to the orientation of Second Portage Lake. Analysis conducted during the design of the Central Dike showed seepage potential at the time. More details are available in section 3.1.10.4 regarding Central Dike seepage. To date Central Dike has been constructed to elevation 143m, from 2012 to 2016.

Figure 2.2: Portage Pit area map



2.1.3 Permafrost

The Meadowbank Gold Mine is located in the area of continuous permafrost. Lake ice thicknesses of between 1.5 m and 2.5 m have been encountered during geotechnical investigations in mid to late spring. Taliks (areas of permanently unfrozen ground) could be expected where water depth is and/or has been greater than about 2 to 2.5 m. Based on thermal studies and measurements of ground temperatures (Golder, 2003), the depth of permafrost at site is estimated to be in the order of 450 to 550 m, depending on proximity to lakes. The depth of the active layer ranges based on depth of overburden, vegetation and organics, proximity to lakes, and aspect of about 1 to 1.5 m.

Based on ground conductivity surveys and compilation of regional data, the ground ice content is expected to be low. Locally on land, ice lenses and ice wedges are present, as indicated by ground conductivity, and by permafrost features such as frost mounds. These areas of local ground ice are generally associated with low-lying areas of poor drainage.

2.1.4 Hydrology

As shown above in Table 2.1, the Baker Lake A meteorological station was used to tabulate the monthly precipitation data. Using this data SNC-Lavalin completed a Log-Pearson 3 probability distribution to determine the annual precipitation for different return periods. The results of this statistical analysis can be seen in Table 2.2.

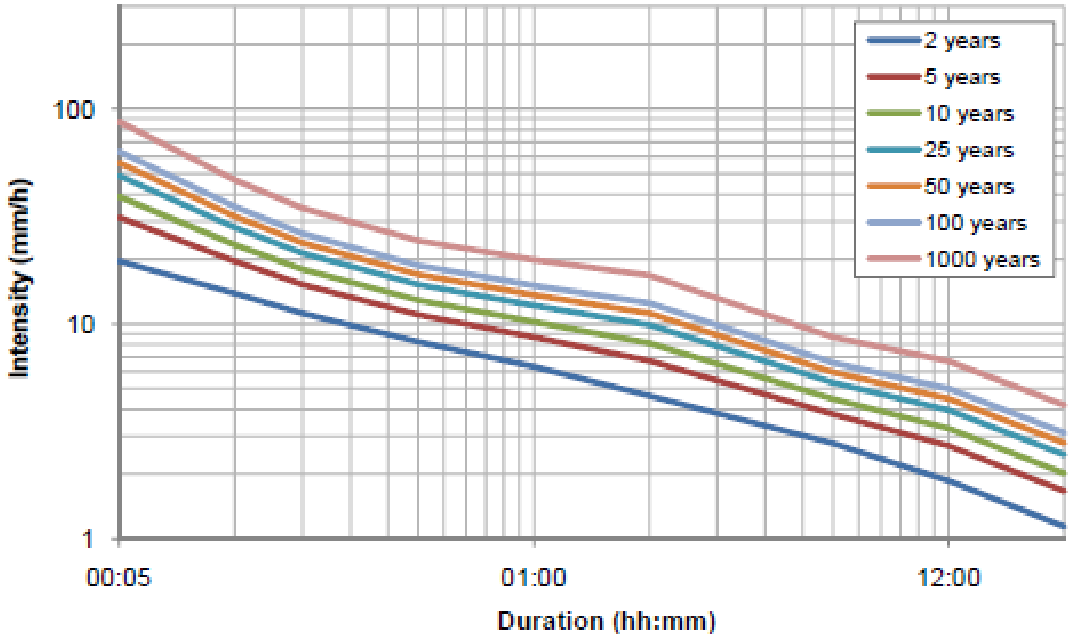
Table 2.2: Total annual precipitation for varying return periods

Return Period (years)	Precipitation (mm)
2	246
5	295
10	322
20	345
100	391

Source: SNC-Lavalin 2012 Water Management Plan (SNC, 2013)

Intensity duration frequency curves (IDF) previously presented by SNC in the Water Management Plan 2012 (SNC, 2013), are seen below in Figure 2.3. These curves prepared by Environment Canada from the Baker Lake A meteorological station, show the IDF curves for precipitations of short duration (5min-24hrs) based on data between 1987 and 2006.

Figure 2.3: Baker Lake A meteorological IDF curves



Source: SNC-Lavalin Water Management Plan 2013 (SNC,2013)

The freshet (spring period) will vary from year to year however it has been observed that the winter snow accumulation (October to May) will begin to melt at the beginning June and continue throughout the month.

2.2 MINING OPERATION DESCRIPTION

The Meadowbank Gold Mine consists of several gold-bearing deposits within reasonably close proximity to one another. The three main deposits are: Vault (including Phaser and BB Phaser), Portage (South, Center and North Portage deposits), and Goose.

The South Portage deposit is located on a peninsula, and extends northward under Second Portage Lake (2PL) and southward under Third Portage Lake (3PL). The North Portage deposit is located on the northern shore of 2PL. The South, Center and North Portage deposits are mined as a single pit, termed the Portage Pit, which extends approximately 2 km in a north-south direction. The Goose deposit lies approximately 1 km to the south of the Portage deposit, and beneath 3PL. The Vault deposit is located adjacent to Vault Lake, approximately 6 km north of the Portage deposits. A series of dewatering dikes (East, West Channel, Bay-Goose, South Camp and Vault dikes) were required to isolate the mining activities from the lakes. Additional dikes (the Central Dike, Stormwater Dike and Saddle Dams) are required to manage tailings within the dewatered 2PL Arm. East Dike, West Channel, Bay-Goose, South Camp, Vault Dike, Stormwater Dike, Saddle Dam 1, Saddle Dam 2 and the start of Central Dike were all constructed from 2009 - 2014. Regarding the Central Dike; the Coffer Dam was built in 2011 up to 110masl, raised to 112masl in 2012, to 120masl in 2013, to 132masl in 2014, then raised to 137masl in 2015, and finally brought to 143masl in 2016. The Saddle Damns 3-4 were constructed up to 140masl in 2015 and finally to 143masl in 2016, note that SD5 was done in one season to 143masl in 2016 only. Further target elevations are being evaluated by AEM at the moment. The dikes were and will be constructed primarily using materials produced on site.

2.2.1 Portage Pit Area

The Portage area located between the Third Portage Lake (3PL) and Second Portage Lake (2PL) contains most of the infrastructure of the Meadowbank mine site including but not limited to the Portage Rock Storage Facility (RSF), North and South Tailings Storage Facilities (NC & SC TSF), the mill, the camp and the Stormwater Management Pond. The East Dike was constructed to isolate the north portion of the Portage Pit from the 2PL. Subsequent renaming of the pits led to the nomenclature for each pit (A, B, C, D and E). Mining in Pits B, C, and D (representing the old Central Portage area) is now completed and they are currently subject to pit infilling operations (which will form part of fish habitat compensation). Mining is still active in Pits A and E. Figure 2.4 below presents the evolution of the Portage pit terminology and Figure 2.5 shows the current Portage Pit and surrounding infrastructures.

Figure 2.4: Portage Pit terminology

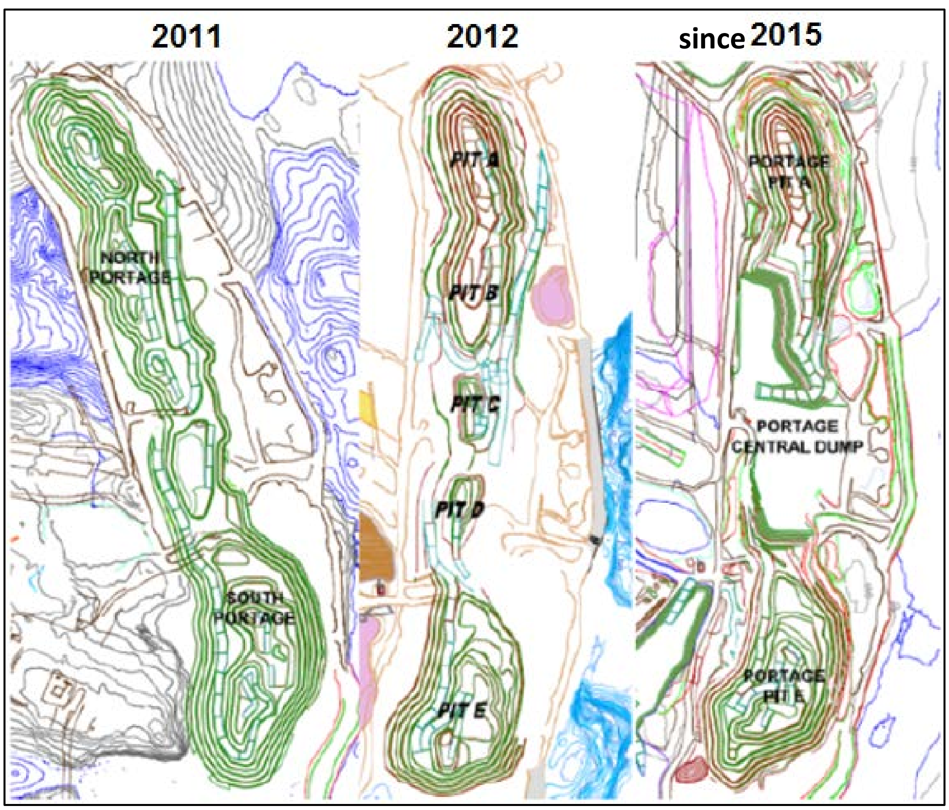
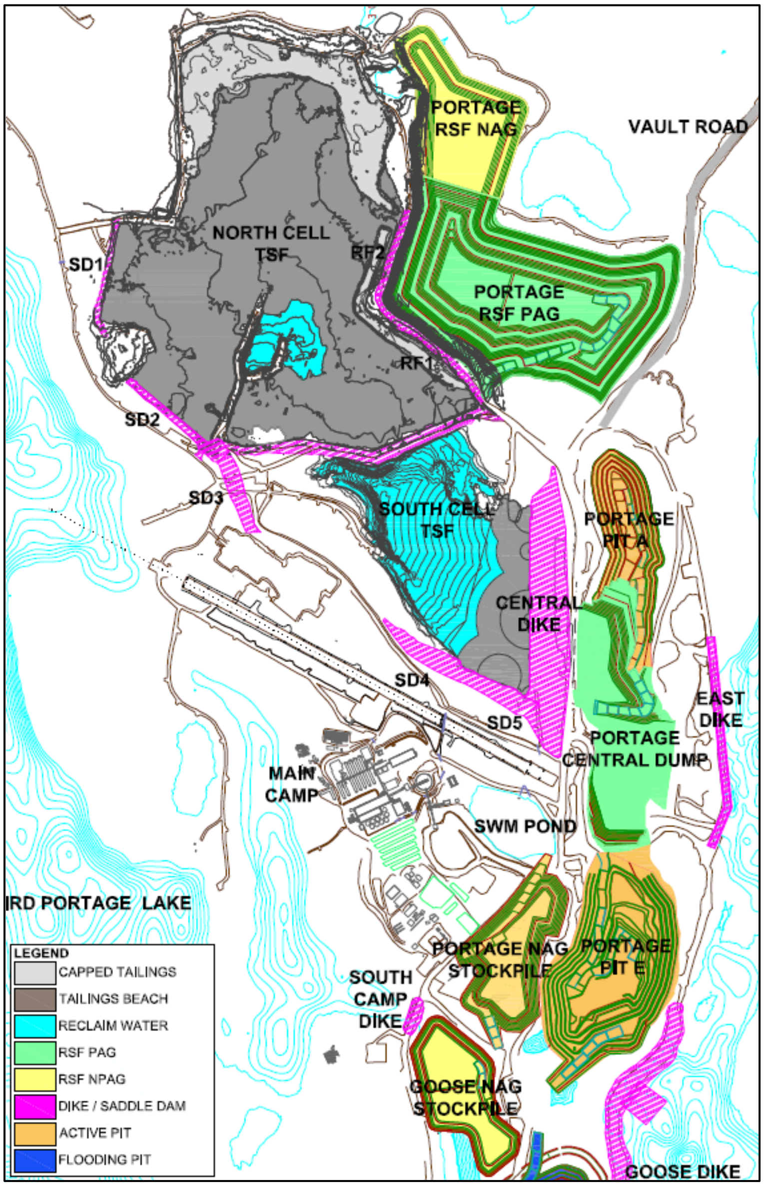


Figure 2.5: Portage Pit area map



Due to observed seepage through the East Dike from Second Portage Lake (2PL) water enters Portage Pit from the East Dike wall. This seepage is controlled via two seepage collection points. From the collection points, the water is pumped to a common pipe and discharged back into 2PL since 2014. The discharge is subject to MMER and Water License effluent criteria. The water is discharged through a diffuser located in 2PL. If the seepage does not meet criteria (mainly related to TSS), the pumping is redirected toward the Portage Pit, specifically in the Portage Central Waste Rock area, where the water flows in the rock backfill pores towards Pit B and Pit E in two sumps located at the northern and southern toe of the dump (sampling locations ST-17 and ST-19 respectively). The water is pumped to the South Cell (SC) reclaim pond from those two sumps. Another source of pit water was observed in the bottom benches of Pit C and D.

These two pits are located in an inferred talik area and also cross a regional fault (Golder, 2009). There are several areas in these pits which are not in permafrost which infers a talik. The water is likely a combination of ground and surface water. AEM is currently monitoring all water quality in sampling locations ST-17 and ST-19 in accordance with the Water License. Pits A and B are located in the permafrost and a minimal amount of water has been observed historically. Some water inflows were observed from the Pit E south wall during the year 2015. A major rock fall occurred in September 2015 which was thought to be related partially to the talik conditions and to the shear zone observed on this wall. All water pumped from this area of the Portage Pit is directed to the operational South Cell TSF and forms part of the reclaim water system (formerly the Portage Attenuation Pond).

During closure, the East Dike seepage and any water inflow originating from Pit C and D will contribute to the pit reflooding process. According to the mine plan, some inflows will not be pumped and will remain in the pit in some inactive portions of the Portage pit from November 2018 as outlined in the Water Balance based on the current mine plan (refer to Appendix A).

2.2.2 Goose Pit Area

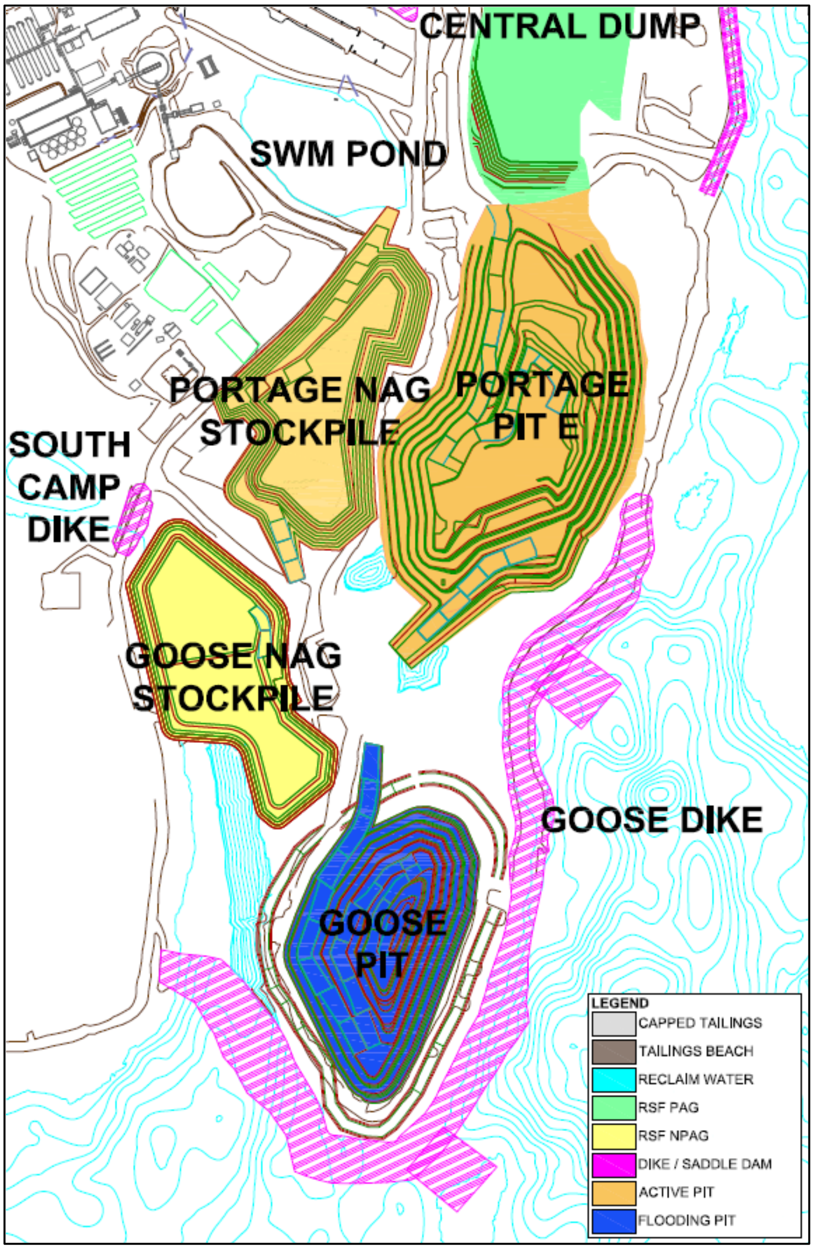
The Goose Pit is under 3PL which required the construction of the Goose Dike to isolate the lake from the mining area. Mining in Goose pit commenced in 2012 and was completed by the end of April 2015. After mining was completed, Goose Pit is being passively re-flooded (only natural runoff and inflow) as part of the closure (refer to the flooding section 3.2 for further details). The Goose Pit area and surrounding infrastructure are illustrated in Figure 2.6.

The majority of the water entering Goose Pit has been observed coming from the South and West wall due to natural inflow from the fractured quartzite rock formation. No major water inflow is observed on the eastern wall associated with the iron formation type rock with small volcanic lenses. Between the quartzite and iron formation, there is a large band of ultramafic rock (soapstone). Most of this pit is located in a talik zone which can explain the water inflow. Some areas of the lower part of the pit are not in permafrost which infers a talik zone. Until mining was completed in April 2015, the water was managed with a system of sumps and trenches along the pit ramp, on the 5109 catch bench and on the working elevation. All water pumped from the Goose Pit was directed to the South Cell Reclaim pond. Since mining has been completed, the inflows are collected in the pit as part of the natural flooding process. Pit water quality is also been monitored during reflooding with sampling station ST-20. The beginning of the active flooding (water transferred from Third Portage Lake) of the Goose pit is planned in 2018. Section 3.2.1 discusses the Goose Pit reflooding.

In 2014, seepage from Central Dike was observed. The seepage is contained at the downstream toe of the dike and a permanent pumping system was installed in 2015. In

September 2015, 50,431m³ of water from the Central Dike D/S Pond was transferred to the Goose pit. This transfer was part of a steady state pumping test performed at that time to understand the nature of the seepage flows. No other transfers have been done in Goose pit since then. More details about the Central Dike seepage are presented in the section 3.1.10.4.

Figure 2.6: Goose Pit area map



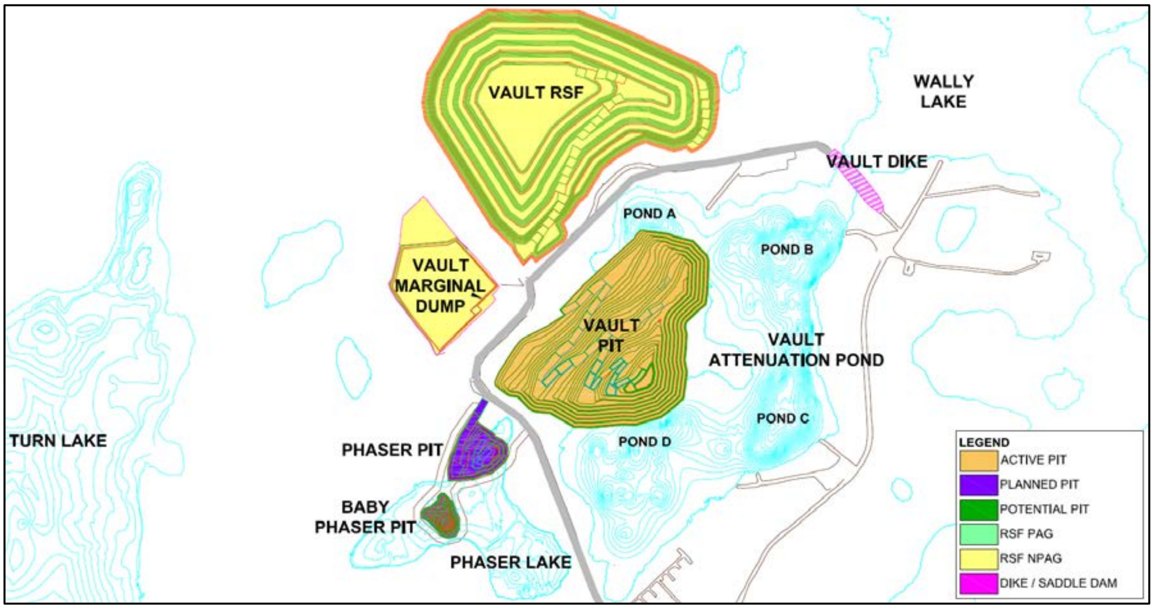
2.2.3 Vault Pit Area

The Vault Pit area contains its own independent infrastructure including but not limited to the Vault RSF, ore and marginal pads, Vault dike, Vault pit, Vault attenuation pond, service building and emergency shelter. The Vault Pit, which is located under the former Vault Lake required the construction of Vault dike in order to isolate the mining area from Wally Lake and allow dewatering. Dewatering was undertaken in 2013 and 2014. This allowed for mining of Vault Pit and the creation of the Vault Attenuation Pond (ATP). The Vault pit began pre-mining operations in 2013 with active mining starting in 2014. Mining is expected to be completed by the end of the third quarter of 2018. Figure 2.7 illustrates the Vault Pit area and surrounding infrastructure.

The majority of the water migrating into Vault Pit has been observed to be runoff from the surrounding area during the freshet period. Water inflow has been observed on the east wall and most of it is collected in a sump located at the toe of the wall and then pumped into the Vault Attenuation pond. AEM is currently monitoring water quality of the sump in sampling locations ST-23 in accordance with the Water License. To manage that inflow, in 2016 a sump was established in the pond D location to ease runoff water management. Occurrences of small, pressurized, isolated pockets of water are sometimes found while drilling. Furthermore, preliminary observations show that the rare water venues seem to be located in a specific area close to one of the attenuations pond's low points (pond D) adjacent to the pit. The water is managed with a system of sumps and trenches along the pit crest, the main ramp and on the working bench. All water pumped from the Vault Pit is directed to the Vault Attenuation Pond (ATP). The water is subsequently treated for total suspended solids removal (TSS) during summer months (if necessary) and discharged into Wally Lake in accordance with the Water License and the MMER. AEM is currently monitoring water quality of the Vault Attenuation Pond and discharge at sampling locations ST-25 and ST-10 respectively in accordance with the Water License It is worth mentioning that as of 2017, no water treatment for TSS has been required prior to discharging in Wally Lake as the water met the MMER and Water license criteria.

In 2015, the footprint of the Vault pit was extended following the new Life-of-Mine (LOM). This footprint extension required AEM to review the water management of the Vault Attenuation Pond and change the maximum operation elevation of the different ponds – specifically pond D. The configuration of the Vault Attenuation Pond is presented on Figure 2.7. There are four internal ponds named Pond A, B C & D respectively, which promote natural settling of the suspended solids and contribute to the low TSS levels confirmed by effluent sampling in accordance with MMER and the Water License. The LOM presented in this document includes the mining of Phaser Pit in 2017-2018. The dewatering of Phaser Lake occurred during summer 2016 to prepare for mining operations to start in 2017. Baby (BB) Phaser Pit is not included in the present LOM as it is still conceptual; but was identified as an opportunity for the next revision of the LOM in 2017.

Figure 2.7: Vault Pit area map



2.3 LIFE OF MINE DESCRIPTION

The current life-of-mine (LOM) has been updated with the current mining surfaces, operational fleet, stockpile situation and milling forecasts. The specifics of the expected monthly milling tonnage are summarized in Table 2.3 seen below.

Table 2.3: Current official LOM figures – Processed ore tonnages

	2016	2017	2018
January	356,345	-	-
February	332,688	-	-
March	315,735	-	-
Q1	*1,004,768*	*973,440*	*810,000*
April	331,560	-	-
May	348,719	-	-
June	315,480	-	-
Q2	*995,759*	*1,013,922*	*819,000*
July	342,922	-	-
August	336,288	-	-
September	296,010	-	-
Q3	*975,220*	*988,816*	*675,251*
October	344,162	-	-
November	334,800	-	-
December	349,897	-	-
Q4	*1,028,859*	*1,034,724*	*-*
Total	4,004,606	4,010,902	2,304,251

2.3.1 Changes from the Water Management Plan 2015

As previously stated, updates to the LOM will lead to additional adjustments of the water management plan. Changes in the LOM plan that affect water management include but are not limited to:

- Phaser and Vault Pits modifications;
- Updated truck mining fleet;
- Updated stockpile status;
- Modification to the Central waste rock storage (Portage Pit) design and overall volume;
- South Cell (SC) and North Cell (NC) TSF NAG capping volumes (progressive reclamation) and timeframe.

In 2016, revisions/modifications were made to the water balance that leads to this update. These include:

- Fresh water consumption revision;
- Total daily mill water requirements;

- Updated tailings deposition plan affecting the North Cell and South Cell deposition calendar;
- Pit water inflow revision based on observed flowmeter data as well as a revision of the pits and TSF run off inflows related to their underlying watersheds (performed by SNC, 2013);
- Flooding sequence and volumes update to take into account the updated run off inflows as well as to optimize flooding activities to reduce the impact on wall stability;
- Reporting on the dewatering of Phaser Lake that occurred in summer 2016;
- Updating the seepage section;
- Changes in tailings dry density as observed through latest bathymetric analysis.

Further details of the modifications/revisions and their effects on the overall water management strategy will be provided in subsequent sections of the Plan.

3 WATER MANAGEMENT PLAN AND WATER BALANCE

3.1 GENERAL WATER MANAGEMENT STRATEGY

At Meadowbank, five major sources of inflow water are considered in the site water management system: freshwater pumped from Third Portage Lake, natural run off, natural pit groundwater inflow, seepage inflow from the East Dike and freshet water. This water is either utilized or removed from the inflow by the following means: water treatment plant effluent (if treatment necessary to meet discharge criteria) or non-treated effluent from the Vault attenuation pond, water trapped in the capillary voids of the tailings fraction (including ice entrapment for winter months) at the TSF's, East Dike seepage discharge into Second Portage Lake, water trapped within the in-pit rock storage facilities area voids and natural flooding (Goose Pit).

The water balance is subdivided into the following sections: Fresh Water from Third Portage, Reclaim Tailings Water, Mill Water, North and South Cell TSF's, Portage Pit, Goose Water Transfers, Model Parameters, East Dike Seepage, Vault Pit, Phaser Pit and Lake, Vault Pond D, Vault ATP and Vault water transfers. The following sections will discuss each item and their inherent parameters.

The Water Balance is presented in Appendix A of this report.

As per the requirements concerning the water balance in the Water License 2AM-MEA1525 (Part E, condition 7), the Water Management Plan will be updated on an annual basis. The Water Management Plan will include a yearly updated water balance according to the water management strategy and the applicable LOM.

3.1.1 Fresh Water from Third Portage Lake

Fresh water from Third Portage Lake is pumped, utilizing a fresh water barge, in order to service the camp, mill, maintenance shop and all other fresh water users at Meadowbank. The amount pumped from the barge is tracked and reported in the water balance and as a requirement of the Type A Water License. The two main consumers of fresh water are the mill with an average of 44,359 m^3/month in 2016 (expected average 82,630m^3/month in 2017) and the camp that averaged 3,378m^3/month in 2016.

It is important to take note that 2017's freshwater consumption at the mill are higher than prior years which is part of a strategy to have sufficient free water volume in the reclaim pond to put less pressure on the reclaim system operation during winter 2017/2018 as seen in 2013 at the North Cell. Despite this increase in 2017, the fresh water use limit prescribed in the Water License will be respected.

The freshwater going to the mill is used in the milling process and will be discharged with the tailings as slurry. Once in the TSF, the total water volume is generally comprised of 40-70% (depending of time in the season due to presence of ice) free reclaim water (recycled back to the mill as process water), 30% entrapped water within the capillary void space of the tailings and 30% is entrapped within the TSF as ice (60% total entrapped in tailings during winter months). The water entrapment within the TSF represents the annual average as the ice entrapment during the summer months would fall to zero, while in winter months it could reach close to 80% (according to the July 2014 bathymetric analysis of the North Cell TSF). However, the 2015 bathymetry analysis of the South Cell revealed that the annual ice entrapment reduced to 36%. The 2016 bathymetry analysis of the South Cell revealed that the annual ice entrapment increased to 39%. According to AEM analysis, these results are the consequence of the tailings deposition strategy itself as deposition occurring in the South Cell since 2014 was only in sub-aqueous conditions, compared to deposition on tailings beaches in the North Cell. Sub-aqueous deposition reduced the impact of the climate (cold temperatures), eased the consolidation of the tailings in the pond and resulted in less water trapped into the capillary void space of the tailings. The average ice entrapment for each year was set at 46% for 2017 and 60% for 2018 which evolves as the changing geometry promotes sub-aerial deposition which is more prone to ice entrapment. The average ice entrapment is based on the North Cell historical data and from assumptions regarding the evolution of ice entrapment in the South Cell as a function of tailings beach length.

The fresh water used in the camp includes laundry facilities, cleaning, cooking and drinking water consumption. The majority of the camp fresh water is returned as sewage treatment effluent to the Stormwater Management Pond which ultimately gets transferred to the active TSF (currently the South Cell) and later in the mine closure period to the Portage Pit from 2019 to 2024 as part of the flooding process at closure.
The total expected fresh water utilization planned for 2017 to mine closure varies from 50-250m^3/hr during mill operation, and drops gradually during closure to 4m^3/hr once the mill has closed (represents water used by the camp only and does not include pit flooding). The variation seen in the fresh water consumption during the mill operation is optimized to prevent a water deficit in the TSF and allows for adequate reclaim volumes while minimizing the reclaim water transfers from the TSF to the pits at closure. The higher freshwater consumption flows are planned at the end of the South Cell operation and occur mainly during summer time. The objective is to increase reclaim pond free water volume before winter to reduce the ice entrapment ratio and secure reclaim pond operation. Table 3.1 shows the water consumption through time. The ice cover during the winter months on the reclaim pond will vary between 0.0-1.7m in thickness which may represent up to 68% (April 2018) of the total reclaim water volume compared to the 31% ratio observed in 2015. This shows the large impact of Arctic climate on tailings and water management at Meadowbank.

In 2016, AEM used 572,843 m^3 of freshwater. In March 2016, the reclaim pump system was not performing as planned and the impact on the freshwater consumption can be observed on figure 3.1. However 2016 total freshwater consumption stayed on target below the freshwater use limit prescribed in the Water License. Tables 3.1 and 3.2 present, respectively, the targeted water consumption for 2016 and the average yearly water consumption summary until the end of the mine life. More details are included in the water balance presented in Appendix A.

Adjustments at the mill and in the water management strategies have led to a revision in fresh water consumption. At the end of Q3 2018, when the mill is scheduled to cease production, freshwater use will be limited to pit flooding and camp use. Figure 3.1 presents the 2017 mill water consumption per month and yearly values are summarized in Table 3.2 for 2016 to 2025, which do not include pit reflooding volumes. Refer to Section 3.2 for the pit flooding activities description and freshwater needs.

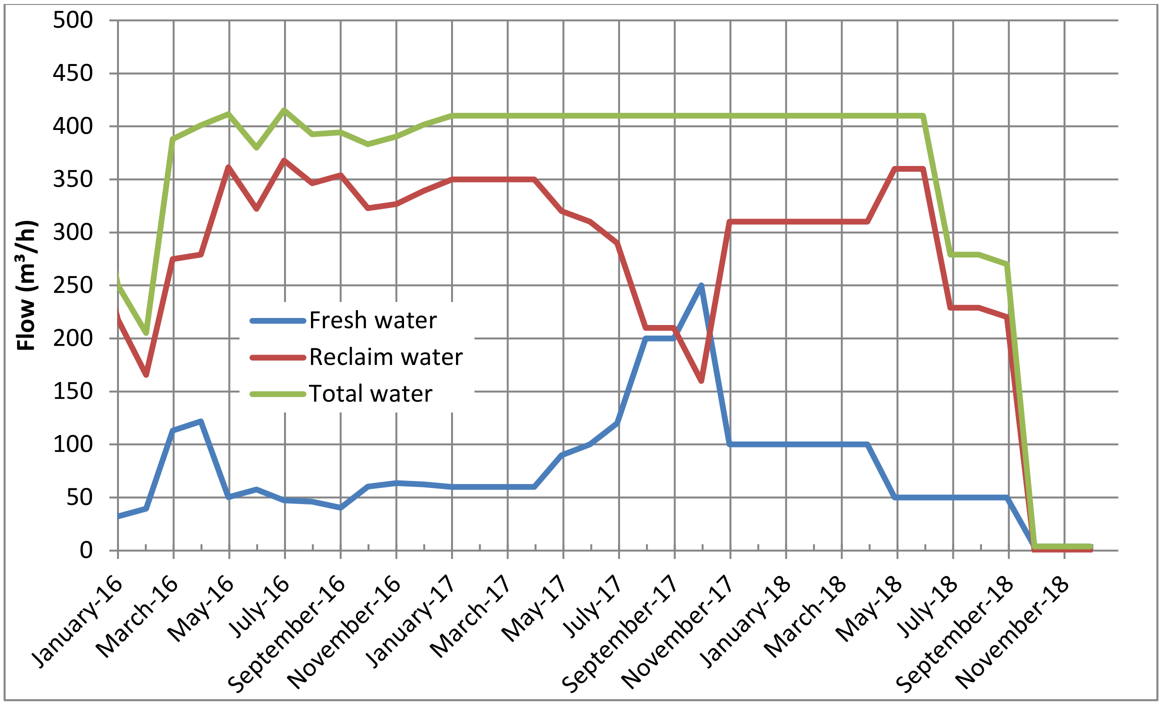
Table 3.1: 2017 Targeted water hourly consumption per month – for Mill and Camp Usage

Month	Fresh Water Flow (m^3/h)	Reclaim Water Flow (m^3/h)	Total Water Flow (m^3/h)
January	60	350	410
February	60	350	410
March	60	350	410
April	60	350	410
May	90	320	410
June	100	310	410
July	120	290	410
August	200	210	410
September	200	210	410
October	250	160	410
November	100	310	410
December	100	310	410
Average	**117**	**293**	**410**

Table 3.2: Yearly water consumption summary – Mill and Camp Usage

Year	Average Fresh Water Flow (m^3/h)	Total Fresh Water (m^3)	Average Reclaim Water Flow (m^3/h)	Total Reclaim Water (m^3)
2016	61	572,843	306	2,880,483
2017	117	1,026,240	293	2,565,360
2018	55	480,340	220	1,919,214
2019-2025	4	34,675	-	-

Figure 3.1: Flow to the mill

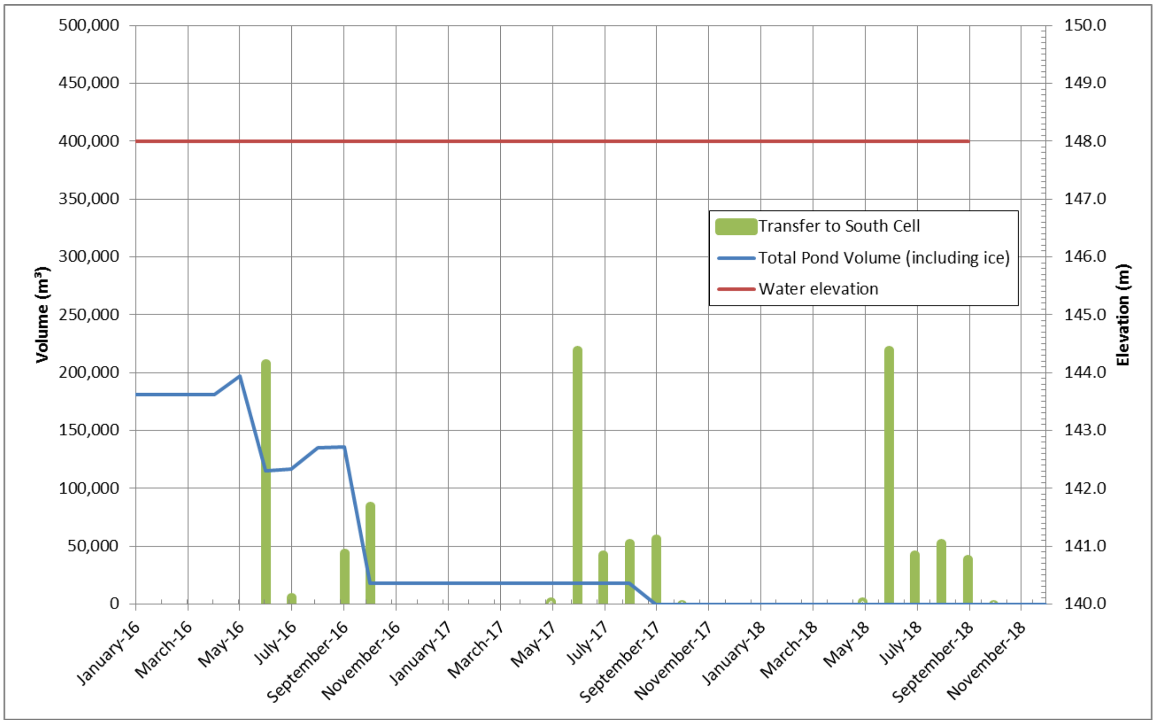


3.1.2 Reclaim Tailings Water

Reclaim tailings water represents the water reclaimed from the TSF during mill operation (North and South Cell reclaim ponds). Currently, the pumping system utilizes a mobile pumphouse on skids which retreats on a road as the water level rises in the South Cell TSF. The suction line is placed at the bottom of the pond and extended as needed according to the pump moves. A summary of the reclaim water sent to the mill on an annual basis can be seen in Table 3.2.

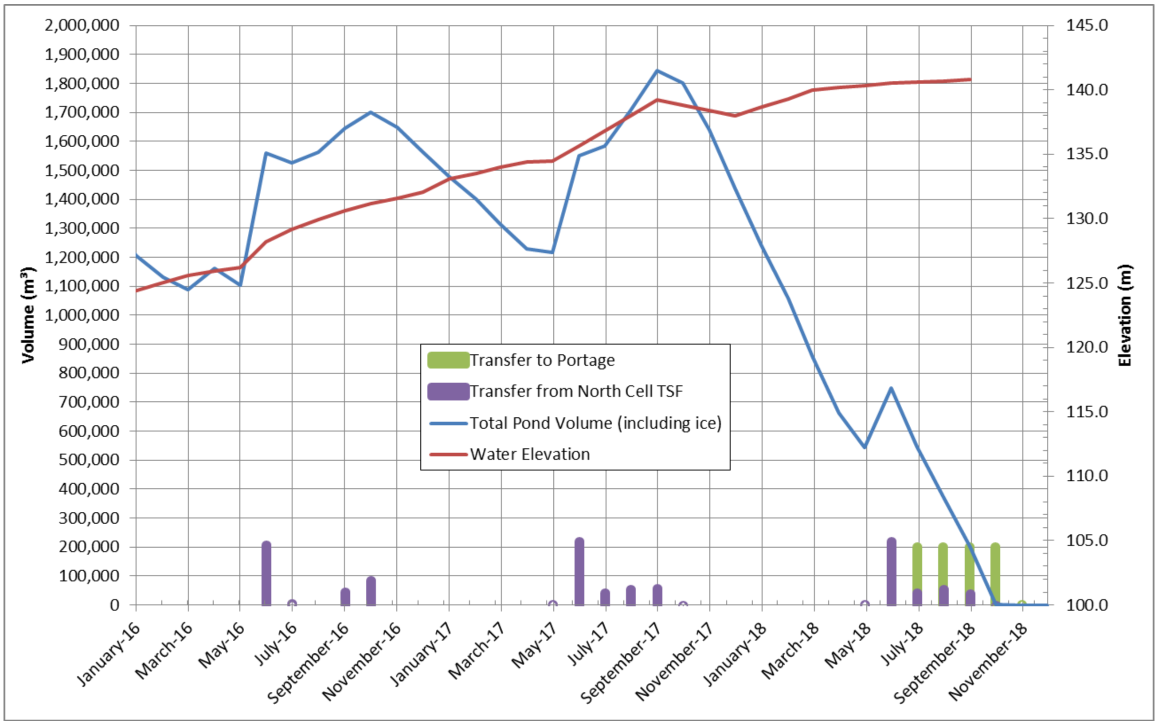
Figure 3.2 represents the water management in the North Cell TSF until the end of its operation. As seen in the water balance spreadsheet presented in Appendix A, at this time, the reclaim pumping system now installed in the South Cell will continue to supply the mill with reclaim water until end of operation. North Cell TSF runoff water inflow will be transferred yearly during summer months into the South Cell to maintain a 2m freeboard in the North Cell TSF as required by the TSF designer, the OMS manual and the Water License. This action will be performed yearly (even after the North Cell is capped during closure operations) until 2029 (planned dike breaching if CCME criteria/site specific criteria are met). It should be understood that run off water (non-contact water) from the surrounding North Cell TSF watershed area is captured in the diversion ditches and conveyed to the Interception Sump. From there, it is planned to be transferred into the North Cell. Remediation on the North Cell ditches was completed last year to prevent any elevated TSS from reaching Third Portage Lake.

Figure 3.2: North Cell TSF – Reclaim water volume, elevation and transfer



The South Cell TSF water management is based on same principles as the North Cell. Figure 3.3 shows the water elevation and volume from 2016 through to mine closure in Q3, 2018. The freshet periods of 2016 and 2017 are represented by two peaks on the volume curve. After the summer of 2017, the reclaim water volume will decrease slowly until the tailings deposition is completed. All water transfers to the pits as per the water management plan and water balance are also included in the graph. Some water will need to be transferred to the Portage Pit at the end of the deposition (cessation of mine and mill operation) for reflooding and to properly dewater the tailings pond for closure capping. Those reclaim water transfers are included in the pit flooding process. The impact on final pit water quality is considered in the yearly water quality forecast model prepared by SNC (Appendix C).

Figure 3.3: South TSF - Reclaim water volume, elevation and transfers



3.1.3 Mill

The LOM figures depicted in Table 2.3 were used to calculate the monthly mill throughput. Based on this, AEM has determined the historical average ore moisture content associated with the mill feed which represents this source of water within the water balance. Table 3.3 illustrates the average moisture content over time until closure. The forecasted average moisture content for 2017-2018 is the average of the measured volume of 2013 to 2015. The moisture content calculation is also an important factor used to calculate tailings storage capacities. Note that the moisture content is established as a percentage of mill throughputs. This means, for example, that for the total 2017 planned mill feed of 4,010,902t with an average 0.99% of moisture, 41,679m^3 of water content in the ore is considered.

Table 3.3: Monthly average moisture content at the mill

Month	Observed Average Moisture Content (%)
January	0.98%
February	1.53%
March	1.04%
April	1.09%
May	1.08%
June	0.99%
July	1.30%
August	0.98%
September	0.89%
October	0.99%
November	0.72%
December	0.93%
Average	0.99%

3.1.4 North Cell

The North Cell TSF has been in operation since January 2010. Deposition ceased temporarily in the North Cell in November 2014 as the South Cell TSF became operational. Tailings deposition resumed in the North Cell from June to October 2015 to accomplish summer deposition as part of the closure of the North Cell. Progressive closure and capping of the North Cell TSF started in winter 2015 (January to April) with the placement of 296,129m^3 of NPAG. Capping continued in winter 2016 (January to the end of May) with the placement of 140,463m^3 of NPAG. More capping was performed in fall 2016 (September to the end of December) with the placement of 15,727 m^3 of NPAG. Capping will continue to occur progressively during operations depending on material availability. As per the design specifications and regulatory requirements, the level of the North Cell reclaim pond must be maintained with a two meter freeboard, with the peripheral structures which are at 150.0masl elevation. For the North Cell the reclaim water must respect a maximum elevation of 148.0masl. A total of 342,538m^3 of water from the North Cell was transferred to the South Cell reclaim pond from June to October 2016.

3.1.5 South Cell

The South Cell area was, prior to the November 2014 commencement of tailings deposition, the mine site attenuation pond (known as the Portage Attenuation Pond). The attenuation pond was designed to contain mine contact water as well as freshet runoff and was discharged to Third Portage Lake via the Water Treatment Plant (WTP) in accordance with the Water License and MMER. In May 2015, AEM proceeded with the dismantlement of the Portage WTP as no more additional water is planned to be discharged into 3rd Portage Lake through the mine life. As presented earlier, AEM adapted its water management strategy to reduce freshwater consumption by directing runoff water into the South Cell for reclaiming. At closure, runoff water will be collected in the Goose and Portage Pits as part of the pit flooding process. The South Cell TSF commenced operation in November 2014 and will be receiving tailings from the mill until end of production in October 2018. Closure and capping will be finalized during the closure process.

The water transfers to the pit, that will be discussed later, and water management strategies within the water balance reflect the tailings deposition plan presented in the 2016 Mine Waste and Tailings management plan (AEM, 2017).

3.1.6 Portage Pit

The Portage Pit incorporates all sub-pits (A, B, C, D & E) and their associated pushback areas. Currently, Portage Pit contains a central waste rock storage area which extends from Pit C to D with a second section located in Pit B. The Portage Pit natural inflow has been revised from the 2012 SNC Water Management Plan (SNC, 2013) with measured on site data from 2013 to 2015. This inflow includes runoff water, groundwater and the part of the East Dike seepage water which is now mainly pumped back to Second Portage Lake, when discharge criteria are met. Field observations revealed an inflow observed originating from the bottom benches of Pit C and D. Since these areas are completed and backfilled with rockfill, water can accumulate in the rockfill porosity voids thus leading to a reduction in Portage Pit water outflow. AEM believes that the water inflow is filling up the porosity voids of the Portage Central Dump to some extent. It is anticipated that additional inflow could occur at the bottom of Pit A and E as there will be an increased hydraulic gradient compared to the surrounding water (from possible GW and surface water from Second Portage Lake). Furthermore, water inflows were observed from the Pit E south wall during the year 2015. A major rockfall occurred in September 2015 which was thought to be related in part to the talik conditions and to the shear zone observed on this wall. Until pit flooding operations commence in 2018, all water pumped from the Portage Pit area will be pumped to the South Cell to supplement reclaim water. Once active pit flooding starts, the pumping systems will be decommissioned and replaced by the infrastructure required for the pit flooding process. Refer to Section 3.2 for the pit flooding activities description.

3.1.7 Goose Pit

Mining in the Goose Pit was completed in April 2015. The inflow values have been revised from the 2012 SNC Water Management Plan (SNC, 2013). It was observed that the pit inflow diminishes during the winter due to the freezing of the pit walls. The volume cannot be measured but is reconciled with the water level measured by survey at each month end. The values for the 2017 Goose pit inflow have been adjusted based on SNC revised run off inflows update (SNC 2015). When referring back to the initial estimates originating from the 2012 SNC Water Management Plan (SNC 2013), an increase was observed in the water inflow during the mining of the bottom benches of Goose which could be attributable to an increased hydraulic head as vertical mining progresses. No more water is pumped from Goose to the South Cell as the mining of this pit is completed and the inflows (runoff and groundwater) are collected in the pit as part of the pit flooding process. As mentioned previously, AEM has monitored (and will continue to do so) the flooding rate since Goose Pit mining was completed. Pit water quality is also been monitored during reflooding with sampling station ST-20.

A total of 352,431 m³ of runoff and groundwater inflows were stored in the pit in 2016. No water transfers were done from the Central Dike seepage since the last one occurred in September 2015 for the South Cell steady state pumping test recommended by the Meadowbank Dike Review Board - MDRB. AEM does not plan to perform other water transfer to Goose pit until pit flooding resumes. Refer to Section 3.2 for the pit flooding activities description and to 3.1.10.4 for Central Dike seepage.

3.1.8 Vault Pit & Phaser Pit

In 2015, the footprint of the Vault pit was extended following the new LOM. This footprint extension required AEM to review the water management of the Vault Attenuation Pond and change the maximum operation elevation of the different ponds. The Vault Attenuation pond is divided in four different ponds as shown on Figure 2.7. It was observed that the elevation of water in Pond D rising above 134.3masl would flow through the pit ring road and into the pit. During winter 2016, AEM constructed a new sump in the Vault Pond D to increase storage capacity to prevent any overflow in the Vault Pit. This measure was successful to contain water during the summer of 2016.

During summer 2016, AEM dewatered Phaser Lake, once approval from regulatory agencies was received. Dewatering of Phaser Lake occurred between August 26 and October 4. A total of 407,666m³ was transferred to the Vault Attenuation Pond from Phaser Lake.

For the past four years, the discharge of the Attenuation Pond water to the Wally Lake has been undertaken without treatment as the water quality has met Water License and MMER criteria for discharge. In 2016, 1,008,457 m³ was discharged from the Vault Attenuation Pond to Wally Lake. This total volume for 2016 is a combination of Phaser Lake dewatering, runoff, and contact water from Vault Pit.

3.1.9 Water Transfers

Water transfers from various locations around the site are required to reduce freshwater consumption, optimize basin storage, optimize the water balance in general and maintain the good working order of the different facilities around the mine site. They are also required to prevent off site environmental impacts.

3.1.9.1 TSF Water Transfers

In order to optimize the tailings deposition sequence, maintain an adequate reclaim pond (operating volume, dike structure protection and water quality), minimize freshwater consumption and perform closure of each cell, water transfers within the tailing storage facilities and pits are required throughout their operating life and in closure. As seen in Table 3.4, water transfers from the North Cell to the South Cell TSF are required for adequate operation and closure of the North Cell. In 2018, water transfers from the South Cell to the pit (Portage) are undertaken to close this TSF. The Central Dike seepage, Interception Sump, WEP, SD3-4-5, and ST-16 water are included as transfers into the TSF. All these transfers were recorded in previous years in order to improve the accuracy of the water balance and maintain adequate reclaim pond levels. These transfers are planned through time until the end of operation.

Water transfers from SD3-4-5 to the TSF are required to keep the dike footprints free of water. These transfers were a total of 34,927m^3 in 2016 and are not expected to increase in volume in the upcoming years.

Water transfers from the Stormwater Management Pond (SMP) to the South Cell TSF are required each summer. Regular transfers from the SMP take place twice yearly from 2016 and ending in 2018. These transfers ensure there is always capacity in the pond to contain freshet water as well as the onsite Sewage Treatment Plant effluent. Once both TSF's are closed, the transfers from SMP will be directed to the Portage Pit until planned camp closure to play part in the pit flooding process.

The diversion ditches (East and West), located around the perimeter of the North Cell TSF and the Portage RSF, are designed to collect the non-contact water runoff from the surrounding water shed. The ditches are divided in two sections – the west and east sections, to divert non-contact water respectively to Third Portage Lake and to NP1 Lake. On the west end of the diversion ditches, an interception sump was constructed in March 2014 and was completed in 2015. The interception sump has been put in place mainly to control the water quality, in terms of total suspended solids. The interception sump aims to collect runoff water from the west section of the diversion ditches and to retain it until the total suspended solids have reached the criteria allowing discharge to the environment. AEM plans, as per the water balance to pump until end of mine life the entire water accumulation from the Interception Sump into the North Cell. This was done in order to plan the maximum transfers required from North to South Cell and to properly design the required pumping station. However, AEM will promote natural drainage of non-contact water into 3rd Portage Lake as much as possible to reduce the overall pumping activities on site, ensuring that water quality meets the required Water License criteria.

The Central Dike seepage is included in the water balance in accordance with the 1:1 ratio (South Cell reclaim water to seep water) based on the conclusion of the steady flow test performed during the 50,431m^3 water transfer to Goose Pit in October 2015. However, at the end of each month, the volumes pumped back from the downstream seep location to the South Cell are accounted for and it is compared to the seep volumes leaking out of the South Cell. The seep volumes are calculated through a mass balance and since it is the only unknown element of the SC system, the volume is derived from the actual South Call surveyed water elevation. The actual real ratio is monitored through time and will be used to validate or change the 1:1 ratio currently used if deemed significantly different. Furthermore, the seepage flow is expected to diminish as the buildup of the tailings beach in the South Cell will allow for diminished flows.

Table 3.4: TSF water transfers

Year	TSF Water Transfers - During Operations									
	North Cell to South Cell (m^3)	SMP to South Cell (m^3)	SMP to Portage (m^3)	South Cell to Portage (m^3)	SD3-4-5 to SC (m^3)	Interception sump to NC (m^3)	WEP to NC (m^3)	ST-16 to NC (m^3)	CD D/S pond to SC (m^3)	SC to CD D/S pond (m^3)
2016	342,538	46,338			34,927	120,052	23,586	26,340	**4,597,687**	**4,198,514**
2017	372,313	34,675				171,214	15,569	19,236	**1:1 *ratio assumed***	
2018	354,470	34,675		806,143		171,214	15,569	19,236	**1:1 *ratio assumed***	
Total	**1,069,320**	**115,688**	**0**	**806,143**	**34,927**	**462,480**	**54,724**	**64,812**		

3.1.9.2 Portage Water Treatment Plant

In May 2015, the Portage water treatment plant (WTP) was dismantled as no more transfers from the former Portage Attenuation Pond will need to be treated and discharged into Third Portage Lake.

3.1.9.3 Vault Treatment Plant

In 2016, the Vault WTP was not required to remove TSS as the water met the discharge criteria stated in the Water License as well as the MMER criteria. The Vault Lake is divided into 4 different zones, see figure 3.4, and has now become the Vault Attenuation Pond as Vault Pit contact water and runoff from the Vault RSF area is pumped to the pond. AEM did not utilize the Vault Water Treatment Plant for the dewatering of Phaser Lake and Vault pit contact water prior to discharge in 2016 since the water met the discharge criteria stated in the Water License as well as the MMER criteria.

Following the regulatory approval for the dewatering of Phaser Lake, Phaser Pit mining is planned to start during winter 2017-2018. A supplementary pit known as BB Phaser Pit is not yet included in the LOM however AEM expects it to be added in the next LOM. AEM dewatered Phaser Lake in summer 2016 and a total of 407,674m^3 was transferred to the Vault Attenuation Pond. See Table 3.5 and section 3.1.8.3 below for details of the proposed Phaser Lake dewatering. The Wally Lake Annual Discharge column presented in table 3.5 shows the potential maximum volume of water that could be treated with the Vault treatment plant (if necessary) until the end of operations.

Figure 3.4: Vault Attenuation Pond

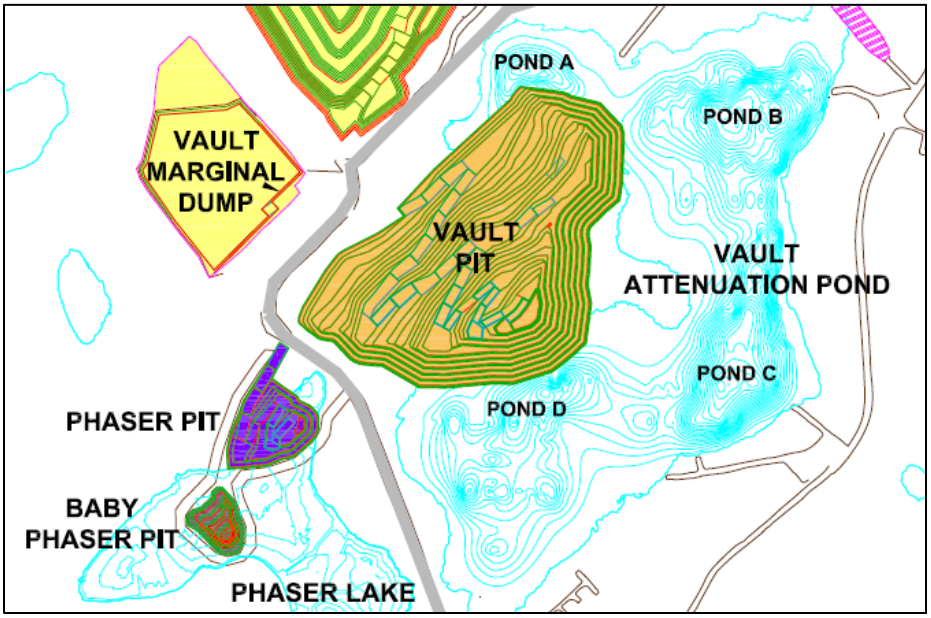


Table 3.5: Wally Lake annual discharge

Year	Wally Lake Annual Discharge (m^3)
2016	1,008,457
2017	620,425
2018	552,094
Total	**2,180,976**

3.1.9.4 Phaser Lake dewatering

Phaser Lake is a small, shallow lake located south of Vault Lake beside the Vault haul road, as shown on figure 3.4. In the current version of the Life of Mine (LOM), Phaser Pit is proposed to be mined during the period from 2017Q3 to 2018Q3. Upon receiving approval from the NWB and other regulators (NIRB, DFO) AEM proceeded to dewater Phaser Lake to allow mining the Phaser Pit. Fish out procedures occurred prior to dewatering in accordance with DFO requirements. A volume of 407,674m^3 of water was pumped to the adjacent Vault Lake ATP. This was then discharged from the Vault ATP to Wally Lake in accordance with the Water License and the MMER criteria.

3.1.9.5 Stormwater Management Pond

The Stormwater Management Pond (SWP) is a small, shallow and fishless, water body that can be seen in Figure 2.2, adjacent to Portage Pit. Treated sewage effluent is discharged to this lake before being transferred to the active TSF (South Cell). The pond also collects freshet flows within its catchment area. The pond water is transferred two times per year during the warmer months – once in the spring and once in the fall with the total flow volume forecasted as being 34,675m^3. This represents less than 1% of the total inflow to the TSF. It should be noted that in 2016, a larger volume of 46,338m^3 was pumped to the SC TSF as the SWP is now used as a snow dump during winter time.

3.1.10 Seepage Collection Systems

3.1.10.1 Mill Seepage Collection system

In November 2013, AEM observed seepage discharging west of the access road in front of the Assay lab shown on figure 3.5. After an investigation, which included initial sampling, drilling of wells and monitoring, contaminants, namely cyanide and copper were identified. The source was determined to be leaking from internal containment structures within the mill. Third Portage Lake (3PL), approximately 200 m to the west, was identified as a possible sensitive receptor. Remedial measures were undertaken immediately and this included construction of an impermeable interception/collection trench downstream of the seepage flow path. A comprehensive monitoring network and plan was implemented which included installation of monitoring wells, a recovery well (MW 203) and a sampling program (including Third Portage Lake). To date no contaminants have been detected in 3PL. Repairs (sealing) were completed within the mill (containment structures) in 2014 to eliminate the source of contaminants. Seepage collected in the trench and recovery well is pumped back to the mill to be used as process water (much the same as reclaim water from the TSF's). The pumping occurs in the warmer months beginning when freshet commences. The recovery well is pumped year round when water available. No flow of water has been pumped during winter months in the trench because of frozen conditions (See Freshet Action Plan – Appendix D). Table 3.6 shows the pumped volumes for 2016. AEM observed that the flow to the trench decreased by three times in 2016 (11,078 m^3) compared to 2015 (30,543 m^3). This decrease seems to be related the remediation work in the mill undertaken in 2014.

Figure 3.5: Mill Seepage Area

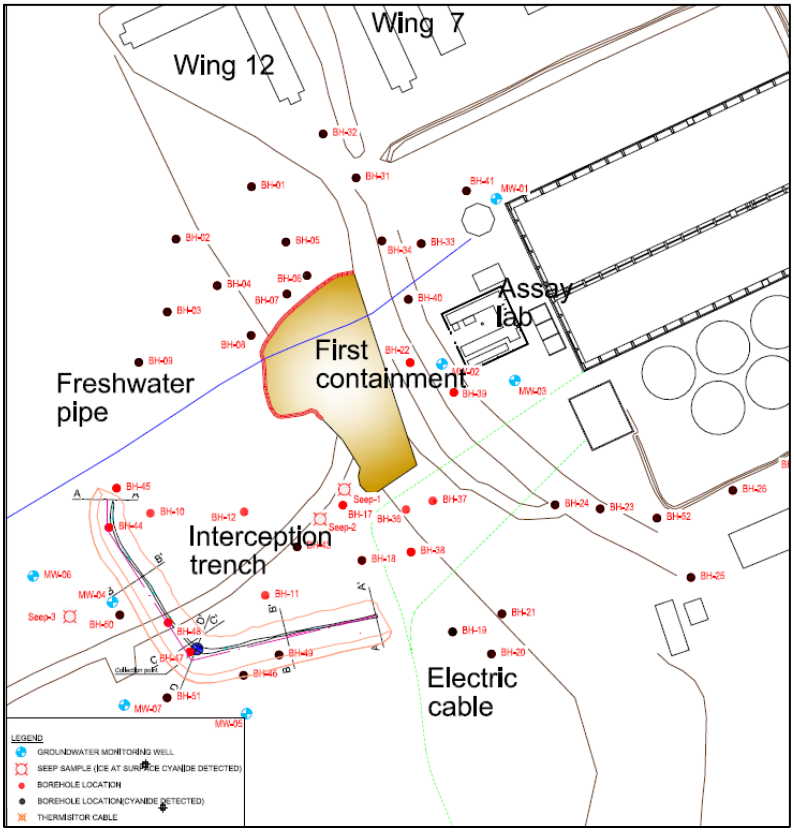


Table 3.6: Mill Seepage 2016 pumped volumes

Month	2016 Mill seepage pumped volumes back to the mill (m^3)
January	0
February	0
March	0
April	0
May	0
June	2,588
July	2,270
August	3,599
September	2,109
October	512
November	0
December	0
Total	**11,078**

3.1.10.2 ST-16 RSF Seepage management

Refer to the Freshet Action Plan (Appendix D) for the history, long term monitoring plan and remedial actions for this seepage location. The pumping system installed in 2014 is still in operation. Contaminated seepage was monitored in accordance with the Freshet Action Plan and 26,340m^3 was pumped back to the North Cell TSF in 2016. Table 3.7 presents the volume of water pumped back to the North Cell TSF from the ST-16 location. There was a higher volume pumped in 2016 (26,340m^3), compared to 2015 (19,236m^3). This volume increase is related to the new contact water management strategy developed in 2016 by the addition of the two sumps behind the Portage waste dump (WEP-1 and WEP-2) to collect contact water. All water collected from these sumps is pumped back in the ST-16 sump system and then transferred to the North Cell reclaim pond. Low contaminant levels are still observed by the sampling program (refer to Appendix D - 2016 Freshet management plan for more details).

Figure 3.6: RSF seepage area

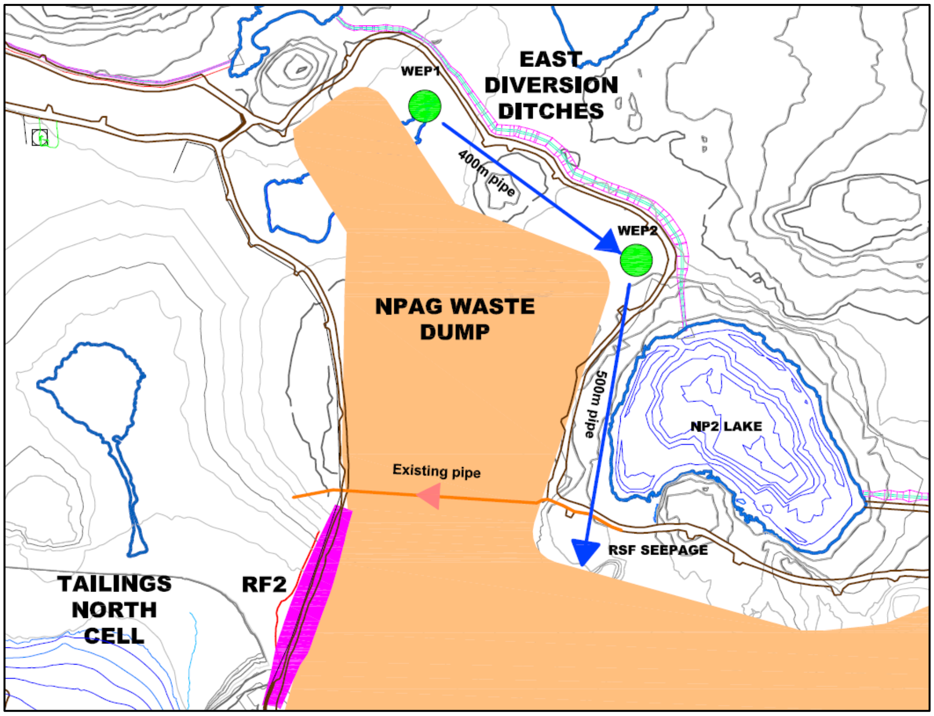


Table 3.7: ST-16 RSF Seepage 2016 pumped volumes

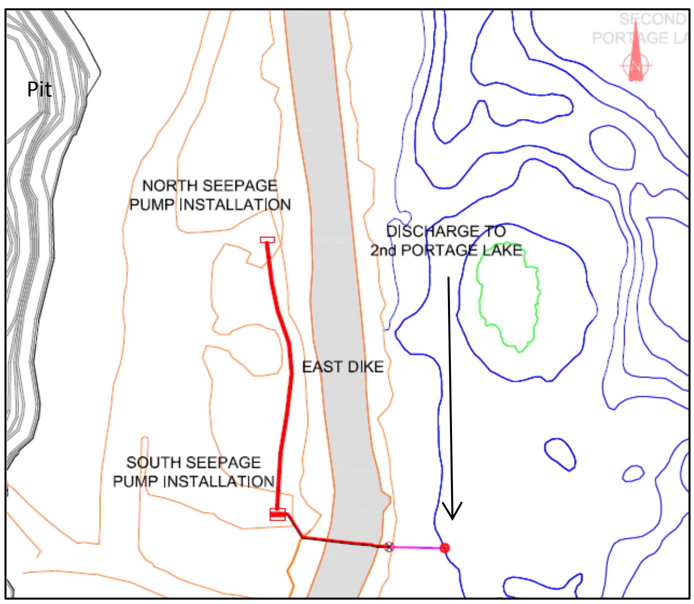
Month	2016 RSF seepage pumped volumes back to NC TSF (m^3)
January	0
February	0
March	0
April	0
May	0
June	17,399
July	1,418
August	3,577
September	1,452
October	2,494
November	0
December	0
Total	**26,340**

3.1.10.3 East Dike Seepage Collection

As previously stated, the East Dike Seepage Collection system collects seepage originating from Second Portage Lake (2PL). Seepage from 2PL traverses through the

East Dike in two discrete locations and is collected and discharged back, as a combined flow, through a diffuser, to 2PL (in accordance with the Water License and the MMER criteria). Once mining of South Portage Pit area is completed, the East Dike seepage will remain in the Portage Pit as part of the pit flooding operations (closure plan). The monthly flow observed in Table 3.8 indicates the 2016 monthly volume discharged to 2PL. If water quality does not meet license or MMER criteria, due to increased TSS during freshet period and large precipitation events in summer, the seepage water is pumped to the mined out areas of the Portage Pit. In 2016 all seepage water met license and MMER criteria and was discharged to 2PL. The total volume returned to Second Portage Lake in 2016 was 179,548m^3. During summer, lower transfer volumes are regularly observed. The stable historical average for the month has been of 14,964m^3 and was applied until 2029, the discharge into 2PL is planned to cease is 2018 after operations so the seepage is let in the pit as part of natural reflooding.

Figure 3.7: East dike pumping system



As stated in section 2.2.1 and above, if the seepage does not meet criteria, the discharge is redirected toward the Portage Pit, specifically in the Portage Central Waste Rock area, where the water flows through the deposited rock of the Portage Central Dump. The "voids" in the rock store some of this water; any remaining water flows to the two sumps located at the toe of the Portage Central Dump (which are respectively named sampling locations ST-17 and ST19). From this point, the water is considered Portage Pit inflow regardless of the proportion coming from East Dike Seepage as it is mixed with contact water and groundwater – if any. Any water collected in these sumps is pumped to the South Cell. These sumps are sampled as per the Water License requirement. Those volumes are recorded.

Table 3.8: East Dike Seepage 2016 pumped volumes

Month	2016 East Dike seepage pumped volumes back to 2PL (m^3)
January	14,512
February	13,445
March	12,720
April	13,063
May	14,486
June	16,914
July	18,262
August	18,476
September	16,020
October	14,867
November	13,439
December	13,344
Total	**179,548**

3.1.10.4 Central Dike Seepage

Once tailings deposition started in the South Cell in November 2014, daily inspections of the downstream toe of Central Dike were undertaken as part of the geotechnical inspection program. A small volume of water located against the downstream toe of Central Dike was noticed at that time. This water was contained between the West road and the Central Dike downstream toe. AEM utilized piezometers, thermistors and a ground water well to monitor the dike integrity, the foundation temperatures and the piezometric levels within the structure and its foundation.

On April 14th 2015, AEM started pumping at the D/S toe of the dike to lower the water level. The water was pumped back to the South Cell TSF. Water quality was closely monitored to foresee any changes from initial conditions in terms of turbidity and clarity. A flowmeter was also installed to monitor the volume of water pumped. By July 7th, 2015 pumping was still on going with a larger pump. The water quality (clarity/turbidity) at the D/S toe is also visually assessed by the Engineering technical personnel during their daily inspection.

Monthly samples are collected as per the Water license (station STS-5) and include analysis for metals, cyanide and major anions. The concentration of some parameters, namely copper, cyanide, sulfates, to name a few, confirms a link between the water ponding at the D/S and the SC reclaim water. Additional to the steady flow test, SNC performed two specific chemical mass balances to evaluate the ratio of reclaim water, ground water and runoff in the water pumped from the Central Dike D/S pond back into the South Cell TSF (SNC, 2015). A transfer to Goose Pit was also done to evaluate the same ratio by monitoring the drawdown in the South Cell during the transfer. SNC identified that 50,000 m^3 of seepage transfer from the downstream toe to Goose Pit was possible without compromising water quality at closure (using CCME guidelines for the protection of aquatic life). The 1:1 ratio was confirmed by this test which meant that the seepage water source was the South Cell reclaim water.

A series of pumping tests were also performed by AEM during the summer 2015 to measure the seepage flow according to the head pressure difference between the South Cell and the Central Dike downstream pond (sampling location STS-5) where seepage water is collected and pumping infrastructure redirects this seepage water back to the cell. In September 2015, mitigation measures were defined with the support of Golder and it was confirmed that the Central Dike could be operated safely under certain conditions. In early November 2015, the downstream pond operational level was to be set at 115masl following Golder's recommendations (Golder, 2015). At the same time, a permanent and winterized pumping system was put in place to manage and track the water volumes through the winter. The deposition in South Cell TSF restarted on October 28th, 2015. Within the first two weeks of deposition, the seepage flow dropped from 800m^3/h to 400m^3/h and then has been stable between 400 to 600 m^3/h since that time. These flows closely follow the ones predicted by Golder in the seepage modelling performed in 2015. Note that a study is currently being done by Golder for a calibration of the seepage model along with a thermal and stability analysis.

In fall 2016 a new electric pumping system was installed to replace the diesel unit previously installed the prior year, mainly to reduce fuel consumption. Pumping has continued until present day and will continue until pit flooding occurs. The figure below shows the general installation related to Central Dike seepage management.

Figure 3.6: Central Dike seepage pumping system

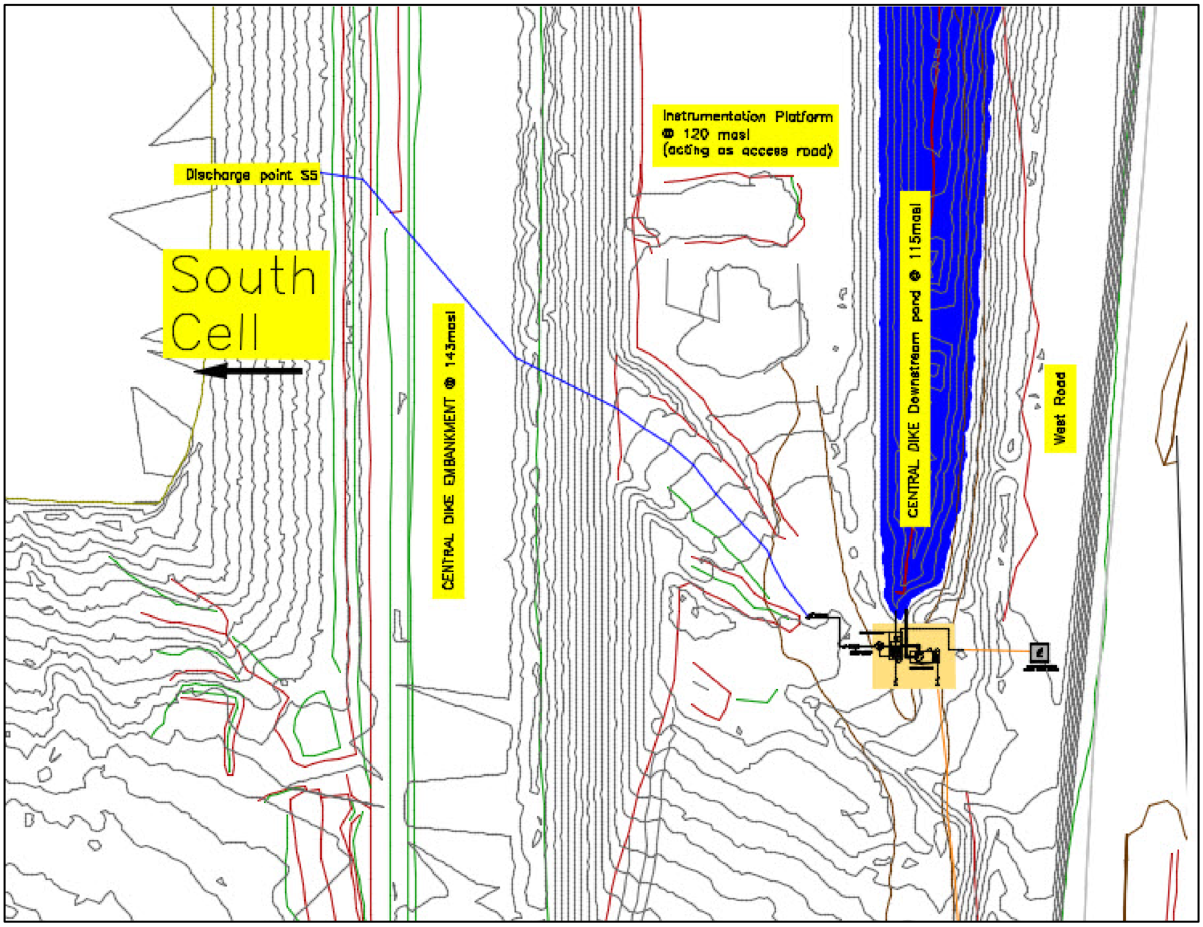


Table 3.9 presents the water pumped from the Central Dike D/S pond to the South Cell TSF in 2016. Golder seepage analysis suggests that the flow should vary between 120 and 850 m^3/h until the end of the operation in the South Cell.

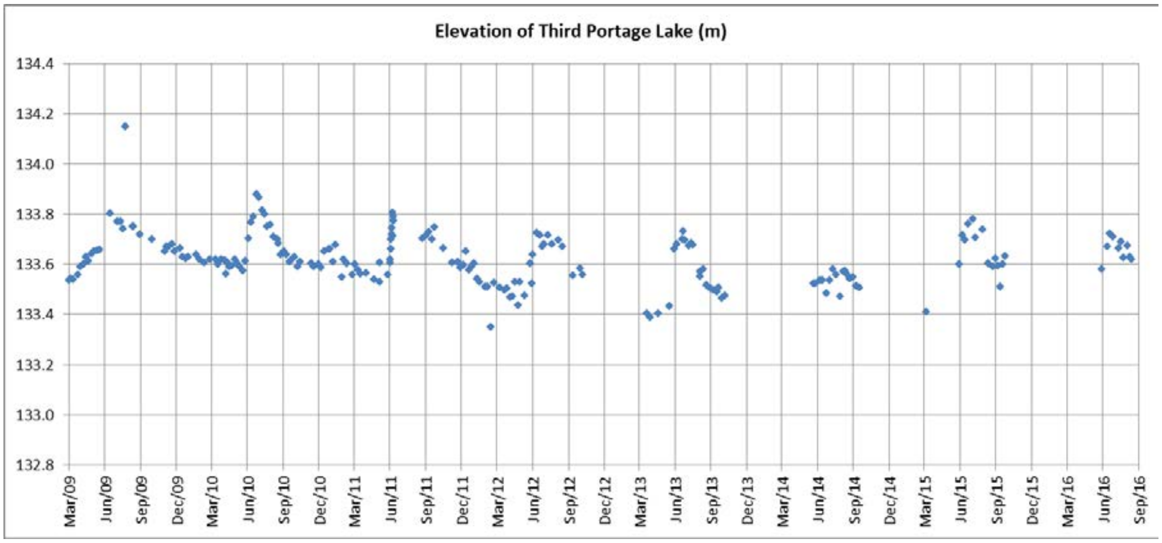
Table 3.9: Central Dike Seepage 2016 pumped volumes

Month	2016 Central Dike seepage pumped volumes back to SC TSF (m^3)
January	305,344
February	277,015
March	306,838
April	324,633
May	376,728
June	385,033
July	441,435
August	395,629
September	363,024
October	503,283
November	453,439
December	465,316
Total	**4,597,687**

3.2 PIT FLOODING

The volumes of water needed for pit flooding, which is part of the overall closure plan, is dependent on the water elevation of Third Portage Lake (3PL). The Goose dike can only be breached when the level of the flooded pits reaches the same elevation as 3PL and pit water quality meets CCME/site specific criteria concentrations. According to 3PL elevation data from 2013-2016 this elevation would be 133.6masl. Figure 3.6 shows the elevation data recorded since 2009.

Figure 3.9: Distribution of TPL elevation surveyed data



The current flooding technique proposed for Portage and Goose Pits is to use a combination of pumps and siphons to achieve the pumping rates prescribed by the water balance which conforms to the approved volume stipulated in the Water License. Details of the complete flooding system will be available in the Final Reclamation and Closure Plan. A total of 32.0Mm^3 will need to be transferred form 3rd Portage Lake to accomplish the required pit flooding for Portage and Goose Pits. As Goose Pit mining is completed, active flooding of Goose Pit is planned to commence first in 2018 with a transfer of 0.8Mm^3. Mining will cease in the Portage Pit during Q3 2018. Pit flooding of the Portage Pit will then commence. At water elevation 131.0 masl both Portage and Goose Pits will join to become one waterbody. Reflooding will continue to the natural Third Portage Lake water elevation at approximately 133.6masl. At this level the dikes can be breached; however this is dependent on pit water quality. The current objective is to ensure the water meets CCME Guidelines for the Protection of Aquatic Life and/or site specific criteria for parameters not listed in the CCME guidelines before the dike is breached. The first phase of the flooding sequence is planned to be completed by the end of summer 2025. Three to four years of monitoring is planned at that point to evaluate the water quality in the pits. During this time, water runoff will be diverting into the pits to finish the flooding to the 3PL elevation. Breach of the dike is planned for 2029.

Prior to completing the capping of the TSF's, residual reclaim water in the South Cell (806,143m^3) will be transferred into the pits. The 2012 Water Management Plan (SNC, 2012) suggested to pump it in equal volumes to Goose and Portage Pits. Due to capping of the South Cell TSF planned to take place right after the end of mine operations in 2018 as well as the requirement to meet water quality criteria early in the reflooding process the current water management plan is to transfer the total amount of reclaim water to the Portage Pit in 2018 only which allows for its capping in 2019. The treatment requirements of the reclaim water will be determined if required as per the

Meadowbank Water Quality Forecasting Update Technical Note rev. 00 completed by SNC (March, 2017 – See Appendix C) (a summary of the findings is also the subject of Section 4 of this report). This document predicts that copper, selenium, fluoride, chromium, total aluminium and total arsenic may require treatment to reach CCME criteria based on the completely mixed assumption. Silver is no longer problematic compared to the previous exercise due to a lower silver loading sampled from the 2016 mill effluent. It is worthwhile mentioning that this year, total concentrations are also analyzed versus only the dissolved ones in 2016 and previous years.

AEM is committed to update the Water Quality Forecast Model, using up to date, year over year data, on a yearly basis until, and possibly after, the cessation of mine operations. The water split between Portage and Goose could also be revised in the future depending on mining plan updates and water balance changes.

To reach water elevation 133.6m, a total of 42.5Mm^3 of water will be required. As previously stated, 32.0Mm^3 originates from 3rd Portage Lake, and the 10.5Mm^3 balance will be made up from the natural pit water inflows including runoff and precipitation combined with reclaim water. The difference from the 2015 Water management plan is related to the Portage Central Dump design modification and changes in the reflooding strategy. The new strategy is based on reducing the hydraulic gradient between Goose Pit and Portage Pit during the reflooding process to reduce the risk of wall instability. AEM also refined the design of the reflooding infrastructure which provided the new flow rate used in the water balance. All these changes led AEM to postpone completion of the reflooding by one year. Note that AEM feels that this approach is conservative, with respect to TSF runoff, as water quality of the runoff should be able to be re-directed to Third Portage Lake five years after capping (2024) which is consistent with the initial function of the diversion ditch system (however please note that the runoff from the capped TSF's will be directed to the pits until the water quality meets closure criteria). Please refer to Table 3.9 for the reflooding sequence per year for all pits.

Table 3.10 Pit flooding profile

Pit Flooding profile								
Year	Volumes pumped from 3rd Portage lake			Volumes pumped from Wally lake				Total flooding water (m^3)
	To Portage pit (m^3)	To Goose pit (m^3)	From 3PL (m^3)	To Vault pit (m^3)	To Vault Attenuation Pond (m^3)	To Phaser pit (m^3)	From Wally Lake (m^2)	
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	806,275	0	806,275	0	0	0	0	806,275
2019	4,900,325	0	4,900,325	4,131,994	0	0	4,131,994	9,032,319
2020	4,457,333	936,101	5,393,434	4,131,994	0	0	4,131,994	9,525,428
2021	3,984,355	915,970	4,900,325	4,131,994	0	0	4,131,994	9,032,319
2022	3,984,355	915,970	4,900,325	4,131,994	0	0	4,131,994	9,032,319
2023	3,984,355	915,970	4,900,325	4,131,994	0	0	4,131,994	9,032,319
2024	3,984,355	915,970	4,900,325	4,131,994	0	0	4,131,994	9,032,319
2025	1,243,162	83,467	1,326,629	3,259,134	476,342	0	3,735,476	5,062,105
Total	**27,334,515**	**4,683,446**	**32,027,963**	**28,051,098**	**476,342**	**0**	**28,527,440**	**60,555,403**

As prescribed in the Nunavut Water Board Water License No. 2AM-MEA1525 (Part E, Conditions 1 and 2), the use of water from Third Portage Lake, for all purposes, including flooding of the pits, shall not exceed a total 2,350,000 m^3 per year from the License approval date to December 31 2017, followed by a maximum 4,935,000 m^3 starting in 2018 through to the expiry of the License 2AM-MEA1525. The use of water from Wally Lake shall not exceed a total 4,185,000 m^3 per year starting in 2018 through the expiry of the License 2AM-MEA1525. As per the recommendations and requirements concerning the water use, the Meadowbank Water Management Plan will be updated on an annual basis. The Water Management Plan includes a pit flooding strategy meeting the requirements outlined in the Nunavut Water Board Water License No. 2AM-MEA1525.

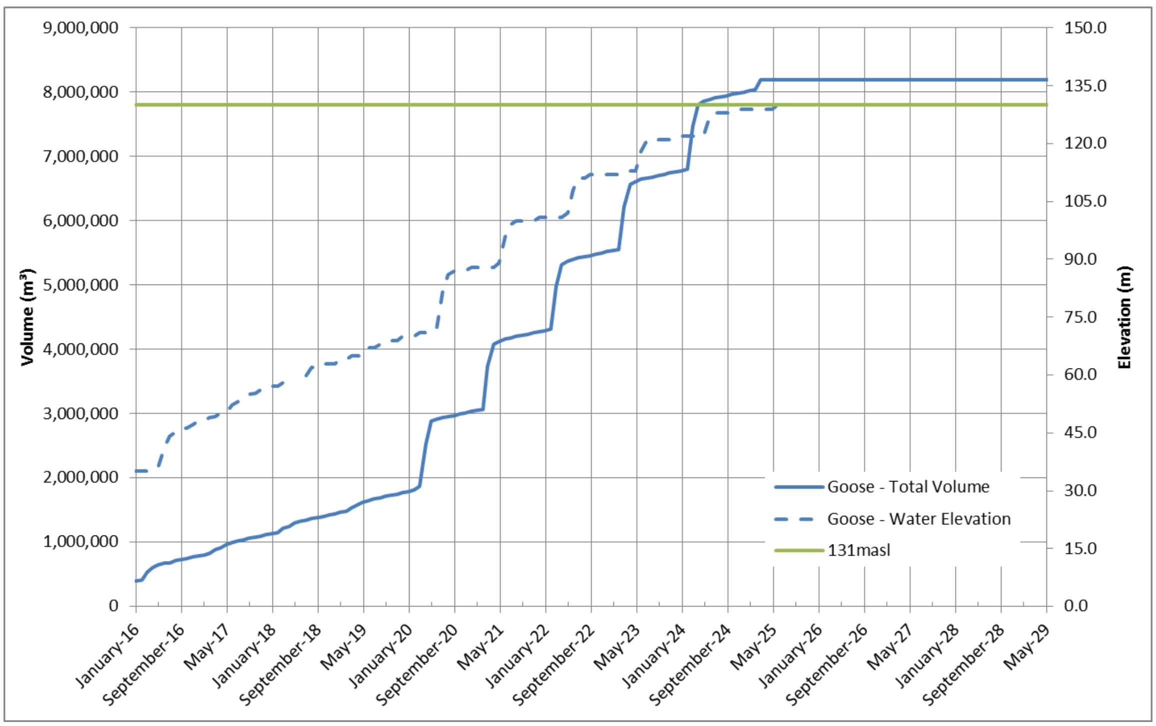
AEM will provide at least 30 days notice to the Nunavut Water Board and Inspector prior to starting the flooding of each pit from water obtained from Third Portage Lake and Wally Lake.

3.2.1 Goose Pit Flooding

Goose pit flooding started in 2015 by allowing the natural inflow volume (runoff, groundwater, precipitation and possible Bay Goose dike seepage) of 383,800m^3 to remain within the pit. Goose Pit flooding continued in 2016 by again allowing the inflow volume of 352,431 m^3 to remain within the pit, 8% more than the our model (SNC, 2015) for this particular year. AEM expects that future yearly run offs fall under the model values because the model does not account for lowering the hydraulic gradient which should lower groundwater flows. Transfers from 3PL to Goose Pit are planned from 2020 to 2025 in order to reach 131.0masl at the same moment than the Portage Pit. At this point, the Goose water will join the Portage Pit water to form one water body. Figure 3.7 depicts the Goose Pit flooding curve. Goose Pit volumes between 131masl and 133.6masl are included as part of Portage flooding volumes.

Artificial flooding – from 3PL – will end in June 2025 after which natural pit inflow will allow for the level to reach the 3PL lake elevation in 2029. If water quality meets all closure criteria including CCME guidelines and site specific criteria, the Goose dike will then be breached. Refer to Section 4 for the pit water quality forecast model.

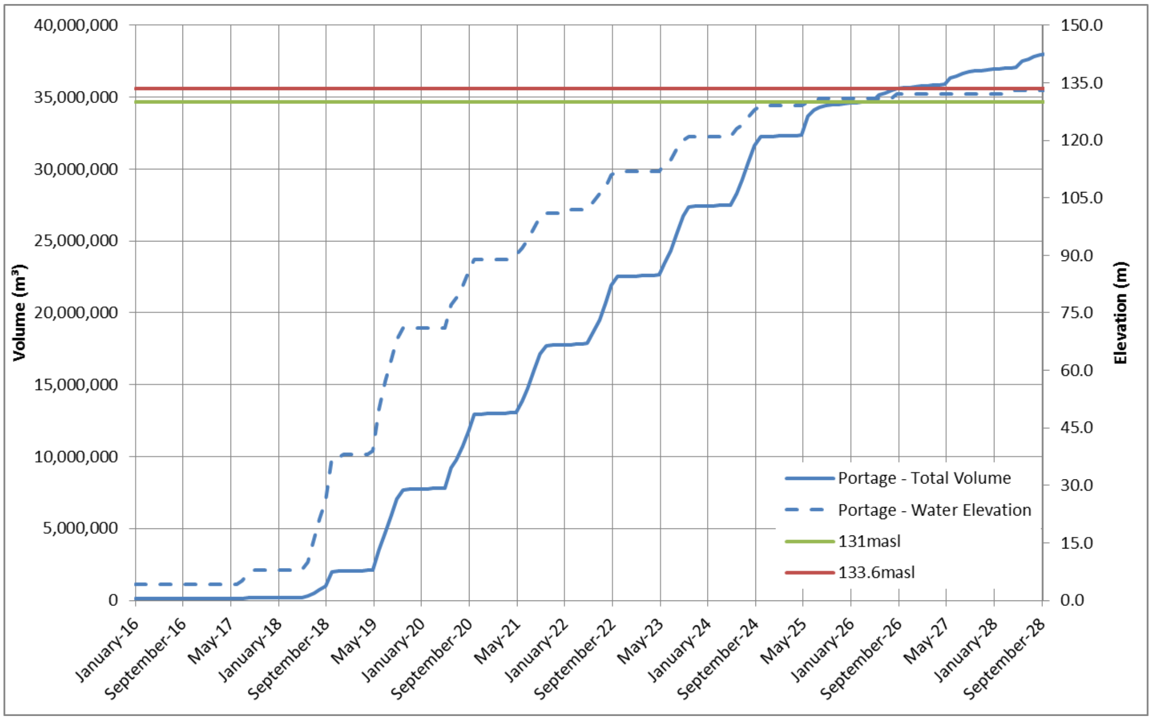
Figure 3.10: Goose pit flooding



3.2.2 Portage Pit Flooding

Portage Pit reflooding will begin in July 2018 with 806,143m^3 transferred and treated (if required) from the South Cell for 2018 and that will be combined in October 2018 to a 806,275m³ transfer from 3rd Portage Lake to the Portage Pit for 2018 also. Table 3.9 presents transfers planned from 3rd Portage Lake to the Portage Pit from 2018 to 2025 to complete the total artificial flooding to elevation 131masl. From this point, runoff water and other pit inflows will be used to complete flooding of both pits until elevation 133.6masl is reached at the end of 2028. See Figure 3.8 to view the pit reflooding curve which includes all water sources used to reflood the pit, including both South Cell reclaim transfers and 3rd Portage lake transfers. Refer to Section 4 for the pit water quality forecast model.

Figure 3.11 Portage pit flooding



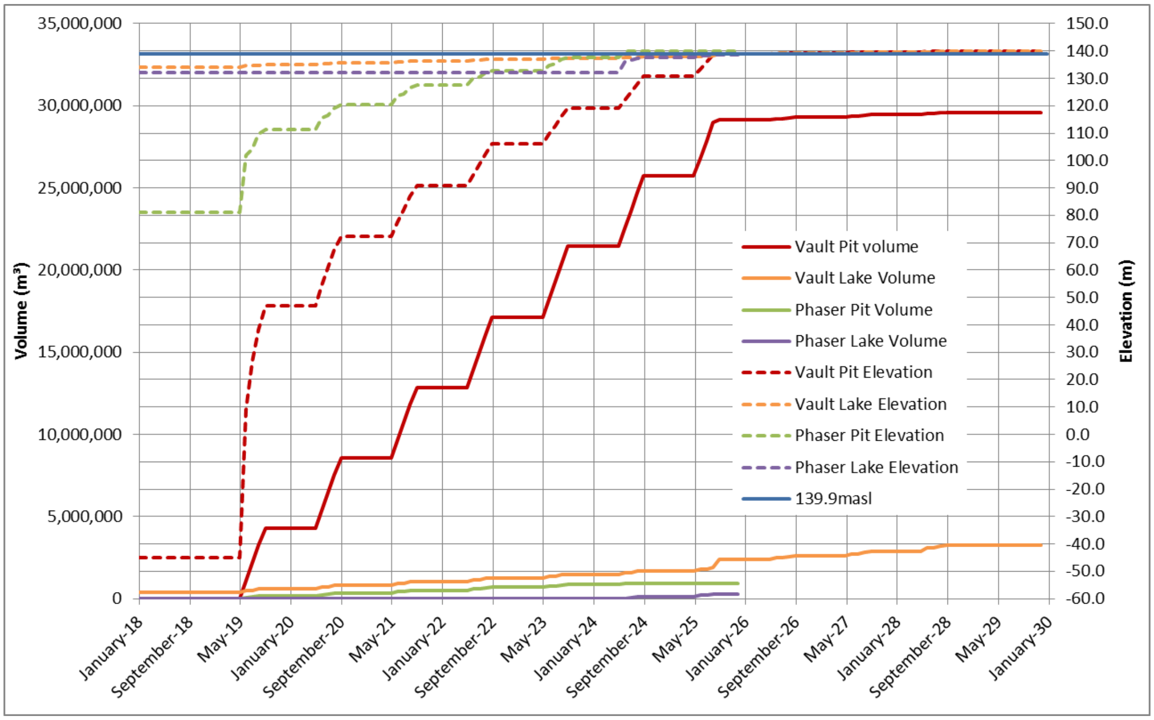
3.2.3 Vault Pit Flooding

The Vault pit area is composed of many basins in the former lake and different pit elevations that are all linked togheter. The flooding of Vault and Phaser is more complex and requires water transfers from basin to basin. Reflooding from Wally Lake of the Vault area will commence in 2019 and will continue until the end of summer 2024 using a siphon system similar to the one planned to use in Goose and Portage. This active flooding will occur at an annual rate of 4,131,994m^3 and finally 3,259,134m^3 in 2025. Like Portage and Goose, from 2025 to2029 the natural inflow will then allow Vault pit to reach 139.9masl (natural Wally Lake water level). The reflooding of Vault area with natural inflow consists of approximatively 0.5Mm^3 yearly from freshet, precipitation, groundwater inflow. The flooding curves for the Vault area are represented in figure 3.9. The final elevation of the reflooding will be 139.9masl for Phaser and Vault Lake. At this point the Vault dike will be breached provided the water meets CCME criteria and/or site specific criteria for parameters not included in the CCME Guidelines. Refer to table 3.9 for the yearly cumulative volumes required to complete the flooding process. Refer to section 4 of this present report for the pit water quality forecast model.

Unlike Vault Pit, Phaser Pit and Lake are planned to be flooded exclusively from their watershed run off inflows until the target elevation of Wally is reached in summer 2027.

From there, those same inflows will be used conjointly with the Vault ATP inflows to flood to the same target elevation as the Vault ATP area – 139.9masl (Wally Lake level).

Figure 3.12: Vault and Phaser pits flooding



3.3 WATER MANAGEMENT STRUCTURES

As per the Water License 2AM-MEA1525 (Part E, Condition 10) AEM will conduct weekly inspections of all water management structures during periods of flow. This program commenced in 2016 and was added to the weekly inspections already undertaken as per the Freshet Action Plan (Appendix D) at water conveyance structures during flow periods. Records of the inspections will be available for review by an Inspector upon request.

4 MEADOWBANK WATER QUALITY FORECASTING UPDATE

The water quality forecast report was prepared by SNC Lavalin (SNC, 2017) and is a continuation of a series of yearly water quality modelling forecast reports that commenced in 2012 and will continue until mine closure as per the Water License part E item 7. The purpose is to identify through a mass balance approach the contaminants of concern during the pit flooding process and determine if water treatment will be required on site for closure activities when comparing the final contaminant levels to the CCME guidelines and/or site specific criteria for parameters that are not included in the CCME Guidelines. Each yearly update builds on the previous year as new monitoring data is added at the site. Forecasted model values of the prior years are compared with the actual sample results from the following years for model calibration purposes. SNC identified 6 contaminants in their 2017 report: copper, selenium, fluoride, chromium, total aluminium and total arsenic as parameters of concern that may require treatment. As previously stated in section 3.2, Silver is no longer problematic compared to the previous exercise due to a lower silver loading sampled from the 2016 mill effluent. As the aforementioned parameters may be of concern prior to dike breaching, treatment options for their removal during or after the pit flooding process will need to be examined and will be assessed in greater detail during the preparation of the final closure and reclamation plan These contaminants originate from the TSF reclaim water when transferred to the pits in 2018 as outlined section 3.2. AEM is committed to implementing the recommendations provided in the SNC Water Modelling Report in 2017 and beyond. These are:

- Continue the current monthly monitoring program of all inflows and outflows of the North and South Cells TSF Reclaim Pond for cyanide, a complete total and dissolved metal scan, ammonia, nitrate, fluoride, chloride, sulfates, total dissolved solids (TDS) and total suspended solids.
- Continue the current monitoring program of the water in the South Cell TSF Reclaim Pond in 2017 for cyanide, total and dissolved metal scan, ammonia, nitrate, chloride, sulfates, total dissolved solids (TDS) and total suspended solids. It is understood that this recommendation is required as per the water license.
- Regular monitoring of pit water quality (Portage and Goose) should also be undertaken, when the site can be safely accessed, and analyzed for cyanide, total and dissolved metals, ammonia, nitrate, chloride, fluoride, sulfates, total dissolved solids (TDS) and total suspended solids. This information will be useful in developing and calibrating a water quality forecast model of the pit water quality based on loadings from surface runoff and possible underground water seepage.
- If possible quantify the seepage flows or volumes entering the Portage and Goose Pits. The study should also attempt to evaluate the seepage rate into the pits as a function of the hydraulic difference between the water level in the pit and in Third Portage Lake.

- Once transfer of South Cell Reclaim Water begins to the Portage Pit (September 2018), regular (at least monthly) monitoring of all outflows of the TSF Reclaim Pond for all parameters should be undertaken, including TSS to ensure low level during transfer.
- In order to validate the assumption of a well mixed system in Portage and Goose Pits, it is recommended to it is recommended to sample and analyze the water at different depths before, during and after the pits are filled with water from South Cell TSF and/or Third Portage Lake, when or if it is safe to do so. Furthermore, it may be useful to evaluate the assumption of a well mixed versus stratified pit water quality prior to mixing Portage and Goose Pits.
- Once Portage and Goose Pits are hydraulically connected, it is recommended to sample the water at different points in the pit area in order to evaluate the mixing efficiency over the entire area. The samples should be taken at different depths over the entire area of the flooded pits before and after the filling season.
- Continue to sample and analyze as per the Water License requirement the Vault Pit and Vault Attenuation Pond and include ammonia and nitrate in the list of parameters to analyze for.
- Perform a bench scale water treatment test to evaluate the contaminant removal efficiency using treatment approaches such as lime neutralization, coagulation/flocculation with aluminium sulphate or ferric sulphate, and coagulation/flocculation with proprietary coagulants designed for metal removal.

This version of the Meadowbank Water Management Plan Report as part of the Meadowbank Annual Report 2016 includes in appendix the updated water quality model and the comparison of predicted and measured water quantity and quality.

5 2016 INTEGRATED DEPOSITION PLAN

A Tailings Deposition Plan prepared by AEM has been used to update last year's model. The 2016 bathymetry was compared to the 2013 to 2015 bathymetries. The analysis revealed that ice entrapment and tailings dry density observed during the winter 2014-2015 was consistent with what was observed during winter 2015-2016. Average tailings dry density measured was down to 1.43t/m³ instead of the average of 1.49t/m³ observed in the South Cell during the previous year. Sub-aerial and sub-aqueous beach angles are also consistent which mean that the global deposition strategy implemented in 2015 is efficient.

No major change was made on the deposition strategy other than increasing the freshwater consumption during summer 2018 in order to store a larger amount of water in South Cell prior to the last winter of deposition. The model suggests that this plan will reduce global ice entrapment and secure the operation of the tailings pond. North Cell parameters are used for 2018 deposition as they were considered more representative of the tailings deposition occurring in a TSF pond at closure.

Closure water management for the TSF was updated as well to optimize the pit flooding process. Reclaim water transfers will be required yearly from the North Cell to the South Cell and then to the Portage Pit (in 2018). This will occur until capping of the North Cell is completed to maintain the proper freeboard elevation in the reclaim pond. Once capping completion occurs, the same transfers will be done until dike breaching, however those transfers will originate from the capped TSF's run off which will differ in terms of quality (likely only TSS cs) from the previous reclaim water transfers before the capping is finished. This deposition plan is presented in the Updated Mine Waste Rock and Tailings Management Plan 2016.

6 CONCLUSION

This report presents an updated/revised water management plan for the Meadowbank mine based on the AEM 2015 Water Management Plan submitted to the NWB as part of the AEM 2015 Annual Report. Validation and updates of the site parameters (i.e. runoff and pit inflows) was conducted in 2016. In addition further updates/modifications/revisions to the mine plan (LOM), site wide water management, tailings deposition plans and operating schedule were evaluated in preparing this report.

The water balance presented has been optimized to reduce freshwater consumption as much as possible, secure operation of the tailings pond during winter 2018 and minimize water treatment requirements at closure. The 2016 TSF bathymetries analysis confirmed the great outcome of the deposition into the South Cell regarding tailings dry density and beach angle.

Upon receiving approval from the NWB and other regulators (NIRB, DFO) AEM proceeded to dewater Phaser Lake to allow mining the Phaser Pit. Fish out procedures occurred prior to dewatering in accordance with DFO requirements. This was then discharged from the Vault ATP to Wally Lake in accordance with the Water License and the MMER. Phaser Pit mining will proceed as planned in 2017.

Central Dike seepage flow has been stable between 400 to 600 m^3/h during 2016. These flows closely follow the ones predicted by Golder in the seepage modelling performed in 2015 and currently under review by Golder. In fall 2016 a new electric pumping system was installed. Pumping has continued until present day and will continue until pit flooding occurs.

Pit flooding volumes and sequencing (including Portage, Goose and Vault Pits) is presented in this report. Passive reflooding commenced in Goose Pit in 2015 when mining completed and was continued in 2016 by accumulating runoff and pit inflow water. It is planned to begin actively reflooding Goose Pit in 2020 with water from Third Portage Lake. Flooding of Portage Pit will begin late in 2018. Flooding of Vault Pit will commence in 2019. The entire pit flooding process will be completed by the end of 2025. Once water quality in the flooded pits meet CCME Guidelines for the Protection of Aquatic Life and/or site specific criteria for parameters not listed in the CCME Guidelines, dike breaching of the surrounding structures will occur to reconnect the Portage and Goose areas to Second Portage Lake and Vault area to Wally Lake (2029). AEM plans at least four years of monitoring to assess the pit water quality prior to breaching. It should be understood that the dikes will not be breached unless the water quality meets the CCME or other site specific criteria.

A water quality forecasting model was completed by SNC Lavalin (SNC, 2017) for the life of mine and is included in this report. The mandate of this report is to analyze the water quality as we proceed through the operating life of the mine and the pit flooding operation in order to determine the needs for potential treatment of contaminants of concern. The impact of transferring the TSF water to the pits during the flooding process was explored using the all available water quality results from the North Cell TSF (since mine commencement) and actual mill tailings composition. Based on current water quality and the latest water balance suing budget BUD2016_V00, the report identifies that copper, selenium, fluoride, chromium, total aluminium and total arsenic may require removal treatment in order for the pit water quality to meet CCME criteria in 2029. AEM is committed to updating this forecast on a yearly basis.

A revised and updated Freshet Action Plan (2017) is included in the 2016 Water Management Plan as Appendix D. The plan details the RSF seepage issue at ST-16 and the Assay Road seepage as well as providing revised monitoring. The 2015 Ammonia Management Plan is included in Appendix E.

7 RECOMMENDATIONS

This section presents a series of recommendations in order to improve on the current water management strategies and water balance. It is AEM's intent to implement all recommendations listed.

- Continue to monitor and include any new flow monitoring locations/devices for any additional or new inflows observed in 2016.
- Continue to update the deposition plans of the North and South Cell as needed to maximize water use and availability as well as increasing the accuracy of the models including but not limited to bathymetric readings.
- Validate new tailings parameters with 2017 North and South Cells bathymetries.
- Conduct the water quality modelling analysis on a yearly basis based on updated water quality results and water balance through the life of mine.
- Continue development of the sediment flux model to evaluate erosion of geotechnical structures on site for the closure, primarily for TSS control: diversion ditches, rock storage facilities, capping of the tailings storage facilities, dikes and dams.
- Evaluate opportunities to reduce contaminants concentration in the reclaim pond prior to closure.
- Evaluate active TSF's ice thickness to optimize operations and potentially diminish closure transfers to the pits
- Continue follow up of the Central Dike seepage flow and adjust pumping station capacity in function of the decreasing flow.
- Implement 2016 Meadowbank water quality forecasting (SNC, 2017) recommendations.

8 REFERENCES

1. SNC (2013) – Water Management Plan 2012. SNC Lavalin. March 2013.
2. Golder (2009) – Meadowbank Gold Project Updated Water Management Plan. Golder Associates Limited. July 2009.
3. Environment Canada (2011a) - National Climate Data and Information Archive, http://climat.meteo.gc.ca/advanceSearch/searchHistoricData_f.html.
   14. Nunavut Water Board, Water Licence NO: 2AM-MEA0815, June 9 2008 to May 3 2015.
4. AEM (2016) – Waste Management Plan 2015
5. SNC (2017) – Meadowbank Water Quality Forecasting Update Base on the 2015 Water Management Plan. February 2017.

APPENDIX A – WATER BALANCE

	Year 2016												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**366**
Tailings (tonnes):	346,010	301,470	298,552	330,864	351,933	310,822	356,514	325,637	355,911	339,156	326,841	348,686	**3,992,396**
Cummulative Tailings (tonnes):	17,479,090	17,780,560	18,079,112	18,409,976	18,761,909	19,072,731	19,429,245	19,754,882	20,110,793	20,449,949	20,776,790	21,125,476	-
Cummulative Tailings (m^3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m^3) - South Cell	2,590,911	2,838,018	3,082,733	3,353,933	3,642,402	3,851,008	4,049,071	4,229,980	4,427,709	4,653,813	4,887,271	5,155,491	-
North Cell (TSF)													
Starting Pond Volume (m^3)	181,114	181,114	181,114	181,114	181,114	196,899	115,184	117,039	134,906	136,061	17,843	17,843	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Runoff (m^3)	0	0	0	0	0	17,954	-333	7,582	21,238	-37,152	0	0	**9,289**
Pumped from ST16, WEP & Interception sump	0	0	0	0	15,785	108,338	8,019	10,285	23,917	3,634	0	0	**169,978**
Total Inflow (m^3)	0	0	0	0	15,785	126,292	7,686	17,867	45,155	-33,518	0	0	**179,267**
Transfer to South Cell (m^3)	0	0	0	0	0	208,007	5,831	0	44,000	84,700	0	0	**342,538**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	208,007	5,831	0	44,000	84,700	0	0	**342,538**
Net Inflow (m^3)	0	0	0	0	15,785	-81,715	1,855	17,867	1,155	-118,218	0	0	**-163,271**
End-of-Month Volume (m^3)	181,114	181,114	181,114	181,114	196,899	115,184	117,039	134,906	136,061	17,843	17,843	17,843	-
South Cell (TSF)													
Pumped From Goose Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Portage Pit (m^3)	0	0	16,320	0	12,662	72,996	3,878	9,236	15,731	1,536	0	0	**132,359**
Runoff (m^3)	0	0	0	0	0	41,175	-12,145	23,408	3,879	-28	0	0	**56,290**
Transfer from North Cell (m^3)	0	0	0	0	0	208,007	5,831	0	44,000	84,700	0	0	**342,538**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	0	43,576	0	2,762	0	0	0	0	**46,338**
Pumped from SD3-4-5 (m^3)	0	0	0	0	10,616	18,574	468	3,174	2,095	0	0	0	**34,927**
Pumped from Central Dike Seepage (m^3)	305,344	277,015	306,838	324,633	376,728	385,003	441,435	395,629	363,024	503,283	453,439	465,316	**4,597,687**
Water from tailings slurry (m^3)	150,205	123,881	144,839	144,442	153,077	190,567	227,740	215,809	209,242	199,354	181,982	179,246	**2,120,385**
Total Inflow (m^3)	455,549	400,896	467,997	469,075	553,083	959,898	667,207	650,018	637,972	788,845	635,421	644,562	**7,330,524**
Reclaim water to the mill (m^3)	261,486	198,764	204,407	200,883	268,825	231,995	273,558	257,759	254,909	240,187	235,296	252,414	**2,880,483**
Seeping to Central Dike D/S pond (m^3)	301,101	274,648	307,581	195,032	342,973	270,401	428,731	354,392	299,608	493,597	453,165	477,285	**4,198,514**
Transfer to Portage Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	562,587	473,412	511,988	395,915	611,798	502,396	702,289	612,151	554,517	733,784	688,461	729,699	**7,078,997**
Net Inflow (m^3)	-107,038	-72,516	-43,991	73,160	-58,715	457,502	-35,082	37,866	83,455	55,061	-53,040	-85,136	**251,527**
End-of-Month Volume (m^3)	1,204,804	1,132,288	1,088,297	1,161,457	1,102,742	1,560,244	1,525,162	1,563,029	1,646,484	1,701,545	1,648,505	1,563,369	-
Mill/Camp													
Ore water (m^3)	3,391	4,612	4,316	3,554	3,418	2,050	2,370	3,191	2,134	3,358	2,353	3,243	**37,991**
Reclaim water (m^3)	261,486	198,764	204,407	200,883	268,825	231,995	273,558	257,759	254,909	240,187	235,296	252,414	**2,880,483**
Freshwater from Third Portage Lake (m^3)	38,715	47,446	84,373	87,744	37,388	41,429	35,270	34,213	29,059	44,848	45,893	46,465	**572,843**
Total Inflow (m^3)	303,592	250,822	293,097	292,181	309,631	275,474	311,198	295,163	286,102	288,392	283,542	302,122	**3,491,317**
Freshwater for camp purposes (m^3)	3,181	3,061	3,418	3,297	3,478	3,235	3,441	3,530	3,342	3,601	3,570	3,378	**40,532**
Slurry water (m^3)	300,411	247,761	289,679	288,884	306,153	272,239	307,757	291,633	282,760	284,791	279,972	298,744	**3,450,785**
Total Outflow (m^3)	303,592	250,822	293,097	292,181	309,631	275,474	311,198	295,163	286,102	288,392	283,542	302,122	**3,491,317**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	351	286	275	279	361	322	368	346	354	323	327	339	-
Freshwater pumping rate (m^3/hr)	52	68	113	122	50	58	47	46	40	60	64	62	-
TSF Water Balance													
Slurry water (m^3)	300,411	247,761	289,679	288,884	306,153	272,239	307,757	291,633	282,760	284,791	279,972	298,744	**3,450,785**
SC Tailings water/ice entrampment (%)	50%	50%	50%	50%	50%	30%	26%	26%	26%	30%	35%	40%	
Void and ice entrapment losses (m^3)	150,205	123,881	144,839	144,442	153,077	81,672	80,017	75,825	73,518	85,437	97,990	119,498	**1,330,400**
Slurry water returned to the SC pond (m^3)	150,205	123,881	144,839	144,442	153,077	190,567	227,740	215,809	209,242	199,354	181,982	179,246	**2,120,385**

	Year 2016												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	7,500	3,000	3,000	9,000	9,800	130,000	65,000	45,000	31,000	0	30,000	19,131	**352,431**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	7,500	3,000	3,000	9,000	9,800	130,000	65,000	45,000	31,000	0	30,000	19,131	**352,431**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	7,500	3,000	3,000	9,000	9,800	130,000	65,000	45,000	31,000	0	30,000	19,131	**352,431**
End-of-Month Volume (m^3)	385,349	388,349	391,349	400,349	410,149	540,149	605,149	650,149	681,149	681,149	711,149	730,280	-
Portage Pit													
Runoff (m^3)	0	0	16,320	0	12,662	72,996	3,878	9,236	15,731	1,536	0	0	**132,359**
East Dike Seepage (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	16,320	0	12,662	72,996	3,878	9,236	15,731	1,536	0	0	**132,359**
Pumped to Attenuation Pond (m^3)	0	0	16,320	0	12,662	72,996	3,878	9,236	15,731	1,536	0	0	**132,359**
Total Outflow (m^3)	0	0	16,320	0	12,662	72,996	3,878	9,236	15,731	1,536	0	0	**132,359**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	101,074	101,074	101,074	101,074	101,074	101,074	101,074	101,074	101,074	101,074	101,074	101,074	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	19,219	511,736	31,709	-52,523	78,452	9,194	0	0	**597,787**
Pumped From Vault Pit (m^3)	0	0	0	0	7,705	19,556	5,660	13,245	6,823	1,458	517	0	**54,964**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	77,616	315,338	14,720	0	0	**407,674**
Total Inflow (m^3)	0	0	0	0	26,924	531,292	37,369	38,338	400,613	25,372	517	0	**1,060,425**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	238,588	223,521	408,963	137,385	0	0	**1,008,457**
Total Outflow (m^3)	0	0	0	0	0	0	238,588	223,521	408,963	137,385	0	0	**1,008,457**
Net Inflow (m^3)	0	0	0	0	26,924	531,292	-201,219	-185,183	-8,350	-112,013	517	0	**51,968**
End-of-Month Volume (m^3)	341,069	341,069	341,069	341,069	367,993	899,285	698,066	512,883	504,533	392,520	393,037	393,037	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	7,705	19,556	5,660	13,245	6,823	1,458	517	0	**54,964**
Total Inflow (m^3)	0	0	0	0	7,705	19,556	5,660	13,245	6,823	1,458	517	0	**54,964**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	7,705	19,556	5,660	13,245	6,823	1,458	517	0	**54,964**
Total Outflow (m^3)	0	0	0	0	7,705	19,556	5,660	13,245	6,823	1,458	517	0	**54,964**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	80,000	-55,000	-22,339	25,033	0	0	0	**27,694**
Total Inflow (m^3)	0	0	0	0	0	80,000	-55,000	-22,339	25,033	0	0	0	27,694
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	77,616	315,338	14,720	0	0	**407,674**
Total Outflow (m^3)	0	0	0	0	0	0	0	77,616	315,338	14,720	0	0	407,674
Net Inflow (m^3)	0	0	0	0	0	80,000	-55,000	-99,955	-290,305	-14,720	0	0	**-379,980**
End-of-Month Volume (m^3)	448,311	448,311	448,311	448,311	448,311	528,311	473,311	373,356	83,051	68,331	68,331	68,331	-

	Year 2017												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	335,296	302,848	335,296	334,260	345,402	334,260	333,188	333,188	322,440	348,657	337,410	348,657	**4,010,902**
Cummulative Tailings (tonnes):	21,460,772	21,763,620	22,098,916	22,433,176	22,778,578	23,112,838	23,446,026	23,779,214	24,101,654	24,450,311	24,787,721	25,136,378	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	5,413,411	5,646,371	5,925,784	6,204,334	6,451,050	6,673,890	6,882,132	7,078,125	7,267,796	7,500,234	7,741,241	8,009,439	-
North Cell (TSF)													
Starting Pond Volume (m^3)	17,843	17,843	17,843	17,843	17,843	17,843	17,843	17,843	17,843	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Runoff (m^3)	0	0	0	0	0	76,665	7,700	42,862	21,238	-13	0	0	**148,451**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	**206,019**
Total Inflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Transfer to South Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	56,544	-13	0	0	**372,313**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	56,544	-13	0	0	**372,313**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	-17,843	0	0	0	**-17,843**
End-of-Month Volume (m^3)	17,843	17,843	17,843	17,843	17,843	17,843	17,843	17,843	0	0	0	0	-
South Cell (TSF)													
Pumped From Goose Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Portage Pit (m^3)	0	0	0	0	0	78,539	0	0	0	0	0	0	**78,539**
Runoff (m^3)	0	0	0	0	0	40,462	-18,494	617	2,655	-25	0	0	**25,216**
Transfer from North Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	56,544	-13	0	0	**372,313**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Water from tailings slurry (m^3)	174,067	158,171	174,182	168,716	198,786	218,788	226,756	225,967	218,463	76,387	58,956	30,534	**1,929,772**
Total Inflow (m^3)	174,067	158,171	174,182	168,716	223,496	556,988	250,543	279,260	289,251	76,348	58,956	30,534	**2,440,514**
Reclaim water to the mill (m^3)	260,400	235,200	260,400	252,000	238,080	223,200	215,760	156,240	151,200	119,040	223,200	230,640	**2,565,360**
Transfer to Portage Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	260,400	235,200	260,400	252,000	238,080	223,200	215,760	156,240	151,200	119,040	223,200	230,640	**2,565,360**
Net Inflow (m^3)	-86,333	-77,029	-86,218	-83,284	-14,584	333,788	34,783	123,020	138,051	-42,692	-164,244	-200,106	**-124,846**
End-of-Month Volume (m^3)	1,477,036	1,400,007	1,313,789	1,230,505	1,215,921	1,549,710	1,584,493	1,707,513	1,845,564	1,802,873	1,638,629	1,438,522	-
Mill/Camp													
Ore water (m^3)	3,286	4,634	3,487	3,643	3,730	3,309	4,331	3,265	2,870	3,452	2,429	3,243	**41,679**
Reclaim water (m^3)	260,400	235,200	260,400	252,000	238,080	223,200	215,760	156,240	151,200	119,040	223,200	230,640	**2,565,360**
Freshwater from Third Portage Lake (m^3)	44,640	40,320	44,640	43,200	66,960	72,000	89,280	148,800	144,000	186,000	72,000	74,400	**1,026,240**
Total Inflow (m^3)	308,326	280,154	308,527	298,843	308,770	298,509	309,371	308,305	298,070	308,492	297,629	308,283	**3,633,279**
Freshwater for camp purposes (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m^3)	305,381	277,494	305,582	295,993	305,825	295,659	306,426	305,360	295,220	305,547	294,779	305,338	**3,598,604**
Total Outflow (m^3)	308,326	280,154	308,527	298,843	308,770	298,509	309,371	308,305	298,070	308,492	297,629	308,283	**3,633,279**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	350	350	350	350	320	310	290	210	210	160	310	310	-
Freshwater pumping rate (m^3/hr)	60	60	60	60	90	100	120	200	200	250	100	100	-
TSF Water Balance													
Slurry water (m^3)	305,381	277,494	305,582	295,993	305,825	295,659	306,426	305,360	295,220	305,547	294,779	305,338	**3,598,604**
SC Tailings water/ice entrampment (%)	43%	43%	43%	43%	35%	26%	26%	26%	26%	75%	80%	90%	
Void and ice entrapment losses (m^3)	131,314	119,322	131,400	127,277	107,039	76,871	79,671	79,394	76,757	229,160	235,823	274,804	**1,668,833**
Slurry water returned to the SC pond (m^3)	174,067	158,171	174,182	168,716	198,786	218,788	226,756	225,967	218,463	76,387	58,956	30,534	**1,929,772**

	Year 2017												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
End-of-Month Volume (m^3)	749,411	768,724	787,855	806,986	826,299	887,015	917,257	966,554	999,819	1,018,950	1,038,263	1,057,394	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
East Dike Seepage (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	78,539	0	0	0	0	0	0	**78,539**
Total Outflow (m^3)	0	0	0	0	0	78,539	0	0	0	0	0	0	**78,539**
Net Inflow (m^3)	0	0	0	0	0	0	20,985	56,628	26,694	0	0	0	**104,307**
End-of-Month Volume (m^3)	101,074	101,074	101,074	101,074	101,074	101,074	122,059	178,687	205,381	205,381	205,381	205,381	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	119,051	9,922	64,582	32,212	-22	0	0	**225,745**
Pumped From Vault Pit (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	141,983	19,679	53,105	25,033	0	0	0	**239,801**
Total Inflow (m^3)	0	0	0	0	0	327,561	47,376	165,654	79,857	-22	0	0	**620,425**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	327,561	47,376	165,654	79,857	-22	0	0	**620,425**
Total Outflow (m^3)	0	0	0	0	0	327,561	47,376	165,654	79,857	-22	0	0	**620,425**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Total Inflow (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Total Outflow (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	141,983	19,679	53,105	25,033	0	0	0	**239,801**
Total Outflow (m^3)	0	0	0	0	0	141,983	19,679	53,105	25,033	0	0	0	239,801
Net Inflow (m^3)	0	0	0	0	0	-68,331	0	0	0	0	0	0	**-68,331**
End-of-Month Volume (m^3)	68,331	68,331	68,331	68,331	68,331	0	0	0	0	0	0	0	-

	Year 2018												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	279,000	252,000	279,000	270,000	279,000	270,000	227,530	227,530	220,191	0	0	0	**2,304,251**
Cummulative Tailings (tonnes):	25,415,378	25,667,378	25,946,378	26,216,378	26,495,378	26,765,378	26,992,908	27,220,438	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	8,224,054	8,417,900	8,650,400	8,875,400	9,074,686	9,254,686	9,396,892	9,530,734	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	**206,019**
Runoff (m^3)	0	0	0	0	0	76,665	7,700	42,862	21,238	-13	0	0	**148,451**
Total Inflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Transfer to South Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Pumped From Portage Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Runoff (m^3)	0	0	0	0	0	40,462	-18,494	617	2,655	-21	0	0	**25,220**
Transfer from North Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Water from tailings slurry (m^3)	30,483	27,672	30,500	29,529	122,043	206,516	145,365	144,855	135,506	0	0	0	**872,470**
Total Inflow (m^3)	30,483	27,672	30,500	29,529	146,753	466,178	169,152	198,149	188,452	-34	0	0	**1,286,834**
Reclaim water to the mill (m^3)	230,640	208,320	230,640	223,200	267,840	259,200	170,452	170,452	158,471	0	0	0	**1,919,214**
Transfer to Portage Pit (m^3)	0	0	0	0	0	0	201,500	201,500	201,500	201,500	143	0	**806,143**
Total Outflow (m^3)	230,640	208,320	230,640	223,200	267,840	259,200	371,952	371,952	359,971	201,500	143	0	**2,725,357**
Net Inflow (m^3)	-200,157	-180,648	-200,140	-193,671	-121,087	206,978	-202,799	-173,802	-171,519	-201,534	-143	0	**-1,438,522**
End-of-Month Volume (m^3)	1,238,365	1,057,717	857,577	663,906	542,819	749,797	546,998	373,196	201,677	143	0	0	-
Mill/Camp													
Ore water (m^3)	2,734	3,856	2,902	2,943	3,013	2,673	2,958	2,230	1,960	0	0	0	**25,268**
Reclaim water (m^3)	230,640	208,320	230,640	223,200	267,840	259,200	170,452	170,452	158,471	0	0	0	**1,919,214**
Freshwater from Third Portage Lake (m^3)	74,400	67,200	74,400	72,000	37,200	36,000	37,200	37,200	36,000	2,945	2,850	2,945	**480,340**
Total Inflow (m^3)	307,774	279,376	307,942	298,143	308,053	297,873	210,609	209,881	196,430	2,945	2,850	2,945	**2,424,822**
Freshwater for camp purposes (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m^3)	304,829	276,716	304,997	295,293	305,108	295,023	207,664	206,936	193,580	0	0	0	**2,390,147**
Total Outflow (m^3)	307,774	279,376	307,942	298,143	308,053	297,873	210,609	209,881	196,430	2,945	2,850	2,945	**2,424,822**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	310	310	310	310	360	360	229	229	220	0	0	0	-
Freshwater pumping rate (m^3/hr)	100	100	100	100	50	50	50	50	50	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	304,829	276,716	304,997	295,293	305,108	295,023	207,664	206,936	193,580	0	0	0	**2,390,147**
SC Tailings water/ice entrampment (%)	90%	90%	90%	90%	60%	30%	30%	30%	30%	0%	0%	0%	
Void and ice entrapment losses (m^3)	274,346	249,044	274,497	265,764	183,065	88,507	62,299	62,081	58,074	0	0	0	**1,517,677**
Slurry water returned to the SC pond (m^3)	30,483	27,672	30,500	29,529	122,043	206,516	145,365	144,855	135,506	0	0	0	**872,470**

	Year 2018												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
End-of-Month Volume (m^3)	1,076,525	1,095,838	1,114,969	1,134,100	1,153,413	1,214,129	1,244,371	1,293,668	1,326,933	1,346,064	1,365,377	1,384,508	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from South Cell (m^3)	0	0	0	0	0	0	201,500	201,500	201,500	201,500	143	0	**806,143**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	0	0	0	0	806,275	0	0	**806,275**
East Dike Seepage (m^3)	0	0	0	0	0	0	0	0	0	0	14,964	14,964	**29,928**
Total Inflow (m^3)	0	0	0	0	0	78,539	222,485	258,128	228,194	1,007,775	15,107	14,964	**1,825,191**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	78,539	222,485	258,128	228,194	1,007,775	15,107	14,964	**1,825,191**
End-of-Month Volume (m^3)	205,381	205,381	205,381	205,381	205,381	283,920	506,404	764,532	992,726	2,000,501	2,015,608	2,030,572	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	119,051	9,922	64,582	32,212	-22	0	0	**225,745**
Pumped From Vault Pit (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	259,230	47,376	165,654	79,857	-22	0	0	**552,094**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	259,230	47,376	165,654	79,857	-22	0	0	**552,094**
Total Outflow (m^3)	0	0	0	0	0	259,230	47,376	165,654	79,857	-22	0	0	**552,094**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	393,037	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Total Outflow (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Outflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-

	Year 2019												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	
Runoff (m^3)	0	0	0	0	0	76,665	7,700	42,862	21,238	-13	0	0	**148,451**
Total Inflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Transfer to South Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Pumped From Portage Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Runoff (m^3)	0	0	0	0	0	40,982	-10,260	8,951	5,933	-22	0	0	**45,584**
Transfer from North Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Total Outflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Total Inflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Freshwater for camp purposes (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m^3/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

	Year 2019												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
End-of-Month Volume (m^3)	1,403,639	1,422,952	1,442,083	1,461,214	1,480,527	1,541,243	1,571,485	1,620,782	1,654,047	1,673,178	1,692,491	1,711,622	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from South Cell (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	1,057,536	1,092,787	1,092,787	1,057,536	599,678	0	0	**4,900,325**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	1,411,220	1,160,757	1,226,006	1,155,418	614,607	14,964	14,964	**5,697,465**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	1,411,220	1,160,757	1,226,006	1,155,418	614,607	14,964	14,964	**5,697,465**
End-of-Month Volume (m^3)	2,045,536	2,060,500	2,075,464	2,090,428	2,130,102	3,541,321	4,702,078	5,928,084	7,083,502	7,698,109	7,713,073	7,728,037	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
End-of-Month Volume (m^3)	393,037	393,037	393,037	393,037	393,037	511,745	517,798	578,465	609,137	609,137	609,137	609,137	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	1,016,064	0	0	0	**4,131,994**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
End-of-Month Volume (m^3)	0	0	0	0	0	1,082,590	2,150,298	3,248,198	4,286,873	4,286,873	4,286,873	4,286,873	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
End-of-Month Volume (m^3)	0	0	0	0	0	73,653	93,332	146,437	171,470	171,470	171,470	171,470	-

MEADOWBANK GOLD MINE
2016 WATER MANAGEMENT PLAN

	Year 2020												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**366**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	
Runoff (m^3)	0	0	0	0	0	76,665	7,700	42,862	21,238	-13	0	0	**148,451**
Total Inflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Transfer to South Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Runoff (m^3)	0	0	0	0	0	40,982	-10,260	8,951	5,933	-22	0	0	**45,584**
Transfer from North Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Total Inflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Total Outflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Total Inflow (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Freshwater for camp purposes (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m^3/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

	Year 2020												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	0	624,067	312,034	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	654,309	361,331	33,265	19,131	19,313	19,131	**1,263,215**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	654,309	361,331	33,265	19,131	19,313	19,131	**1,263,215**
End-of-Month Volume (m^3)	1,730,753	1,750,066	1,769,197	1,788,328	1,807,641	1,868,357	2,522,666	2,883,996	2,917,261	2,936,392	2,955,705	2,974,836	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from South Cell (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	1,057,536	468,720	780,754	1,057,536	1,092,787	0	0	**4,457,333**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	1,411,220	536,690	913,973	1,155,418	1,107,716	14,964	14,964	**5,254,473**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	1,411,220	536,690	913,973	1,155,418	1,107,716	14,964	14,964	**5,254,473**
End-of-Month Volume (m^3)	7,743,001	7,757,965	7,772,929	7,787,893	7,827,567	9,238,786	9,775,476	10,689,449	11,844,867	12,952,583	12,967,547	12,982,511	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
End-of-Month Volume (m^3)	609,137	609,137	609,137	609,137	609,137	727,845	733,898	794,565	825,237	825,237	825,237	825,237	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	1,016,064	0	0	0	**4,131,994**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
End-of-Month Volume (m^3)	4,286,873	4,286,873	4,286,873	4,286,873	4,286,873	5,369,463	6,437,171	7,535,071	8,573,746	8,573,746	8,573,746	8,573,746	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
End-of-Month Volume (m^3)	171,470	171,470	171,470	171,470	171,470	245,122	264,801	317,906	342,939	342,939	342,939	342,939	-

	Year 2021												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	
Runoff (m^3)	0	0	0	0	0	76,665	7,700	42,862	21,238	-13	0	0	**148,451**
Total Inflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Transfer to South Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Runoff (m^3)	0	0	0	0	0	40,982	-10,260	8,951	5,933	-22	0	0	**45,584**
Transfer from North Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Total Inflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Total Outflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Total Inflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Freshwater for camp purposes (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m^3/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

	Year 2021												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	603,936	312,034	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
End-of-Month Volume (m^3)	2,993,967	3,013,280	3,032,411	3,051,542	3,070,855	3,735,507	4,077,783	4,127,080	4,160,345	4,179,476	4,198,789	4,217,920	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from SC (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	453,600	780,754	1,092,787	1,057,536	599,678	0	0	**3,984,355**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	807,284	848,723	1,226,006	1,155,418	614,607	14,964	14,964	**4,781,496**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	807,284	848,723	1,226,006	1,155,418	614,607	14,964	14,964	**4,781,496**
End-of-Month Volume (m^3)	12,997,474	13,012,438	13,027,402	13,042,366	13,082,040	13,889,324	14,738,047	15,964,053	17,119,471	17,734,078	17,749,042	17,764,006	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
End-of-Month Volume (m^3)	825,237	825,237	825,237	825,237	825,237	943,945	949,998	1,010,665	1,041,337	1,041,337	1,041,337	1,041,337	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	1,016,064	0	0	0	**4,131,994**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
End-of-Month Volume (m^3)	8,573,746	8,573,746	8,573,746	8,573,746	8,573,746	9,656,337	10,724,045	11,821,944	12,860,619	12,860,619	12,860,619	12,860,619	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
End-of-Month Volume (m^3)	342,939	342,939	342,939	342,939	342,939	416,592	436,271	489,376	514,409	514,409	514,409	514,409	-

	Year 2022												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	**206,019**
Runoff (m^3)	0	0	0	0	0	76,665	7,700	42,862	21,238	-13	0	0	**148,451**
Total Inflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Transfer to South Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Runoff (m^3)	0	0	0	0	0	40,982	-10,260	8,951	5,933	-22	0	0	**45,584**
Transfer from North Cell (m^3)	0	0	0	0	1,625	219,200	42,281	52,677	38,701	-13	0	0	**354,470**
Total Inflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Total Outflow (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Total Inflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Freshwater for camp purposes (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m^3/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

	Year 2022												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	603,936	312,034	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
End-of-Month Volume (m^3)	4,237,051	4,256,364	4,275,495	4,294,626	4,313,939	4,978,591	5,320,867	5,370,164	5,403,429	5,422,560	5,441,873	5,461,004	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from SC (m^3)	0	0	0	0	1,625	260,181	32,021	61,627	44,634	-35	0	0	**400,053**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	453,600	780,754	1,092,787	1,057,536	599,678	0	0	**3,984,355**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	807,284	848,723	1,226,006	1,155,418	614,607	14,964	14,964	**4,781,496**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	807,284	848,723	1,226,006	1,155,418	614,607	14,964	14,964	**4,781,496**
End-of-Month Volume (m^3)	17,778,970	17,793,934	17,808,898	17,823,862	17,863,536	18,670,819	19,519,543	20,745,549	21,900,967	22,515,574	22,530,538	22,545,502	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
End-of-Month Volume (m^3)	1,041,337	1,041,337	1,041,337	1,041,337	1,041,337	1,160,045	1,166,098	1,226,765	1,257,437	1,257,437	1,257,437	1,257,437	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	1,016,064	0	0	0	**4,131,994**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
End-of-Month Volume (m^3)	12,860,619	12,860,619	12,860,619	12,860,619	12,860,619	13,943,210	15,010,918	16,108,817	17,147,492	17,147,492	17,147,492	17,147,492	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
End-of-Month Volume (m^3)	514,409	514,409	514,409	514,409	514,409	588,061	607,740	660,845	685,878	685,878	685,878	685,878	-

	Year 2023												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (tonnes) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (tonnes) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m³)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	**206,019**
Runoff (m³)	0	0	0	0	0	77,826	20,794	56,114	26,452	0	0	0	**181,187**
Total Inflow (m³)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Transfer to South Cell (m³)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Reclaim water to the mill (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m³)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Net Inflow (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m³)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Runoff (m³)	0	0	0	0	0	42,909	11,465	30,938	14,584	0	0	0	**99,896**
Transfer from North Cell (m³)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Total Inflow (m³)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Reclaim water to the mill (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m³)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Total Outflow (m³)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Net Inflow (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m³)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m³)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Total Inflow (m³)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Freshwater for camp purposes (m³)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m³)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Net Inflow (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m³/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m³/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m³)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

	Year 2023												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	603,936	312,034	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
End-of-Month Volume (m^3)	5,480,135	5,499,448	5,518,579	5,537,710	5,557,023	6,221,675	6,563,950	6,613,247	6,646,512	6,665,643	6,684,956	6,704,087	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from SC (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	0	11,590	0	0	0	**34,675**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	453,600	780,754	1,092,787	1,057,536	599,678	0	0	**3,984,355**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	810,372	883,543	1,261,247	1,169,282	614,642	14,964	14,964	**4,868,544**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	810,372	883,543	1,261,247	1,169,282	614,642	14,964	14,964	**4,868,544**
End-of-Month Volume (m^3)	22,560,465	22,575,429	22,590,393	22,605,357	22,645,031	23,455,404	24,338,946	25,600,193	26,769,475	27,384,117	27,399,081	27,414,045	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
End-of-Month Volume (m^3)	1,257,437	1,257,437	1,257,437	1,257,437	1,257,437	1,376,145	1,382,198	1,442,865	1,473,537	1,473,537	1,473,537	1,473,537	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	1,016,064	0	0	0	**4,131,994**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
End-of-Month Volume (m^3)	17,147,492	17,147,492	17,147,492	17,147,492	17,147,492	18,230,083	19,297,791	20,395,690	21,434,366	21,434,366	21,434,366	21,434,366	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73652.3	19679.2	53104.9	25033.1	0	0	0	**171,470**
End-of-Month Volume (m^3)	685,878	685,878	685,878	685,878	685,878	759,531	779,210	832,315	857,348	857,348	857,348	857,348	-

	Year 2024												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**366**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from ST16, WEP & Interception sump	0	0	0	0	1,625	142,535	34,581	9,815	17,463	0	0	0	**206,019**
Runoff (m^3)	0	0	0	0	0	77,826	20,794	56,114	26,452	0	0	0	**181,187**
Total Inflow (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Transfer to South Cell (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
South Cell (TSF)													
Runoff (m^3)	0	0	0	0	0	42,909	11,465	30,938	14,584	0	0	0	**99,896**
Transfer from North Cell (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Total Inflow (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Total Outflow (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Total Inflow (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Freshwater for camp purposes (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	2,945	2,755	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,770**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m^3/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

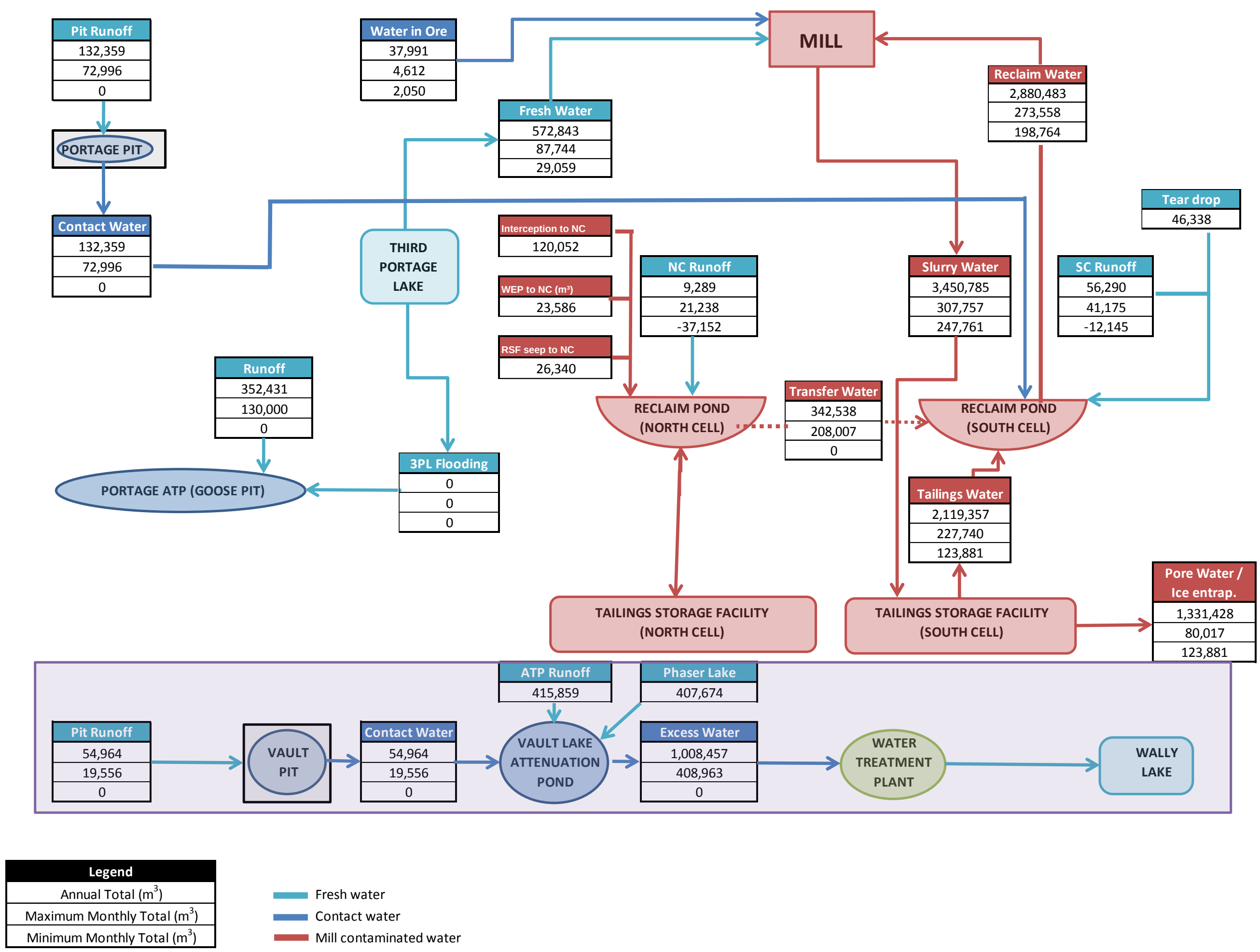
	Year 2024												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	30,242	49,297	33,265	19,131	19,313	19,131	**327,114**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	603,936	312,034	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	664,652	342,276	49,297	33,265	19,131	19,313	19,131	**1,243,084**
End-of-Month Volume (m^3)	6,723,218	6,742,531	6,761,662	6,780,793	6,800,106	7,464,758	7,807,034	7,856,331	7,889,596	7,908,727	7,928,040	7,947,171	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	20,985	56,628	26,694	0	0	0	**182,846**
Transfer from SC (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23,085	0	0	11,590	0	0	0	0	**34,675**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	453,600	780,754	1,092,787	1,057,536	599,678	0	0	**3,984,355**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	810,372	883,543	1,272,837	1,157,692	614,642	14,964	14,964	**4,868,544**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	39,674	810,372	883,543	1,272,837	1,157,692	614,642	14,964	14,964	**4,868,544**
End-of-Month Volume (m^3)	27,429,009	27,443,973	27,458,937	27,473,901	27,513,575	28,323,947	29,207,490	30,480,326	31,638,019	32,252,661	32,267,625	32,282,589	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
End-of-Month Volume (m^3)	1,473,537	1,473,537	1,473,537	1,473,537	1,473,537	1,592,245	1,598,298	1,658,965	1,689,637	1,689,637	1,689,637	1,689,637	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	1,016,064	0	0	0	**4,131,994**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	1,038,675	0	0	0	**4,286,873**
End-of-Month Volume (m^3)	21,434,366	21,434,366	21,434,366	21,434,366	21,434,366	22,516,956	23,584,664	24,682,564	25,721,239	25,721,239	25,721,239	25,721,239	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
End-of-Month Volume (m^3)	857,348	857,348	857,348	857,348	857,348	931,000	950,679	1,003,784	1,028,817	1,028,817	1,028,817	1,028,817	-

	Year 2025												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**366**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	27,440,629	-
Cummulative Tailings (m3) - North Cell	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	14,167,927	-
Cummulative Tailings (m3) - South Cell	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	9,660,257	-
North Cell (TSF)													
Starting Pond Volume (m^3)	0	0	0	0	0	-1,625	-144,160	-178,741	-188,556	-206,019	-206,019	-206,019	-
Water from tailings slurry (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Runoff (m^3)	0	0	0	0	0	77,826	20,794	56,114	26,452	0	0	0	**181,187**
Total Inflow (m^3)	0	0	0	0	0	77,826	20,794	56,114	26,452	0	0	0	**181,187**
Transfer to South Cell (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Net Inflow (m^3)	0	0	0	0	-1,625	-142,535	-34,581	-9,815	-17,463	0	0	0	**-206,019**
End-of-Month Volume (m^3)	0	0	0	0	-1,625	-144,160	-178,741	-188,556	-206,019	-206,019	-206,019	-206,019	-
South Cell (TSF)													
Runoff (m^3)	0	0	0	0	0	42,909	11,465	30,938	14,584	0	0	0	**99,896**
Transfer from North Cell (m^3)	0	0	0	0	1,625	220,361	55,375	65,929	43,915	0	0	0	**387,206**
Total Inflow (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to Portage Pit (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Total Outflow (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
End-of-Month Volume (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	-
Mill/Camp													
Ore water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Freshwater from Third Portage Lake (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Total Inflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Freshwater for camp purposes (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	2,945	2,660	2,945	2,850	2,945	2,850	2,945	2,945	2,850	2,945	2,850	2,945	**34,675**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater pumping rate (m^3/hr)	4	4	4	4	4	4	4	4	4	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tailings water/ice entrampment (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Void and ice entrapment losses (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Slurry water returned to the pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

	Year 2025												ANNUAL TOTAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	19,131	19,313	19,131	19,131	19,313	60,716	0	0	0	0	0	0	**156,735**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	83,467	0	0	0	0	0	0	**0**
Total Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	144,183	0	0	0	0	0	0	**240,202**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	19,131	19,313	19,131	19,131	19,313	144,183	0	0	0	0	0	0	**240,202**
End-of-Month Volume (m^3)	7,966,302	7,985,615	8,004,746	8,023,877	8,043,190	8,187,373	8,187,373	8,187,373	8,187,373	8,187,373	8,187,373	8,187,373	-
Portage Pit													
Runoff (m^3)	0	0	0	0	0	78,539	51,227	105,925	59,959	19,131	19,313	19,131	**353,225**
Transfer from SC (m^3)	0	0	0	0	1,625	263,270	66,840	96,867	58,499	0	0	0	**487,101**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	974,069	269,093	0	0	0	0	0	**1,243,162**
East Dike Seepage (m^3)	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	14,964	**179,567**
Total Inflow (m^3)	14,964	14,964	14,964	14,964	16,589	1,330,841	402,124	217,756	133,421	34,095	34,277	34,095	**2,263,055**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	14,964	14,964	14,964	14,964	16,589	1,330,841	402,124	217,756	133,421	34,095	34,277	34,095	**2,263,055**
End-of-Month Volume (m^3)	32,297,552	32,312,516	32,327,480	32,342,444	32,359,033	33,689,875	34,091,999	34,309,755	34,443,177	34,477,271	34,511,548	34,545,643	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	118,708	6,053	60,667	30,672	0	0	0	**216,100**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pumped from Wally Lake (m^3)	0	0	0	0	0	0	0	0	476,342	0	0	0	**476,342**
Total Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	507,014	0	0	0	**692,442**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	118,708	6,053	60,667	507,014	0	0	0	**692,442**
End-of-Month Volume (m^3)	1,689,637	1,689,637	1,689,637	1,689,637	1,689,637	1,808,345	1,814,398	1,875,065	2,382,079	2,382,078	2,382,078	2,382,078	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	66,526	17,775	47,967	22,611	0	0	0	**154,880**
Pumped from Wally Lake (m^3)	0	0	0	0	0	1,016,064	1,049,933	1,049,933	143,204	0	0	0	**3,259,134**
Total Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	165,815	0	0	0	**3,414,013**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	0	0	0	0	0	1,082,590	1,067,708	1,097,900	165,815	0	0	0	**3,414,013**
End-of-Month Volume (m^3)	25,721,239	25,721,239	25,721,239	25,721,239	25,721,239	26,803,829	27,871,537	28,969,437	29,135,252	29,135,252	29,135,252	29,135,252	-
Phaser Open Pit (including Phaser Lake)													
Runoff (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
Total Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	171,470
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Inflow (m^3)	0	0	0	0	0	73,652	19,679	53,105	25,033	0	0	0	**171,470**
End-of-Month Volume (m^3)	1,028,817	1,028,817	1,028,817	1,028,817	1,028,817	1,102,470	1,122,149	1,175,254	1,200,287	1,200,287	1,200,287	1,200,287	-

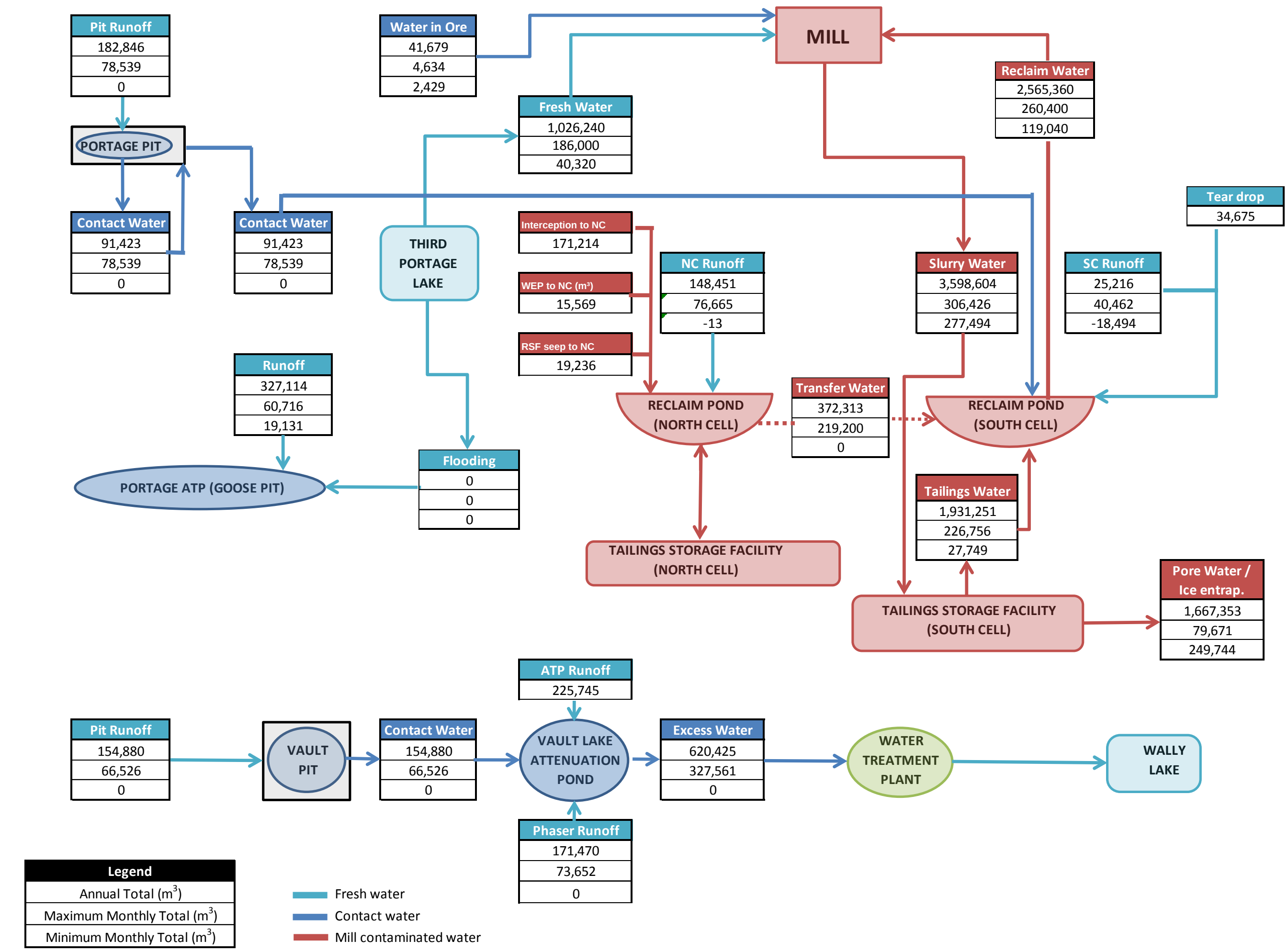
APPENDIX B – GENERAL WATER MOVEMENT

General Water Movement – 2016



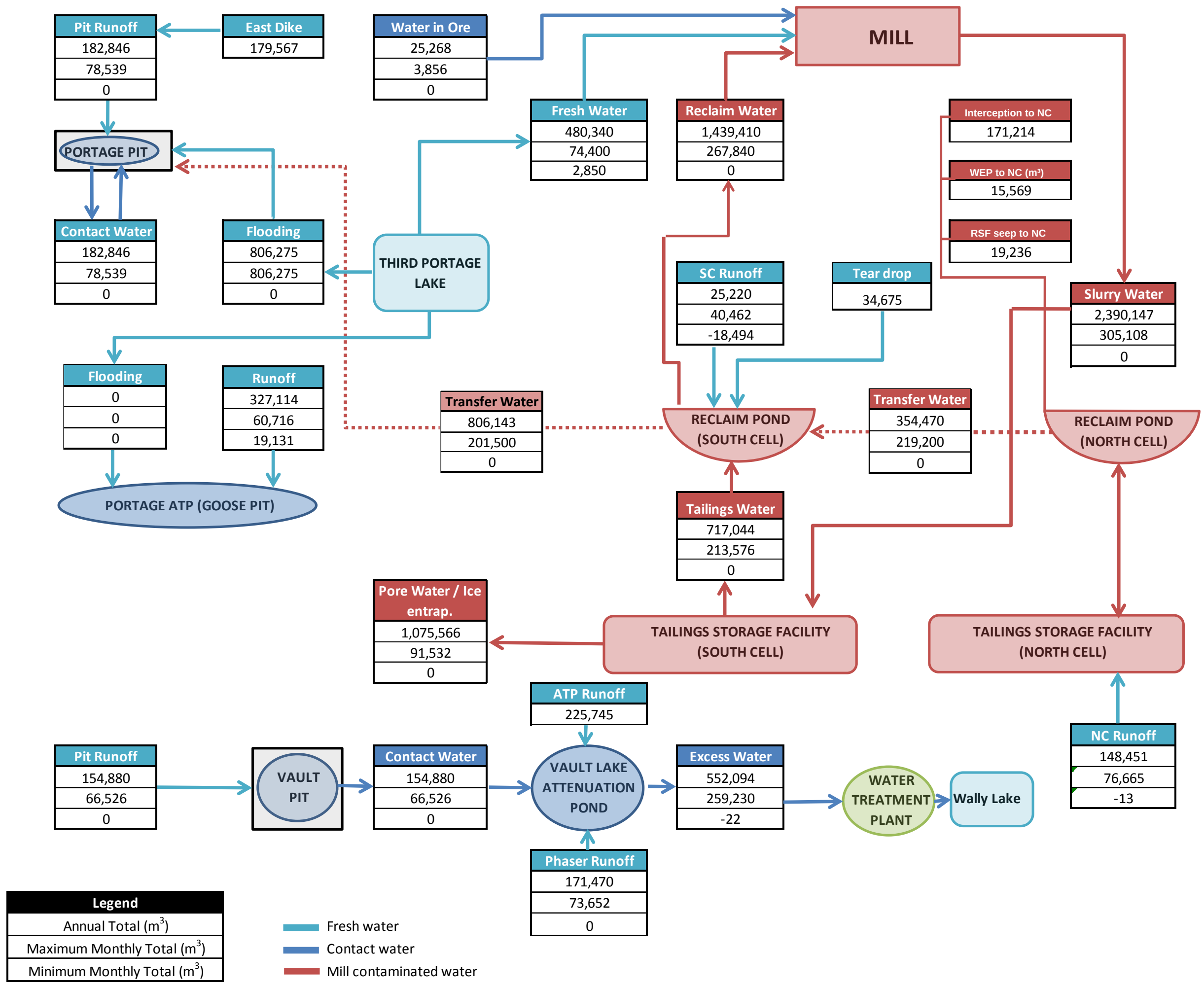
*Small water transfers are not shown on this drawing, refer to water balance tables for detailed water movement.

General Water Movement – 2017



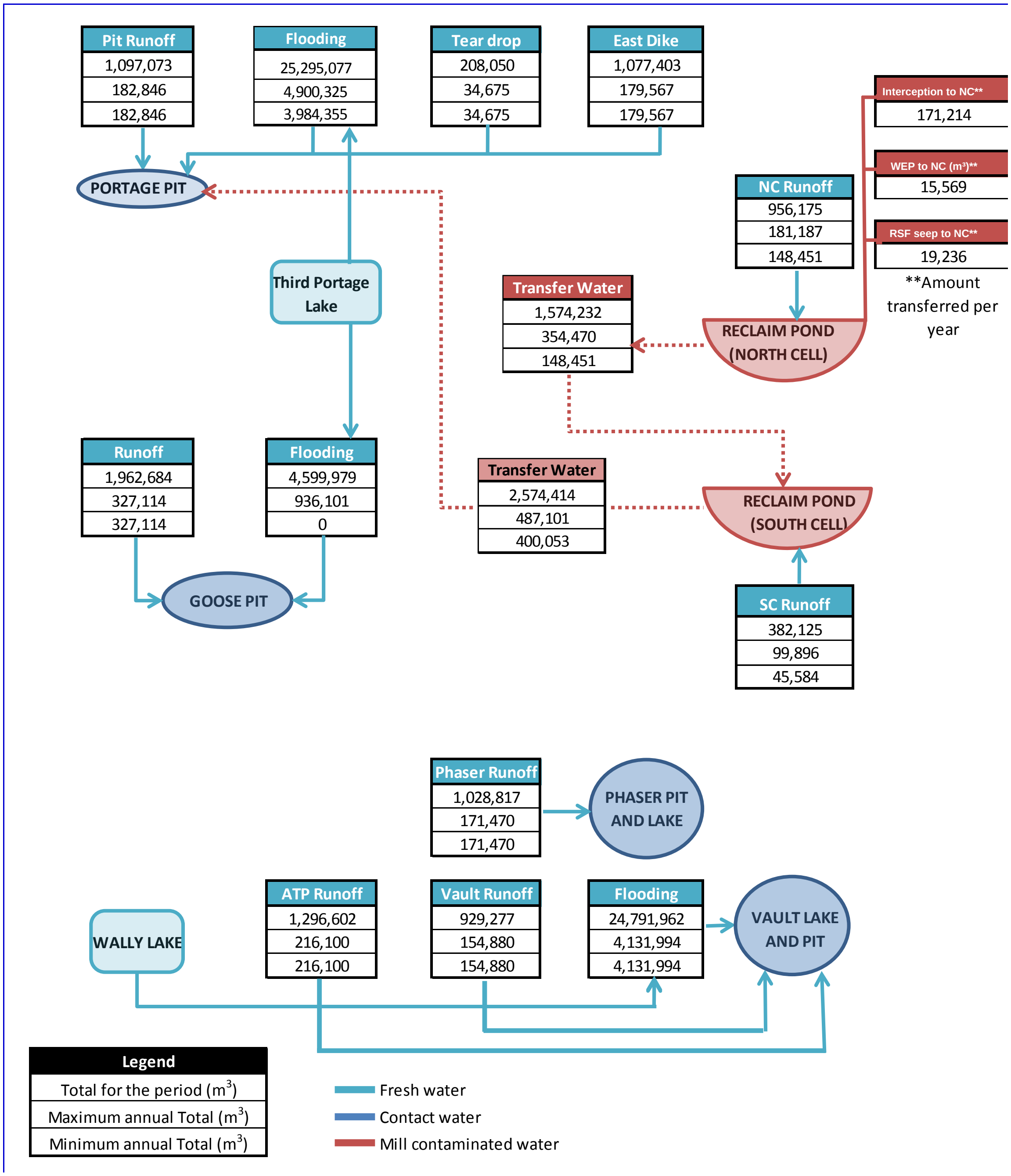
*Small water transfers are not shown on this drawing, refer to water balance tables for detailed water movement.

General Water Movement – 2018

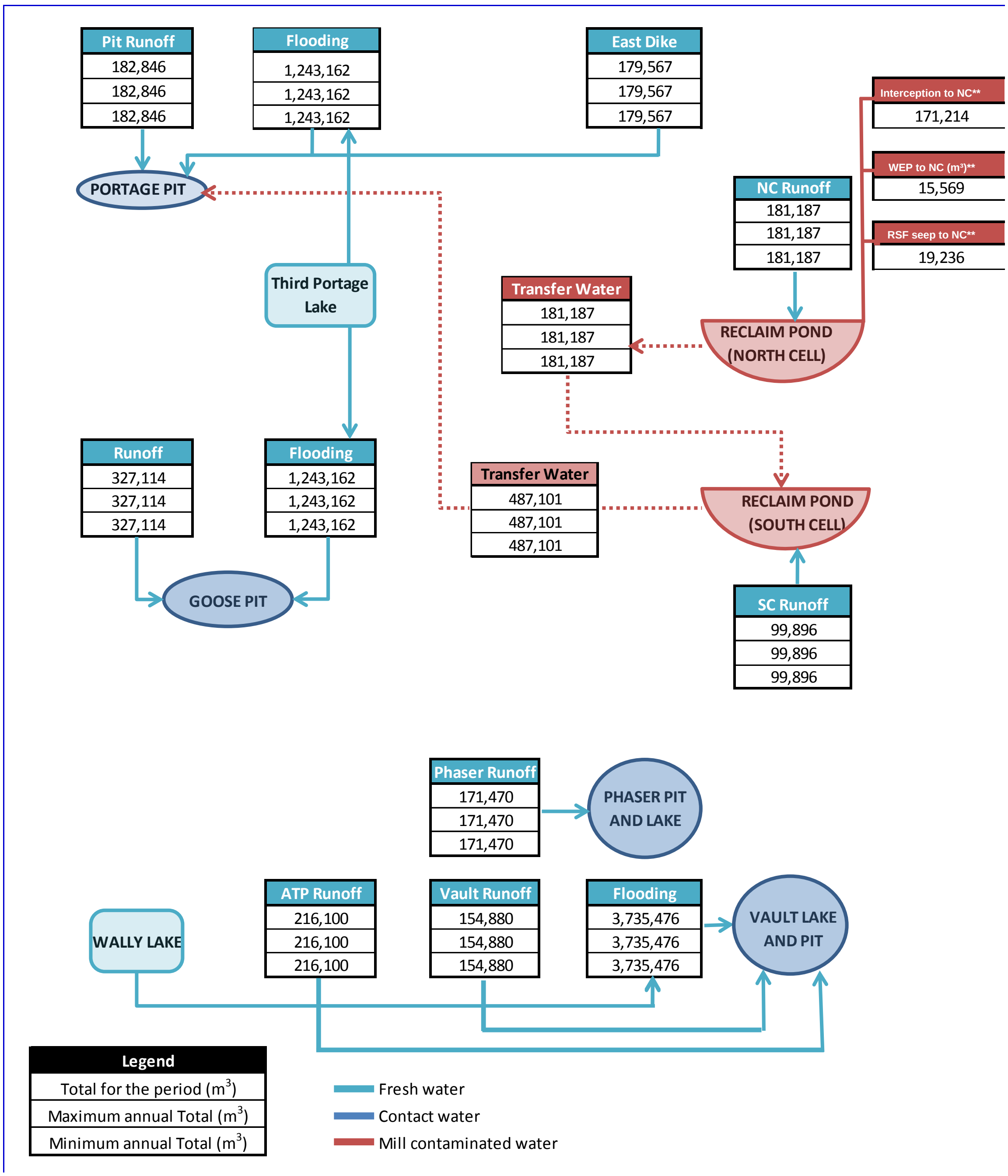


*Small water transfers are not shown on this drawing, refer to water balance tables for detailed water movement.

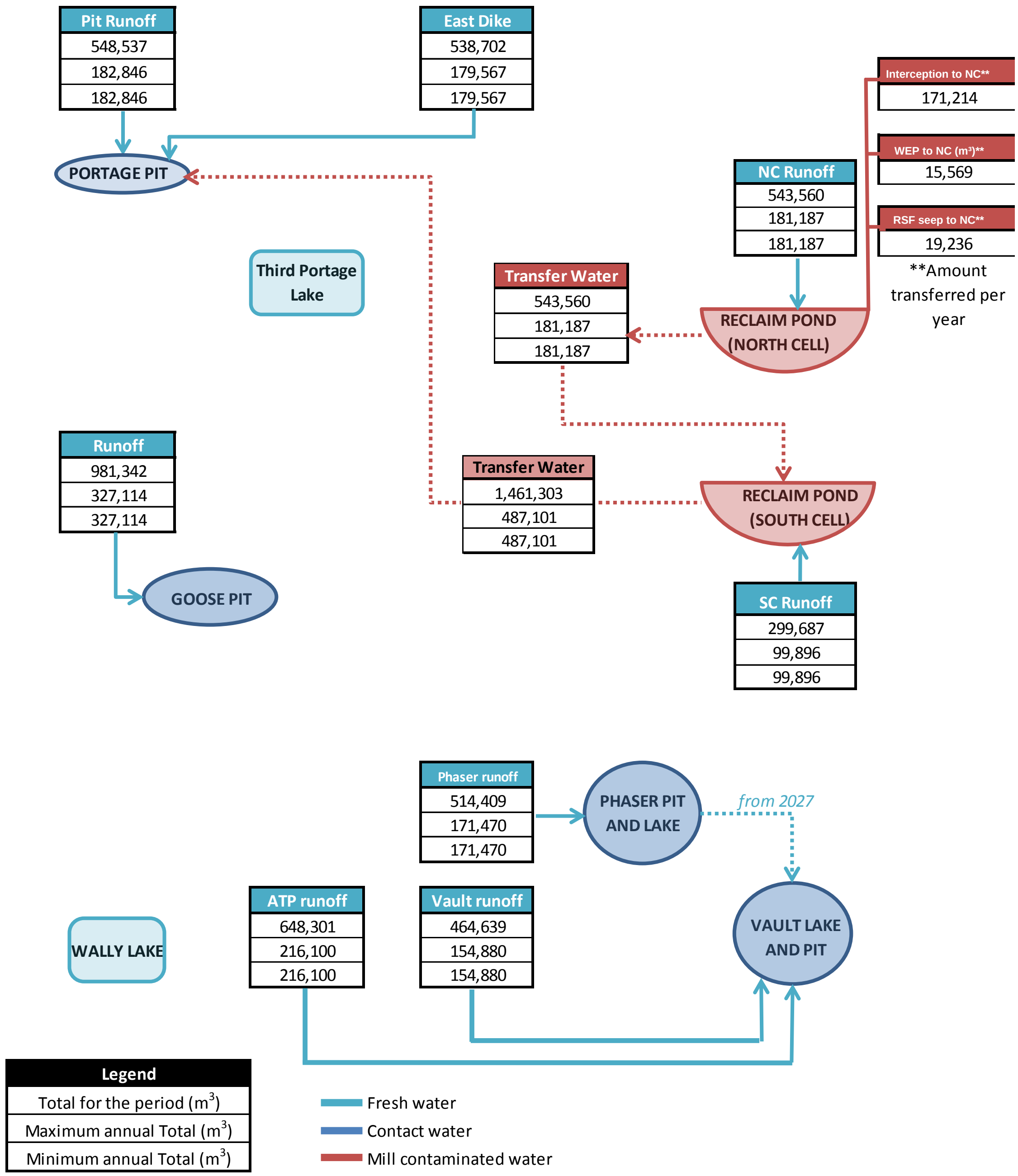
General Water Movement – 2019-2024



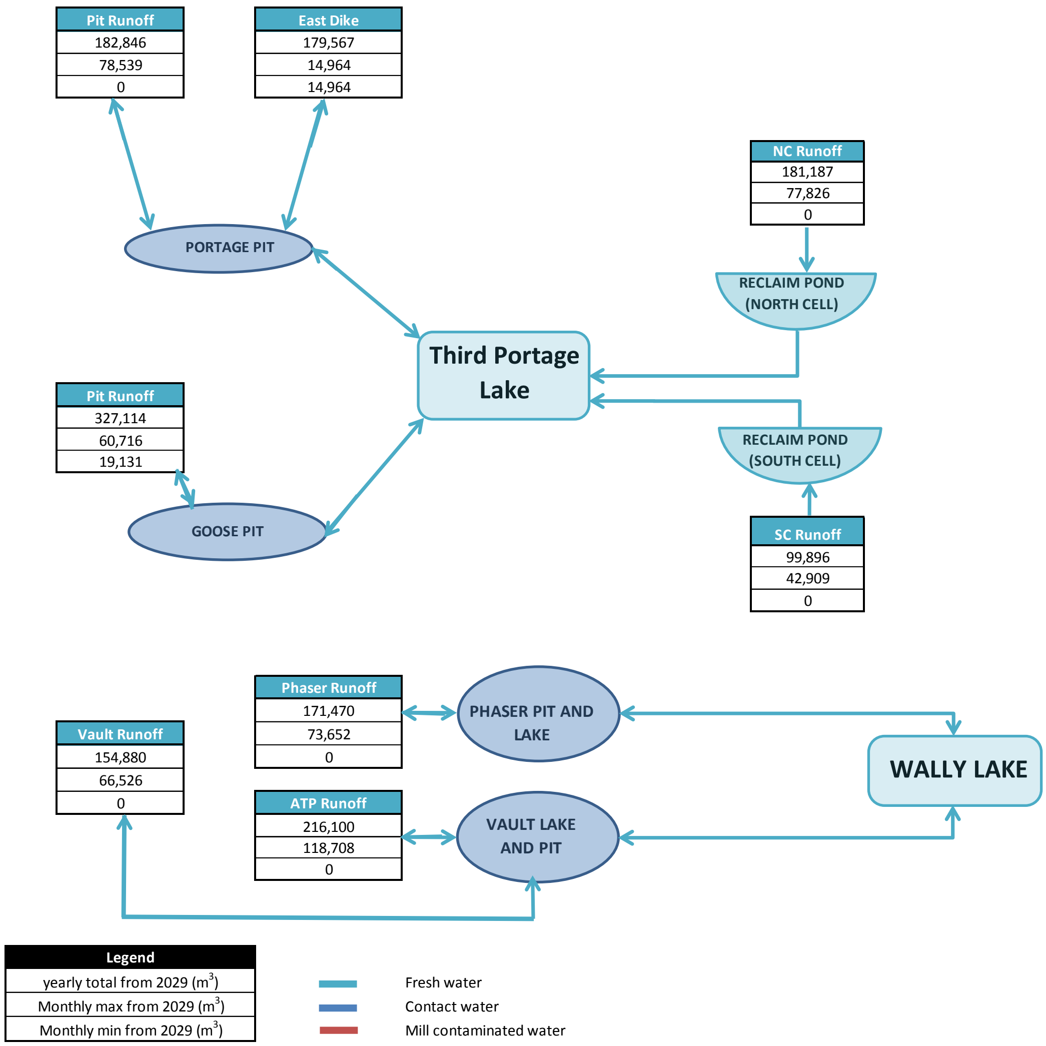
General Water Movement – 2025



General Water Movement – 2026-2028



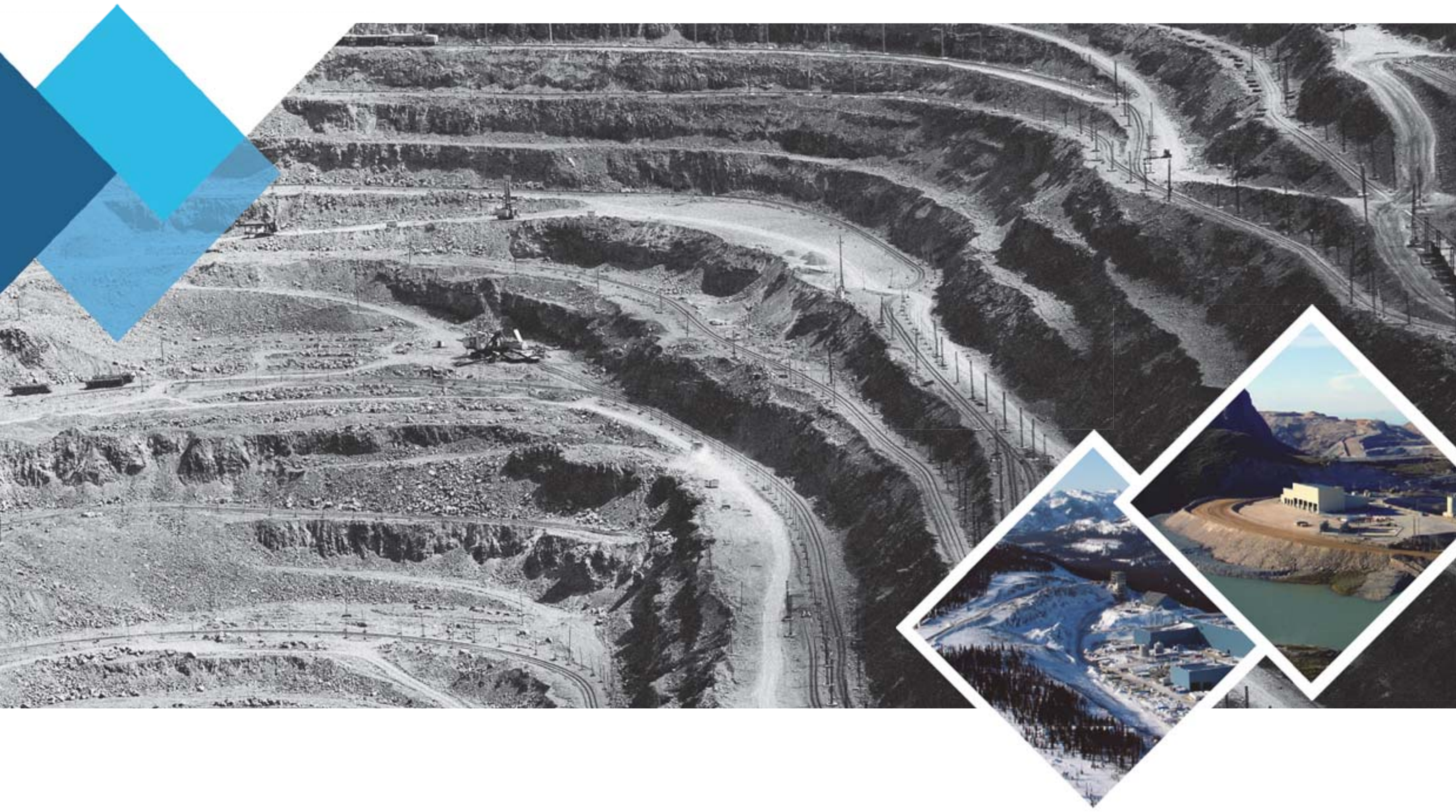
General Water Movement – 2029



APPENDIX C – 2016 MEADOWBANK WATER QUALITY FORECASTING UPDATE

Meadowbank Water Quality Forecasting Update for the 2016 Water Management Plan

Agnico-Eagle Mines, Meadowbank Mine



Mining & Metallurgy

03 | 28 | 2017

Report > Rev. 0
Internal ref. 644523-0000-40ER-0001

Title of document: **Meadowbank Water Quality Forecasting Update for the 2016 Water Management Plan**

Client: **AGNICO EAGLE**

Project: **Meadowbank Gold Project**

Prepared by: Anh-Long Nguyen, Eng., M.Sc.

Reviewed by: Eliane Fried, Eng. M.A.Sc.

REVISION INDEX

Revision				Pages Revised	Remarks
#	Prep.	App.	Date		
PA	ALN	EF	Feb 10, 2017		For internal review
PB	ALN	EF	Feb. 14, 2017		For Client review
00	ALN	EF	Mar. 28, 2017		For Information

NOTICE TO READER

TABLE OF CONTENTS

List of figures

List of tables

List of Appendix

1.0 Introduction

1.1 Mandate

SNC-Lavalin (SLI) was mandated by Agnico Eagle (Agnico) to review and update the water quality forecasting model developed in 2012, and updated yearly using the Water Balance reported in the appendix A of the 2016 Water Management Report and Plan (WMP 2016) to be submitted in March 2017 by Agnico.

1.2 Study Objectives and Content

This Technical Note presents the water quality forecast model updated for the Meadowbank Gold Project, based on the Water Balance 2016 (WB 2016) of Agnico. The WB 2016 was developed according to the updated Life of Mine (LOM) (version BUDV00 2016) and the mine development sequence provided by Agnico and summarized in Table 1-1. The updated water quality forecast model applies to the North and South Cell Tailings Storage Facility (TSF) Reclaim Ponds, and the Portage and Goose Pits.

The objective of this Technical Note is to forecast the concentration of the selected parameters of concern within the North and South Cell TSF Reclaim Ponds, and the Portage and Goose Pits from 2016 until closure, verify last year's assumptions and results, update the model if necessary, develop recommendations and determine whether water treatment could be required.

For the Vault pit, no treatment is expected when re-flooding the pit. This is largely due to the fact that there is no tailings disposal facility at the Vault site. The Vault Attenuation Pond only receives mine pit and freshet water. This will be confirmed through regular monitoring required by the Type A Water License from 2014 to 2018. The first modelling of the Vault area was realized in 2016 based on the 2014 and 2015 data. For this year's report, the measurements taken in 2016 for this monitoring campaign were analyzed and are presented in section 5.0.

1.3 Water Balance

The WB 2016 was developed by Agnico. Agnico examined the water transfers required for the water management infrastructure during the active life of mine, pit re-flooding activities and post closure, all under average hydrologic conditions.

The WB 2016 was based on the revised mining schedule presented in Table 1-1 below for Meadowbank and Vault areas.

Table 1-1: Water Management Phases (based on BUDV00 2016)

ACTIVITY	UPDATED START DATE[1]	UPDATED END DATE[1]	WMP 2012 START DATE	WMP 2012 END DATE
Pits Mining				
Portage Pit	January 2010	June 2018	January 2010	December 2016
North (Pit A)	January 2010	June 2018	January 2010	December 2015
Central (Pit B, C D)	January 2010	April 2013	January 2010	December 2013
South (Pit E)	January 2010	December 2017	January 2010	December 2016
Goose Pit	April 2012	May 2015	April 2012	June 2015
Vault Pit	January 2014	September 2018	January 2014	February 2018
Phaser Pit	July 2015	September 2018	-	-
Tailings Storage Facility Operations				
North Cell	January 2010	October 2015	January 2010	March 2015
South Cell	November 2014	September 2018	April 2015	February 2018
Rock Storage Facility (RSF) Operations				
Portage RSF	January 2009	June 2018	January 2009	December 2016
Vault RSF	January 2014	September 2018	January 2014	February 2018
Attenuation / Reclaim Pond Water Management				
Attenuation Pond (South Cell)[2]	January 2009	November 2014	January 2009	March 2015
Attenuation Pond Vault Lake	January 2014	September 2018	January 2014	February 2018
Other Key Activities				
Mill Operations	January 2010	September 2018	January 2010	February 2018
Dewatering of Vault Lake	June 2013	July 2014	September 2013	November 2013
Dewatering of Phaser Lake	July 2016	October 2016	September 2016	October 2016
Flooding of Portage Pit[3]	July 2017	July 2025	March 2017	September 2023
Flooding of Goose Pit[3]	June 2020	July 2025	July 2015	September 2023
Flooding of Vault Pit[3]	October 2018	September 2025	March 2018	October 2023
Flooding of Phaser Pit[3, 4]	-	-	-	-
Breaching of dikes	n/a	2029 only if water criteria are met	n/a	n/a

Notes: [1] Periods are given from the beginning of the starting month to the end of the ending month. [2] After October 2014, the Reclaim Pond is relocated to the South Cell TSF. After this date, there is no Attenuation Pond. [3] Artificial flooding only with a combination of pumps and siphons, natural run off inflow as part of re-flooding not accounted in this table. [4] Phaser pit and lake are expected to be flooded solely on a passive method (run offs) due to the small flooding volume required to re-establish initial elevation combined with its big watershed.

2.0 Review of Water Balance and Water Quality Data for 2016

2.1 Documents Reviewed

A review of the available water balance and water quality data measured in 2016 was undertaken by SLI and compiled with previous data measured since 2012. This included a review of the following documents:

> Water balance model 2016 (WB 2016) based on the life of mine BUDV00 2016.

> Water quality chemical analysis results for the Portage Area for 2016. The chemical analysis results of interest for this Technical Note are presented in Appendix A and were integrated in the data previously obtained, specifically:

- North Cell TSF Reclaim Pond (ST-21) from January 2013 to October 2016;
- South Cell TSF Reclaim Pond (ST-21) (former South Cell TSF Attenuation Pond ST-18) from June 2013 to December 2016;
- Mill effluent metal and cyanide concentrations from January 2013 to December 2016;
- Four grab samples of Mill Effluent taken in 2016;
- Portage North Pit (ST-17, Pit A) and Portage South Pit (ST-19, Pit E) from January 2013 to November 2016;
- Goose Pit (samples taken in the sump pit and in the lake, ST-20) from January 2013 to October 2016;
- Central Dike seepages collected in the downstream collection pond (ST-S-5) sampled in 2016;
- East Dike (ST-8) seepage and Saddle Dam 3 (ST-32) sump sampled in 2016;
- Saddle Dam 1 downstream sump (ST-S-2) and Portage Rock Storage Facility seepage (RSF) (ST-16) sampled from 2015 to 2016;
- Tailing shake flask extraction tests results conducted in 2016 on the tailings.

> Water quality chemical analysis results for the Vault Area for 2016, specifically:

- Vault Pit sump (ST-23) from October 2013 to November 2016;
- Vault Attenuation Pond (ST-25) from July 2014 to October 2016;
- Discharge to Wally Lake (ST-10) from June 2013 to October 2016.

It is important to remember that the review of the Meadowbank water quality data was undertaken to gain a better understanding of the water quality in the Portage Area, particularly as it affects the TSF Reclaim Ponds, and to provide a basis for the development and update of the mass balance. Analysis of the Vault water quality data was undertaken to gain a better understanding of the water quality and update of the mass balance in this area.

2.2 Updates to the Water Balance

In the Water Balance 2012 (WB 2012), South Cell TSF Reclaim Water was to be transferred to the pits in 2018 when there was approximately 6 Mm^3 of non-contact water already accumulated in the pits.

In the WB 2013, the South Cell TSF Reclaim water was to be transferred to the pits beginning in 2015 when there would be very little water in the pits. Runoff water will then be allowed to flow into the pit and mix with the South Cell Reclaim Water.

In the WB 2014, based on the volume of Reclaim Water anticipated in the North Cell TSF and South Cell TSF Ponds, South Cell Reclaim Water was to be transferred to Portage pit starting August 2017. Based on the updated water balance model, no Reclaim Water was to be transferred to Goose Pit. Furthermore, the percentage of tailings water/ice entrapment was also updated in the 2014 WMP to better reflect what was currently observed on site.

In WB 2015, based on the volume of Reclaim Water anticipated in the North Cell TSF and South Cell TSF Ponds, South Cell Reclaim Water will be transferred to Portage pit starting September 2018. The transfer was postponed one year due to a longer life of mine. Based on the updated water balance model, no Reclaim Water will be transferred to Goose Pit other than 50,431 m^3 transferred from the Central Dike Downstream Pond in September 2015, which was similar to the South Cell Reclaim Pond water quality.

In the updated WB 2016, the tailings deposition and water transfer schedule is similar to the WB 2015. Water in sumps from Saddle Dam 3-4-5 was added as a new input to the South Cell TSF reclaim pond for the year 2016. Furthermore, the transfer of seepages and runoff water from the North Cell interception sump, Rock Storage Facility (RSF) and Saddle Dam 1 to the North Cell TSF continued past 2018 until closure. Portage and Goose Pit filling rate were also adjusted.

Moreover, a different percentage of tailings water/ice entrapment for North and South Cell TSF was used in the WB 2016 in order to better characterize the difference of ice entrapment cover between the two, partly due to the continuing water inflow from the mill effluent in the South Cell TSF.

It is important to note that the Mill Effluent is currently being discharged to the South Cell TSF and has been since November 2014 (with the exception of discharge in the North cell in summer 2015, from July to October). It was discharged previously in the North Cell TSF. The South Cell TSF Reclaim Pond thus collected water from the Mill Effluent and additional runoff water from surrounding areas until July 2015. The Mill Effluent was then sent to the North Cell TSF from July to October 2015 to complete tailings deposition for that cell. From October 2015 until September 2018, the mill effluent will be discharged only in the South Cell TSF.

2.3 North and South Cell TSF Reclaim Ponds (ST-21)

2.3.1 Measured vs Forecasted Concentrations

A review of the chemical analysis for water samples collected in the North Cell (now transferred to the South Cell) and South Cell TSF Reclaim Ponds (station ST-21) was undertaken by SLI in order to identify contaminants that were above discharge criteria as stipulated in the MMER, CCME and the Water License, Part F. It is understood that the MMER, CCME and Water License criteria apply to mining effluents discharged to the environment and are as such not applicable to the TSF Reclaim Ponds since no effluent is discharged from this area to the environment. However, the MMER, CCME and Water License criteria are used as a guide to identify potential parameters that may become a problem should they be discharged to the pit as part of reflooding and then the environment without treatment.

It should be noted that the parameters of concern were only determined based on the chemical analyses provided by Meadowbank and summarized in Appendix A.

The parameters of concern identified in the previous water quality forecasting reports that may represent a potential long term contamination risk are the following:

- Cyanide (total)
- Nitrate
- Copper
- Chloride
- Iron
- Ammonia
- Selenium

Table 2-1 presents the MMER, Water License (Nunavut Water Board License, 2015) and CCME discharge criteria for the parameters of concern identified in 2016 that may represent a potential contamination risk in the Portage Area when filling Portage and Goose Pits after the mining sequence is complete. These criteria are also presented in Figure 2-1, where applicable.

Figure 2-1 presents the concentration of these parameters measured in the North and South Cell TSF Reclaim Ponds from 2013 to 2016. Also shown in this figure are the forecasted concentrations from the 2015 Water Quality Forecasted Model. For the metal parameters, only the dissolved values are shown in Figure 2-1.

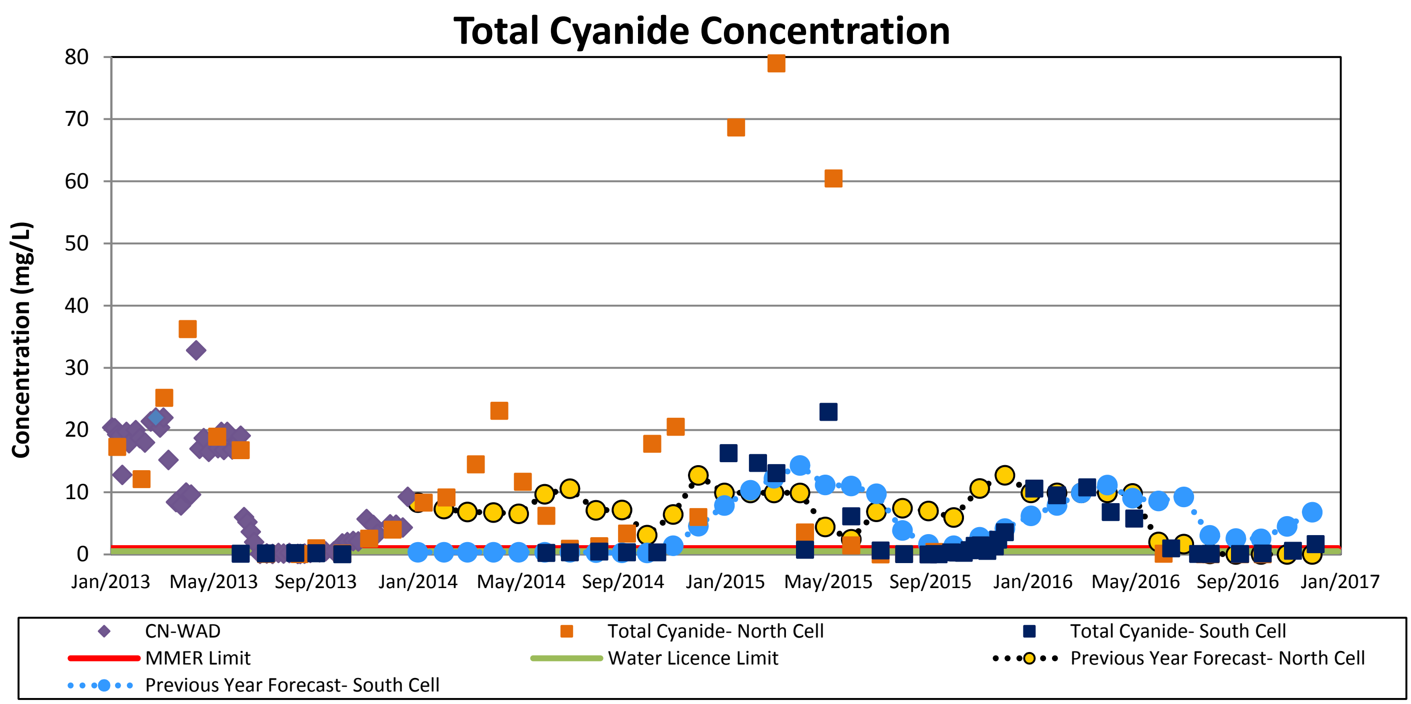
Table 2-1: Discharge Criteria for the Parameters Evaluated

PARAMETER	DISCHARGE CRITERIA		
	MMER (1)	*Water License (2) (Part F)*	*CCME (3) (criteria date)*
Cyanide (CN)	1.00 mg/L (as total CN)	0.5 mg/L (as total CN)	5 µg/L (as free CN) (1987)
Copper (Cu)	0.30 mg/L	0.1 mg/L	2 µg/L(4) (1987)
Iron (Fe)	*no criteria*	*no criteria*	0.3 mg/L (1987)
Total Ammonia (NH_3)	*no criteria*	16 mg N/L	1.83 mg N/L(5) (2001)
Nitrate (NO_3)	*no criteria*	20 mg N/L	2.94 mg N/L(7) (2012)
Chloride (Cl)	*no criteria*	1,000 mg/L	120 mg/L(6) (2011)
Selenium	*no criteria*	*no criteria*	1 µg/L (1987)

Notes:

(1) MMER criteria corresponding to the maximum average monthly concentration
(2) Water License (Part F) criteria for Third Portage Lake corresponding to the maximum average concentration
(3) CCME criteria as per the Water Quality Guidelines for the Protection of Aquatic Life for freshwater and long-term exposure. Criteria referenced from www.ccme.ca in Feb. 2017.
(4) The copper discharge criterion depends on hardness. A Third Portage Lake hardness level is approx. 12 mg/L as $CaCO_3$. For hardness between 0 to 82 mg/L $CaCO_3$, the copper limit is set at 2 µg/L.
(5) The ammonia concentration limit depends on temperature and pH (an increase in temperatures and pH leads to a more stringent ammonia concentration limit). In this case, 2.22 mg/L of NH_3, or 1.83 mg N/L was determined based on an average pH of 7.5 in Third Portage Lake and a maximum measured temperature of approx. 15°C.
(6) This is the long-term chloride concentration limit. The short term concentration limit is 640 mg/L.
(7) This is the long-term nitrate concentration limit (13 mg/L as NO_3). The short term concentration limit is 550 mg/L.

Figure 2-1: Concentration in the North and South Cell TSF Reclaim Ponds



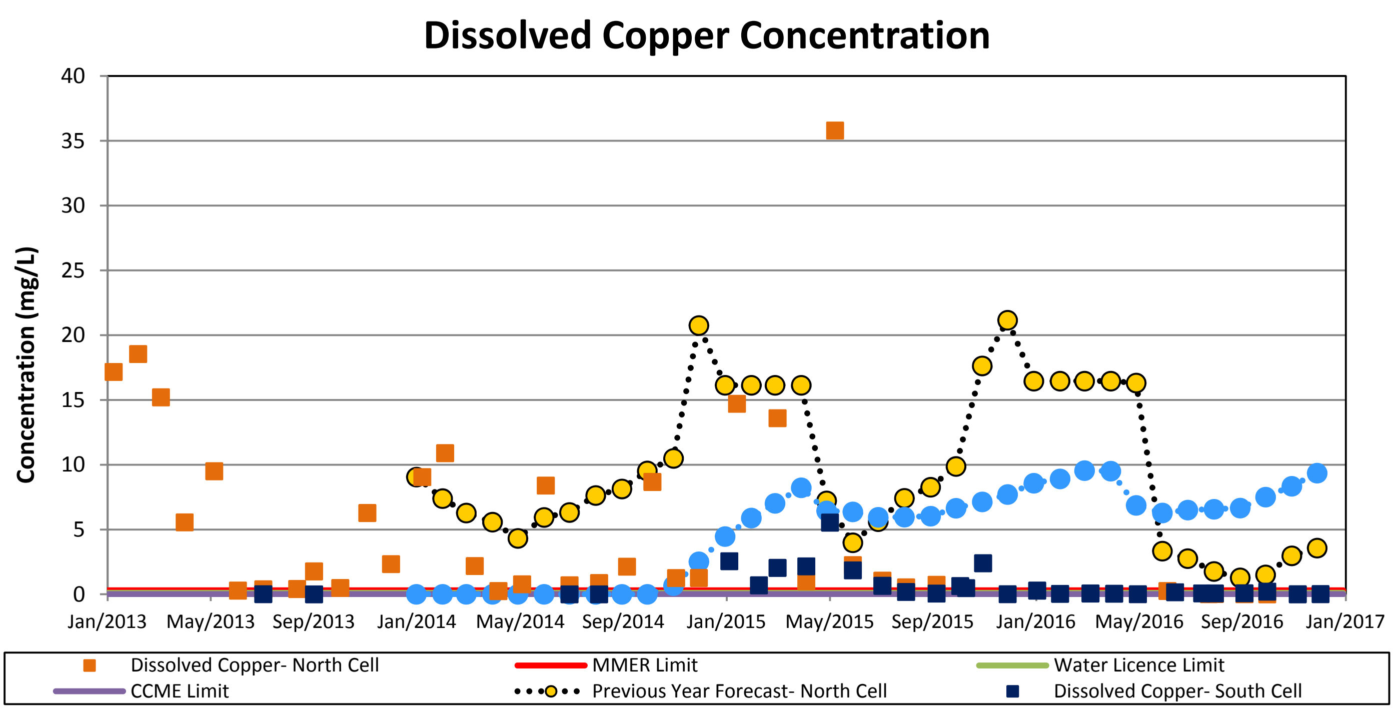
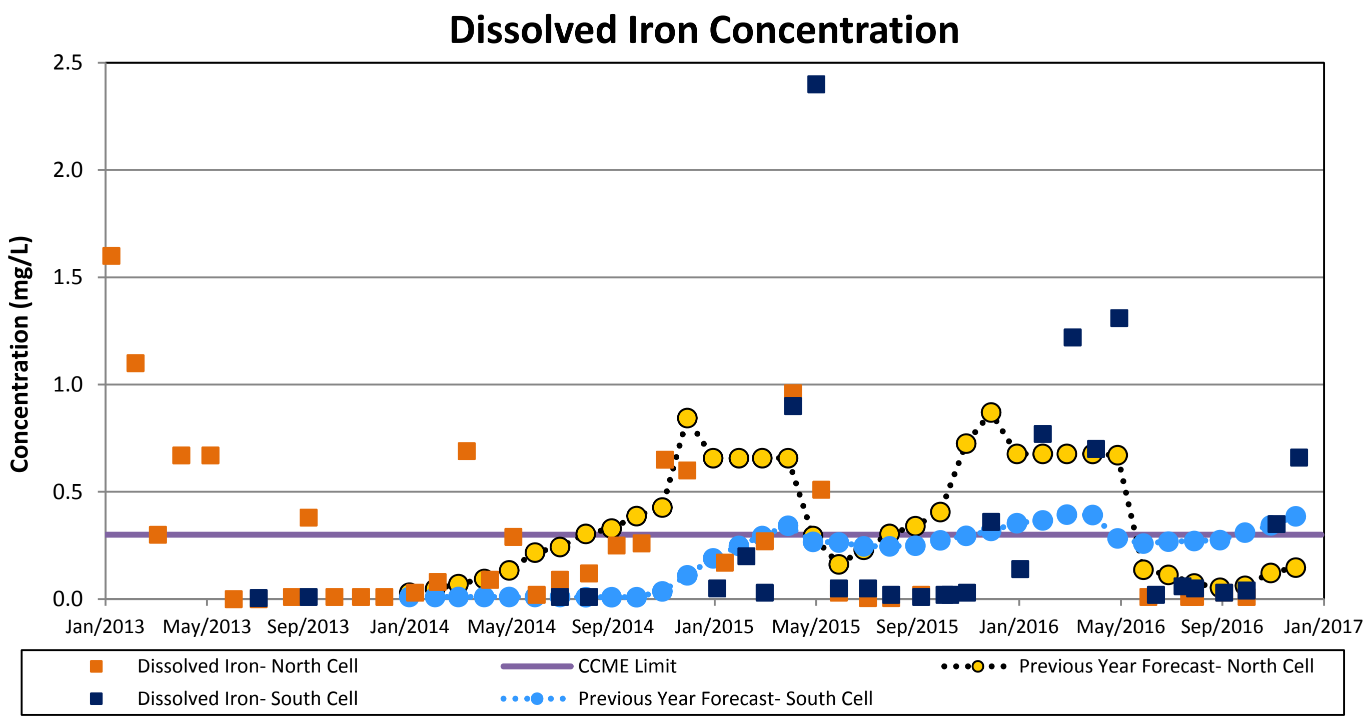


Figure 2 1: (continued) Concentration in the North and South Cell TSF Reclaim Ponds



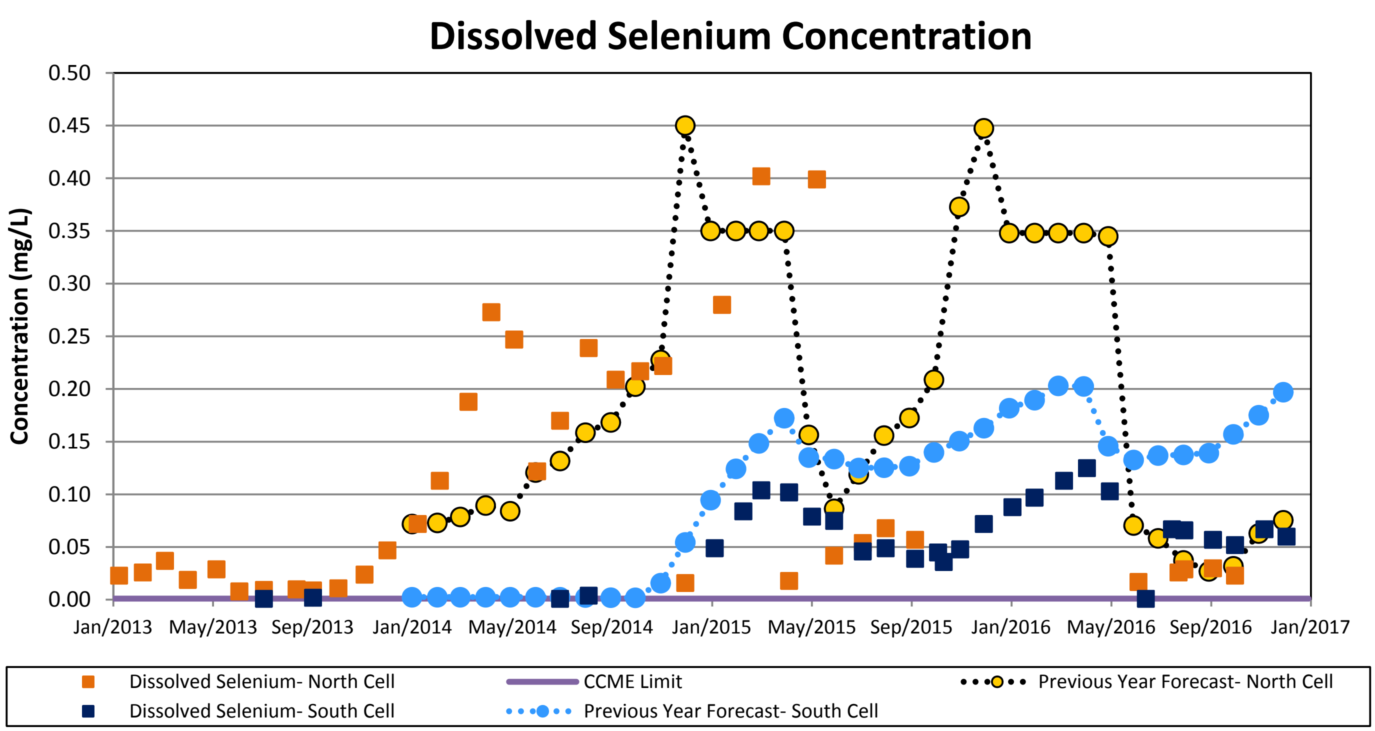
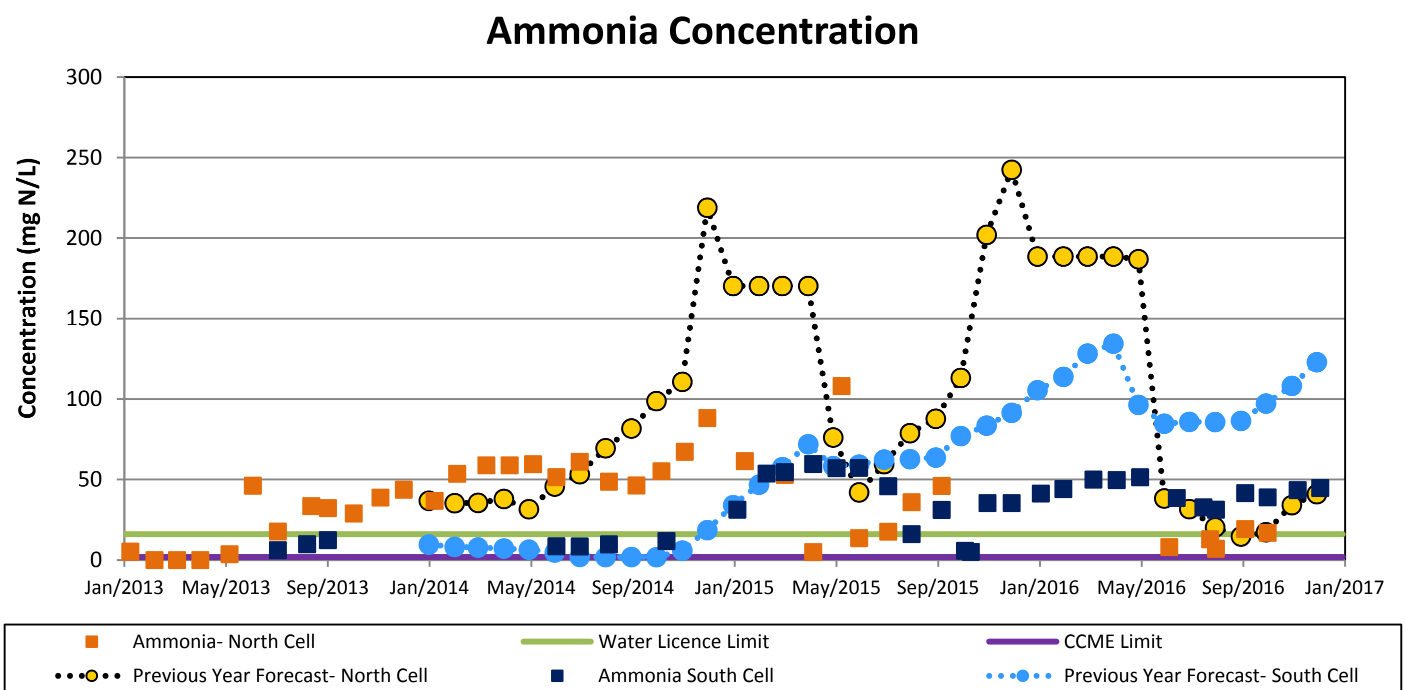


Figure 2 1: (continued) Concentration in the North and South Cell TSF Reclaim Ponds



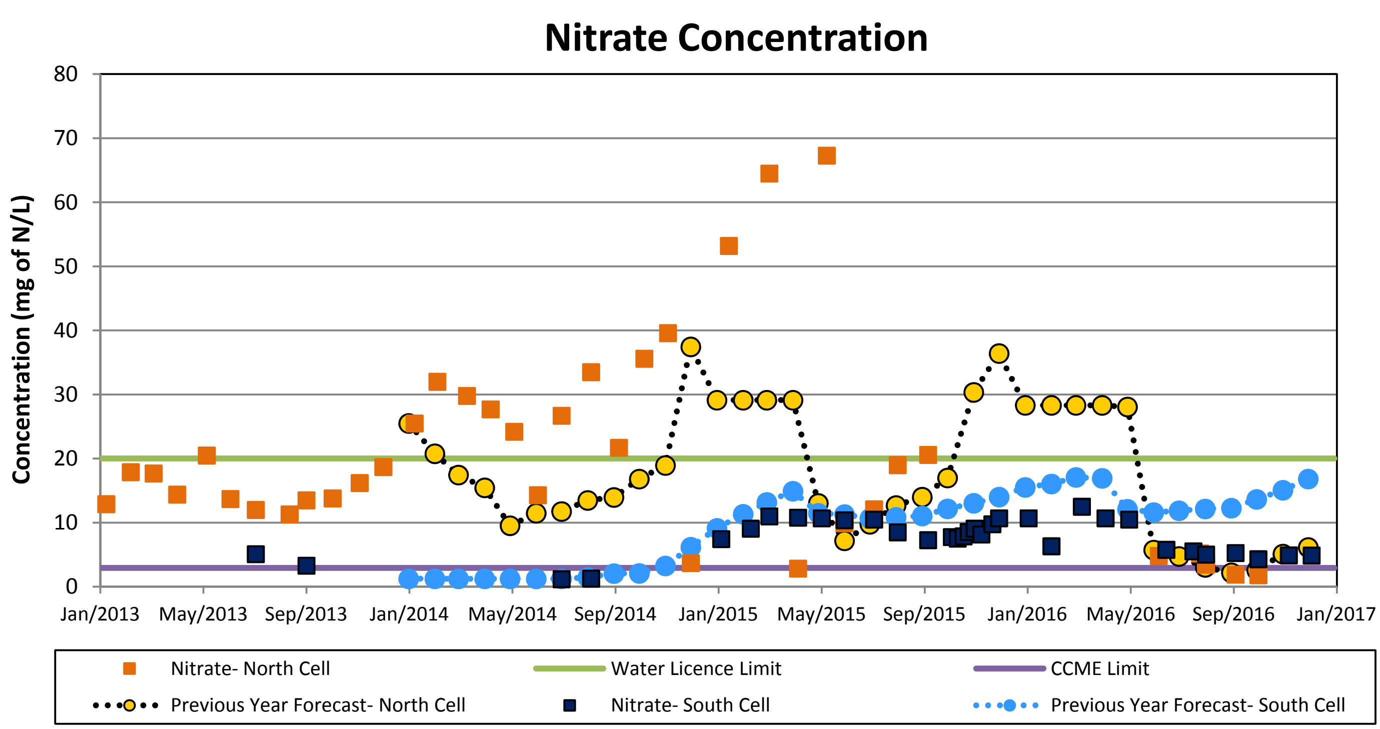
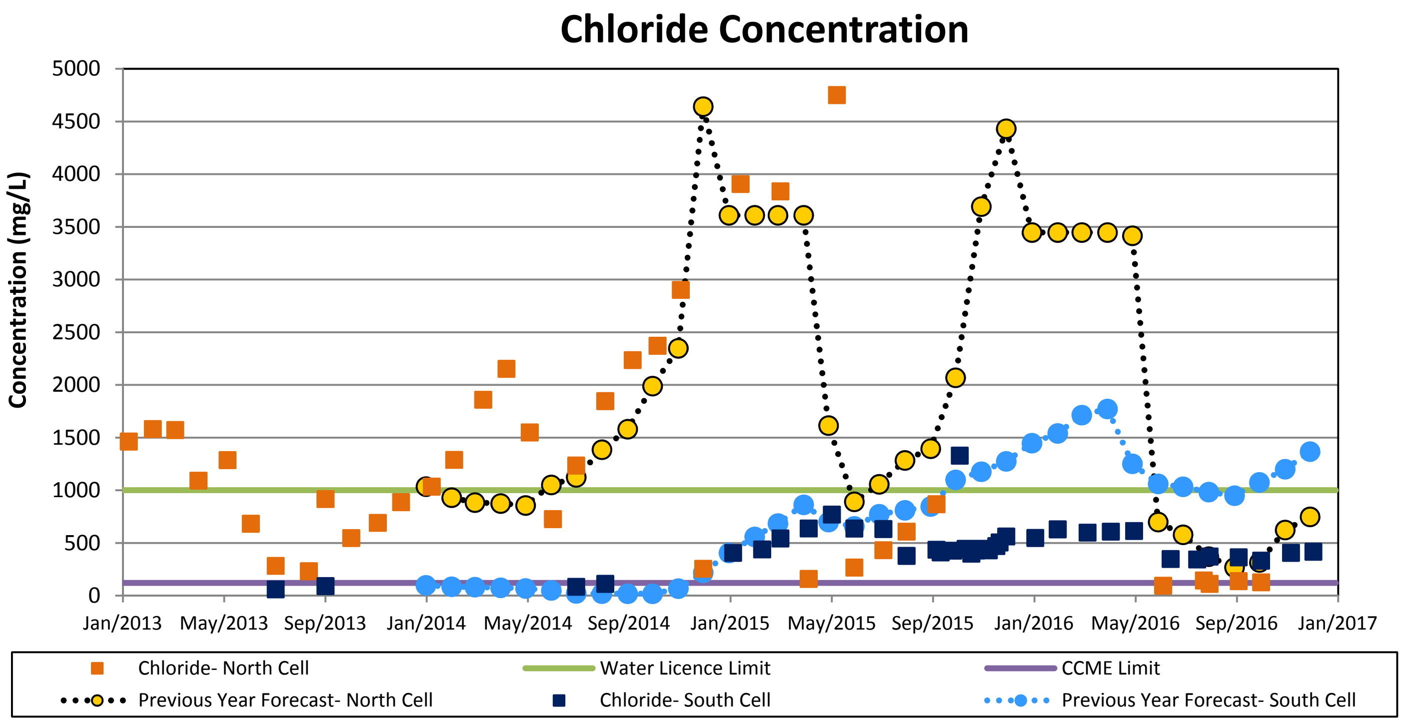


Figure 2 1: (continued) Concentration in the North and South Cell TSF Reclaim Ponds



From the graphs shown in Figure 2-1, the following observations can be made based on the measured concentrations:

i. Total cyanide concentrations in the North Cell TSF Reclaim Pond were very low in 2016 since there is no tailing deposition in this cell. In the South Cell TSF Reclaim Pond, the concentrations were higher during the winter months and decreased significantly during the summer months. The measure data demonstrated that cyanide volatilization does occur efficiently during the summer months.

ii. Dissolved copper concentrations in the North Cell TSF were very low since there is no tailings deposition in this cell. Dissolved copper concentrations measured in the South Cell TSF Reclaim Pond were also very low when comparing to previous years. In 2016, about 82% of the ore processed at Meadowbank came from the Vault Pit. This type of ore has lower iron content compared to the ore from Portage. Consequently, the cyanide destruction system requires less copper sulfate to catalyze the reaction, thus reducing the concentration of dissolved copper in the mill effluent.

iii. Dissolved iron concentrations in the North Cell TSF Reclaim Pond were very low and below the CCME limits in 2016, since there is no tailings deposition in this cell. In the South Cell TSF, the dissolved iron concentrations increased in the winter months and then decreased to values below the CCME limits in the summer months. This trend is most likely attributed to the additional volume of snow melt and runoff water that enters the Reclaim Pond in the spring and summer months.

iv. Dissolved selenium concentrations in the North Cell TSF Reclaim Pond were low in 2016 since no tailing deposition occurred in this cell. For the South Cell TSF Reclaim Pond, the concentration increased steadily over the winter months and then decreased over the summer months, following a similar trend as the iron concentrations.

v. Total ammonia concentrations in the North Cell TSF Reclaim Pond were low in 2016 since no tailing deposition occurred in this cell. In the South Cell TSF Reclaim Pond, total ammonia concentration increased from January to May, decreased during the summer months and started to rise once more in the fall/winter. Ammonia is produced by the hydrolysis of cyanate, which is a by-product of the cyanide destruction system. Therefore, when the cyanide destruction system is operating efficiently, it is expected that the concentration of ammonia will increase in the Reclaim Ponds. The decrease observed in the summer could be attributed to the additional volume of snow melt and runoff water that enters the Reclaim Pond in the spring and summer months and/or natural biological degradation over the summer months.

vi. Nitrate concentrations in the North Cell TSF Reclaim Pond were low in 2016 since no tailing deposition occurred in this cell. For the South Cell TSF Reclaim Pond, the measured concentrations increased from January to May and decreased over the spring and summer months, following a similar trend as total ammonia concentrations.

vii. Chloride concentrations in the North Cell were low since there is no tailing deposition occurring in this cell. In the South Cell TSF Reclaim Pond, the measured concentrations were similar to the values measured in 2015. A decrease in chloride concentrations is noted during the summer months. The primary source of chloride found in the TSF Reclaim Ponds is most likely from the use of calcium chloride in the winter months as an anti-freeze solution on the ore and a dust suppressant in the Mill dome.

The graphs in Figure 2-1 also present the forecasted values from the previous model (based on 2015 WMP) versus the actual measured values. A couple of points to note:

a) Forecasted concentrations of total cyanide in the South Cell TSF Reclaim Pond follow the same trend as the measured values in 2016. The model and measured values confirm that very little natural cyanide degradation occurs during the winter months, but increases significantly in the warmer spring/summer months.

b) Forecasted concentrations for copper, iron and selenium in the South Cell TSF were generally higher than the measured values, aside from some high iron concentrations measured at the beginning and end of 2016. These higher iron concentrations could be attributed to the lower volume available for settling in the Reclaim Pond in the winter months, resulting in higher concentration of colloidal particles remaining in suspension. The current forecasting model is based on a mass balance using the water balance around the site. It does not take into account possible geochemical reactions that could help precipitate out the metals of the water column phase at equilibrium. Furthermore, more ore from Vault was processed in 2016 than in previous years. This ore requires less cyanide to extract the gold and less copper catalyst in the cyanide destructions. For this reason, the forecasted concentrations for these metals will be in general more conservative than the measured values.

c) Forecasted concentrations for total ammonia in the South Cell TSF were more conservative than the measured value. The model takes into consideration an ammonia load coming from the hydrolysis of cyanate (CNO-), the by-product of the cyanide destruct process. The ammonia loading considered in the model is based on the loading produced when ore from Portage Pit were processed at the mill. In 2016, more ore from Vault Pit was processed at the mill. As mentioned previously, the ore from Vault requires less cyanide to extract the gold, resulting in the production of less cyanate following the cyanide destruct system and consequently less ammonia.

d) Forecasted nitrate concentrations in the South Cell showed a gradual increase over the winter and a drop in the summer months. The measured values followed a similar trend, but were lower than the forecasted values, especially during the summer months.

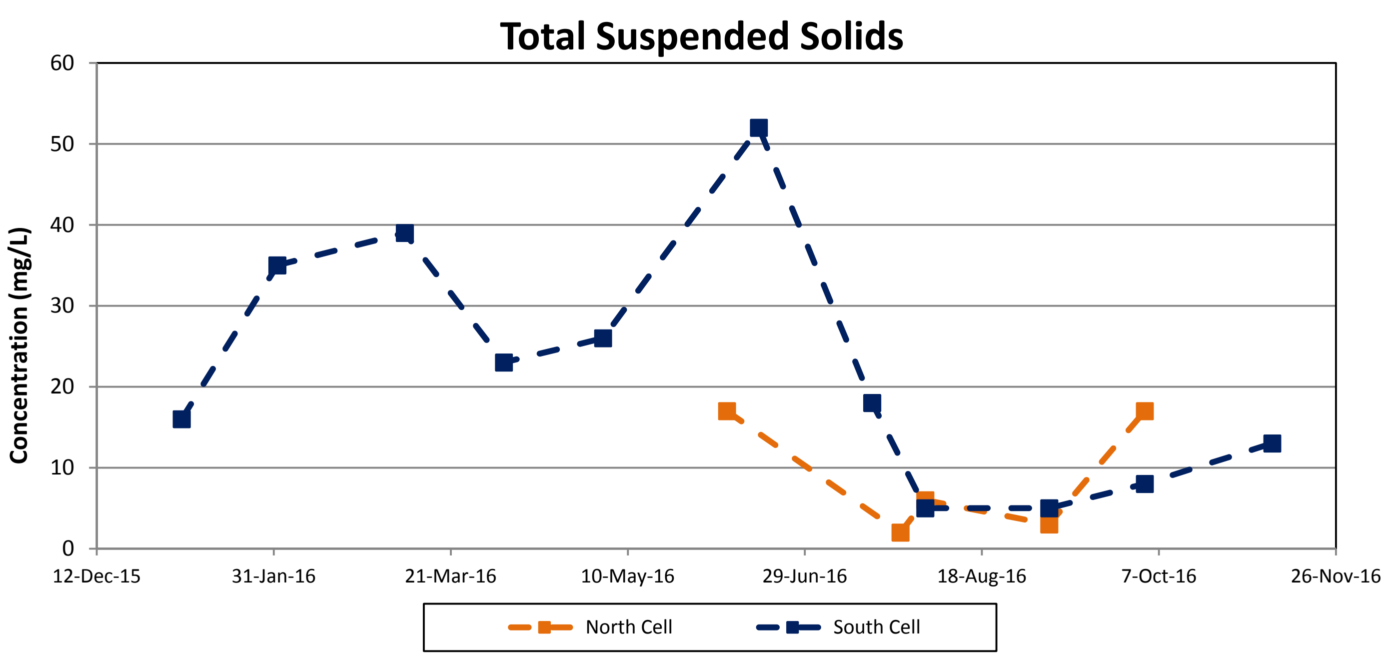
e) Forecasted chloride concentration in the South Cell TSF was expected to rise rapidly in 2015 and 2016. The measured values followed a similar trend, but the concentrations were about half of the forecasted values. The lower measured values can be attributed to a lower consumption of calcium chloride on site.

In general, for the parameters of concern identified in the previous model, the measured values in 2016 are lower than the forecasted valued from the 2015 model.

2.3.2 Total Suspended Solids in the Reclaim Pond

Figure 2-2 presents the Total Suspended Solids (TSS) measured in the North and South Cell TSF Reclaim Pond in 2016. The TSS measured in the North Cell during the summer months are low. For the South Cell, high TSS was measured from January to mid-June and then it decreased over the summer months.

Figure 2-2: TSS Measurement in the North and South Cell TSF Reclaim Ponds



The variation in TSS observed in the South Cell can be attributed to the volume of free water available in the winter months and summer months and also to the fact that active tailings deposition is occurring in the cell. In the winter months, the available volume is significantly reduced due to the formation of ice in the pond. This effectively reduces the settling time available to efficiently settle out any residual tailing particles. Consequently, the settling efficiency is reduced in the winter months compared to the summer months.

During operations, higher TSS value in the Reclaim Water will only impact, if it does, the process plant.

At closure, when Reclaim Water will be transferred to Portage Pit, it will be important to transfer water with little to low TSS concentrations. Based on Figure 2-2, the preferred time to transfer the Reclaim Water to Portage Pit will be between July and September. Every effort should be made to limit the transfer of tailings and sediments from the TSF to the pits. This is particularly true once the water level in the cell reaches the tailings surface. TSS target for transfer will be developed prior to transfer of water during closure. TSS level in transferred reclaim water will also be measured.

2.3.3 Total versus Dissolved Metals

The previous water quality forecast models were developed based only on dissolved metal concentrations. It was assumed that any metals associated with the suspended fractions will settle and will not be mobilized during the transfer of Reclaim Water to Portage Pit and at the breaching of the dikes.

In order to gain a better appreciation of the difference between total versus dissolved metal concentration measurements, the measured concentrations for copper and iron sampled in 2016 were compared. Table 2-2 and Figure 2-3 presents the total and dissolved concentrations measured for copper and iron in the South Cell TSF Reclaim Pond. Total suspended solids (TSS) concentrations are also shown for reference.

For copper, samples taken in North and South Cell TSF in the summer months indicate that it is present mostly in dissolved form. In the winter months, there is a higher fraction of the copper present as a particulate. As mentioned in section 2.3.2, the higher particulate copper observed in the samples taken in winter may be a result of the poorer settling efficiency in the Reclaim Pond during that period.

With regard to iron, in the North Cell, the iron is present mostly as suspended solids. In the South Cell, the fraction of iron present as a suspended solid is variable over the year.

For both parameters, the difference between total and dissolved concentrations is at its lowest during the summer months. At the end of tailings deposition, Reclaim Water will be transferred to the pit during the summer months. As mentioned in section 2.3.2, every effort should be made to limit the transfer of tailings and sediments from the TSF to the pit, thus minimizing the transport of metallic particles to the pit.

Furthermore, the use of dissolved metal concentrations in the water quality forecasting model remains an acceptable approach to estimate the forecasted results in the Reclaim Pond and Portage Pit. By doing so, it helps identify parameters of concern that could be in solution in the Reclaim Pond at the end of tailings deposition and therefore would require additional treatment to precipitate them out of solution. However, as per the review of the 2015 annual report, total metal concentrations will also be considered in the water quality forecast model in order to gain an appreciation of the impact of metallic particles on the final water quality in the pits.

Table 2-2: Total and Dissolved Concentrations Measurements in North and South Cell TSF

		Copper			Iron		
Date	TSS	Total	Dissolved	% Dissolved / Total	Total	Dissolved	% Dissolved / Total
	mg/L	mg/L	mg/L		mg/L	mg/L	
South Cell TSF Reclaim Pond							
5-Jan-16	16	0.610	0.291	*48%*	0.440	0.140	*32%*
1-Feb-16	35	0.508	0.041	*8%*	0.890	0.770	*87%*
8-Mar-16	39	1.882	0.072	*4%*	2.670	1.220	*46%*
5-Apr-16	23	1.501	0.053	*4%*	2.640	0.700	*27%*
3-May-16	26	0.082	0.013	*16%*	1.460	1.310	*90%*
16-Jun-16	52	0.223	0.165	*74%*	0.600	0.020	*3%*
18-Jul-16	18	0.086	0.079	*92%*	0.790	0.060	*8%*
2-Aug-16	5	0.069	0.075	*108%*	0.160	0.050	*31%*
6-Sep-16	5	0.109	0.089	*81%*	0.170	0.030	*18%*
3-Oct-16	8	0.263	0.216	*82%*	0.440	0.040	*9%*
8-Nov-16	13	0.023	0.011	*47%*	0.890	0.350	*39%*
5-Dec-16	8	0.206	0.019	*9%*	1.010	0.660	*65%*
North Cell TSF Reclaim Pond							
7-Jun-16	17	0.355	0.262	*74%*	0.880	0.010	*1%*
26-Jul-16	2	0.033	0.024	*73%*	0.300	0.010	*3%*
2-Aug-16	6	0.047	0.030	*64%*	0.220	0.010	*5%*
6-Sep-16	3	0.014	0.014	*97%*	0.200	0.030	*15%*
3-Oct-16	17	0.016	0.012	*76%*	0.980	0.010	*1%*

2.3.4 Depth Sampling in the South Cell TSF Reclaim Pond

In the summer of 2016, Reclaim Water was sampled at three different locations in the South Cell TSF Reclaim Pond, as shown on Figure 2-4. At each location, samples were taken near the surface of the pond (at 2 m depth) and below the surface (at 5 to 6 m depth and 11 m depth). The objective of this sampling campaign was to evaluate if there were any spatial differences in the South Cell TSF Reclaim Pond.

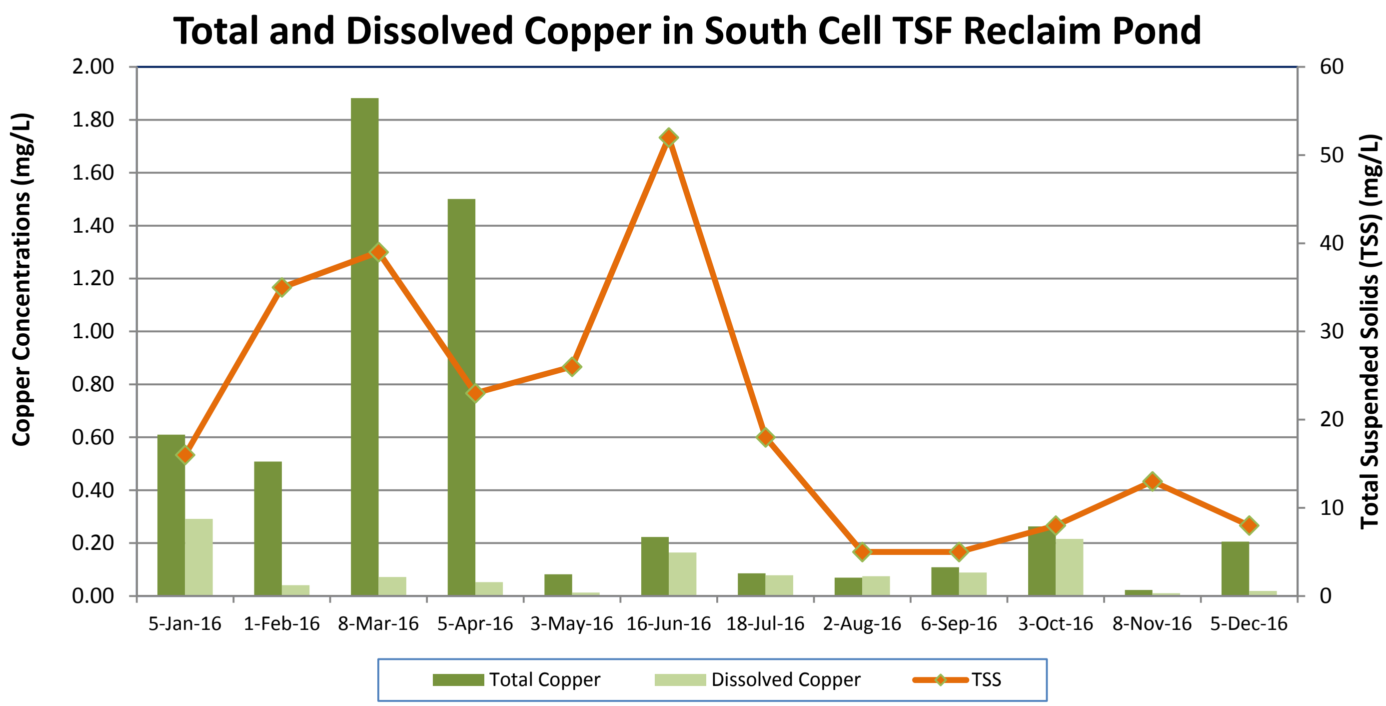
Table 2-3 compares the different measurements for key parameters of concern sampled at each location, while Figure 2-5 presents the comparison graphically.

As show in Figure 2-5, there is a negligible difference in concentrations between the samples taken at different locations and depths for a given parameter. Most of the data, except for iron and selenium, demonstrate that there is a negligible spatial difference in the water quality (i.e. relative deviation < 10%) within the South Cell TSF Reclaim Pond. Total iron shows some spatial variability in the Reclaim Pond. With regard to dissolved iron concentrations, though the relative deviation is higher than 10%, only one sample has a measurement lower than the other values. With regard to selenium, two samples has dissolved measurements that were close to, but higher than, the total concentration measurements, indicating a possible analytical error.

Table 2-3: Measurements from Depth Sampling Program in the South cell TSF Reclaim Pond

Parameter	Surface sample (at a 2m depth) (mg/L)		Middle-depth sample (at a 5 to 6m depth) (mg/L)			Deep sample (at a 11 m depth) (mg/L)	Average (mg/L)	Relative Deviation (%)
	Station A	Station B	Station A	Station B	Station C	Station C		
Total Cyanide (CN)	0.105	0.105	0.101	0.105	0.107	0.128	0.109	9%
Copper (Cu)	0.0801	0.0817	0.0821	0.0818	0.0778	0.0733	0.079	4%
Dissolved Copper	0.0783	0.0679	0.0701	0.067	0.0721	0.0668	0.070	6%
Iron (Fe)	0.13	0.13	0.16	0.16	0.18	0.24	0.167	24%
Dissolved Iron	0.02	0.01	0.02	0.02	0.02	0.02	0.018	22%
Ammonia-Nitrogen (mg N/L)	32.9	32.1	32.4	32.8	32.3	32.9	33	1%
Chloride (Cl)	356	361	356	359	363	365	360	1%
Selenium (Se)	0.055	0.055	0.048	0.056	0.049	0.054	0.053	6%
Dissolved Selenium	0.047	0.063	0.038	0.052	0.053	0.052	0.051	16%
Sulfates (SO_4)	2057	2014	2119	2165	2049	2113	2086	3%
TDS	2818	2822	2822	2822	2822	2838	2824	0%

Figure 2-3: Total and Dissolved Concentrations Measured in South Cell TSF Reclaim Pond



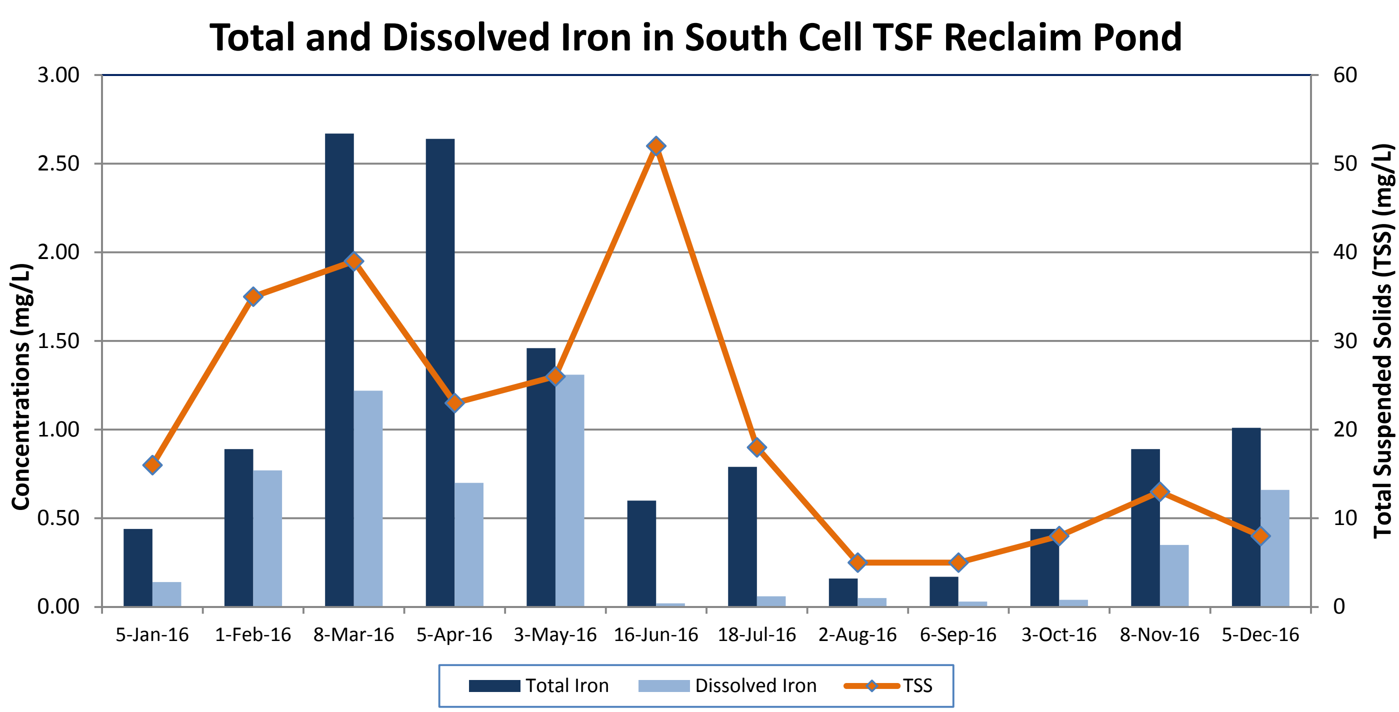


Figure 2-4: Approximate Locations of Samples taken in South Cell TSF Reclaim Pond

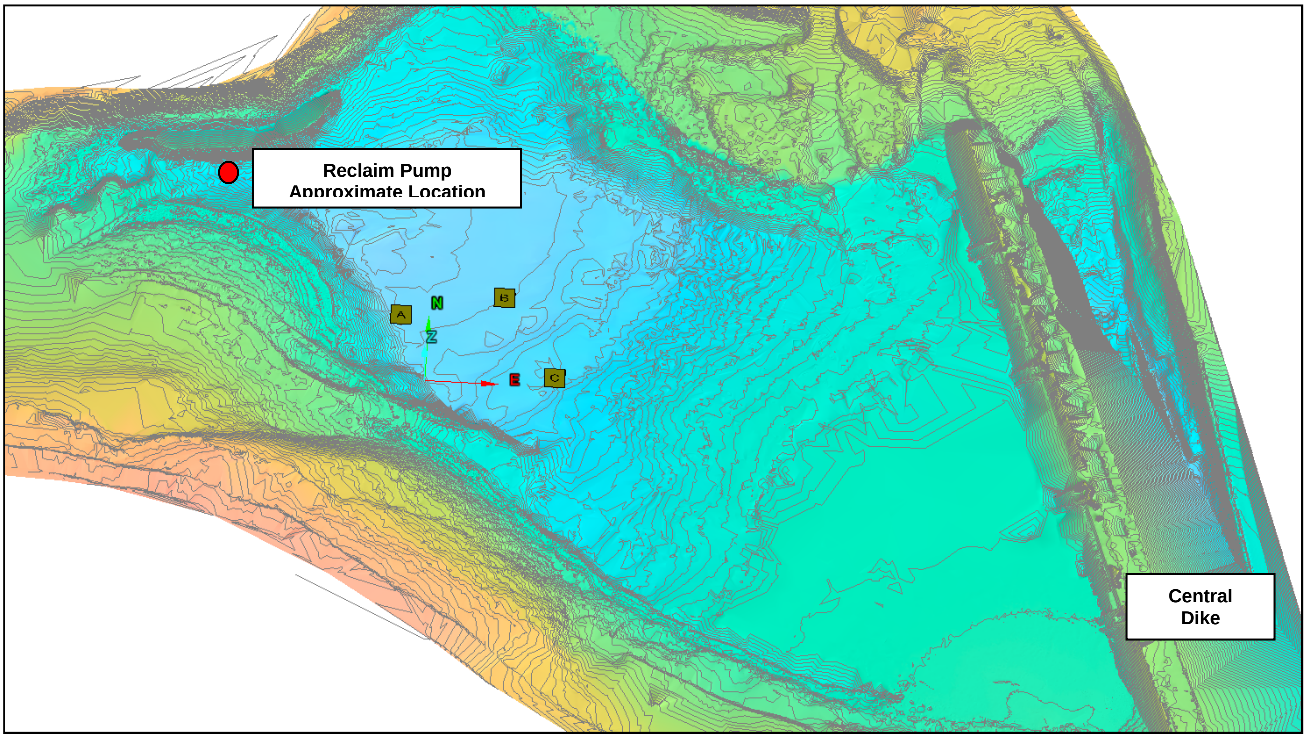
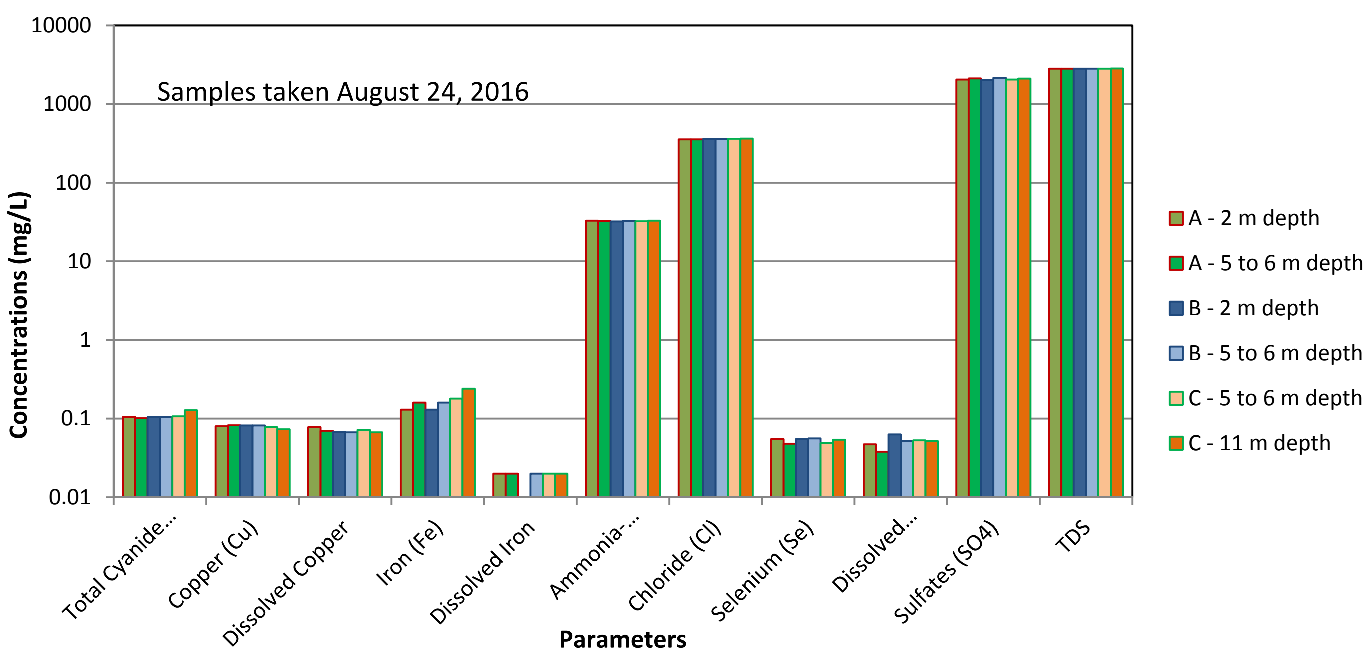


Figure 2-5: Comparison of Depth Sampling Measurements - South Cell TSF Reclaim Pond



2.3.5 Selenium Speciation

In previous water quality forecast model, selenium was identified as a parameter of concern. In order to define the proper water treatment process that could be used to remove selenium, it is important to understand the speciation of the selenium in the Reclaim Water. Table 2-4 summarize the selenium speciation analysis conducted in 2016 on samples taken from the South Cell TSF Reclaim Pond.

The data clearly shows that the selenium is present in the Reclaim Phase as selenate (Se(VI)) instead of selenite (Se(IV)). Section 4.3 of the technical note provides a discussion on the water treatment options available to remove this form of selenium.

Table 2-4: Speciation of Selenium

Date	Total Selenium	Selenite Se(4)	Selenate Se(6)	% as Selenate
	mg/L	mg/L	mg/L	%
2-Aug-16	0.065	0.005	0.061	92%
6-Sep-16	0.055	0.006	0.047	89%
3-Oct-16	0.052	0.003	0.049	94%
8-Nov-16	0.064	0.002	0.05	96%
5-Dec-16	0.06	0.001	0.045	98%

2.4 Mill Effluent

A review of the chemical analysis for the Mill Effluent was undertaken by SLI in order to identify the impact of the Mill Effluent water quality on the water quality observed in the North and South Cell TSF Reclaim Ponds. The Mill Effluent is tested twice daily for gold (solid and dissolved) and iron (dissolved), copper (dissolved) and cyanide (CN-WAD) using the on-site lab, which is not accredited for environmental water quality chemical analysis. These chemical analyses were provided to SLI for January 2013 to December 2016.

Figure 2-6 shows the daily average dissolved metal concentrations and cyanide (CN-WAD) in the Mill Effluent sampled at the final tailings sampling point 360-SA-008. This figure illustrates the following:

- Dissolved iron and copper concentrations are present in the Mill Effluent. Thus the main source of iron and copper in the TSF Reclaim Pond comes from the Mill Effluent.
- There is a relationship between copper and cyanide concentrations at the Mill Effluent. This is clearly represented in Figure 2-6 where the two trends behaved similarly in 2016. A low concentration of CN-WAD is generally associated with less cyanide required to extract the gold in certain ore type, resulting in less copper catalyst required in the cyanide destruction. During the previous year, iron concentrations also followed the trends of copper and cyanide, but this is less the case in the winter of 2016.
- Compared to the values of 2015, the concentrations for all three parameters in 2016 are generally lower, as shown in Figure 2-7. The lower concentrations may be attributed to the processing of more ore from the Vault Pit than from Portage Pit.

Figure 2-6: Iron, Copper and Cyanide (CN-WAD) in the Mill Effluent from 2016

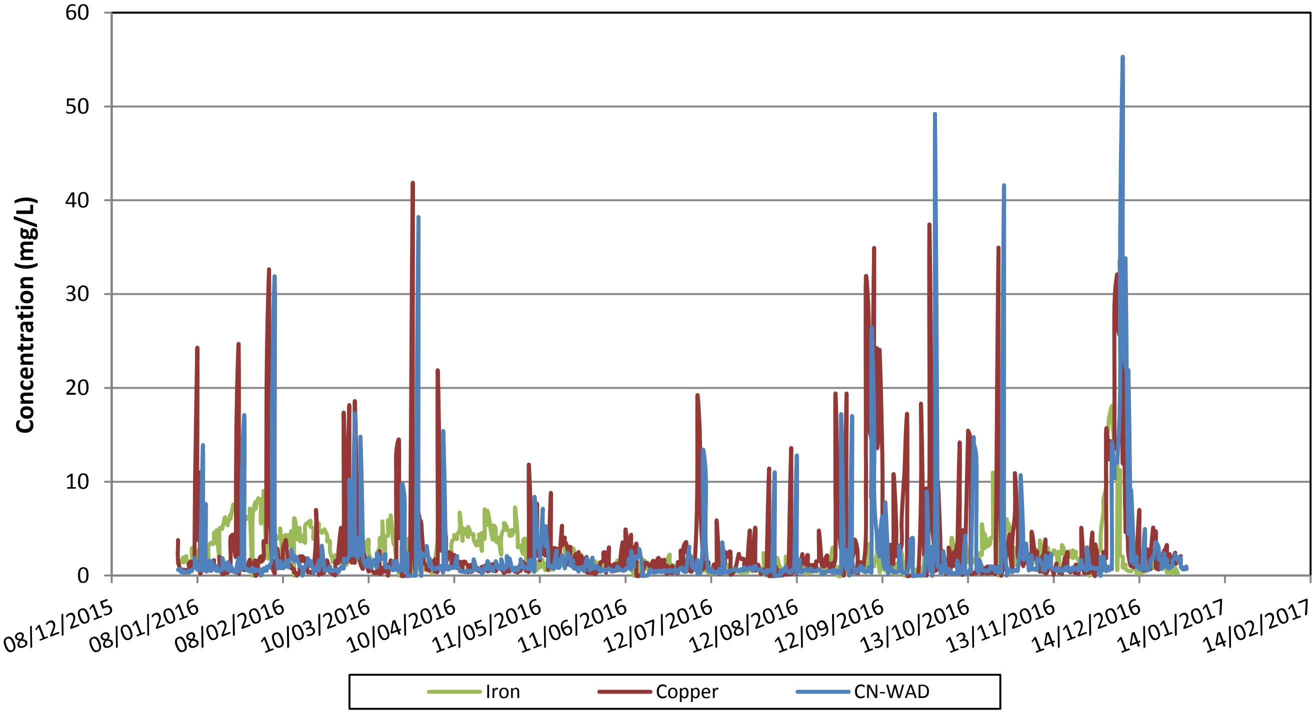
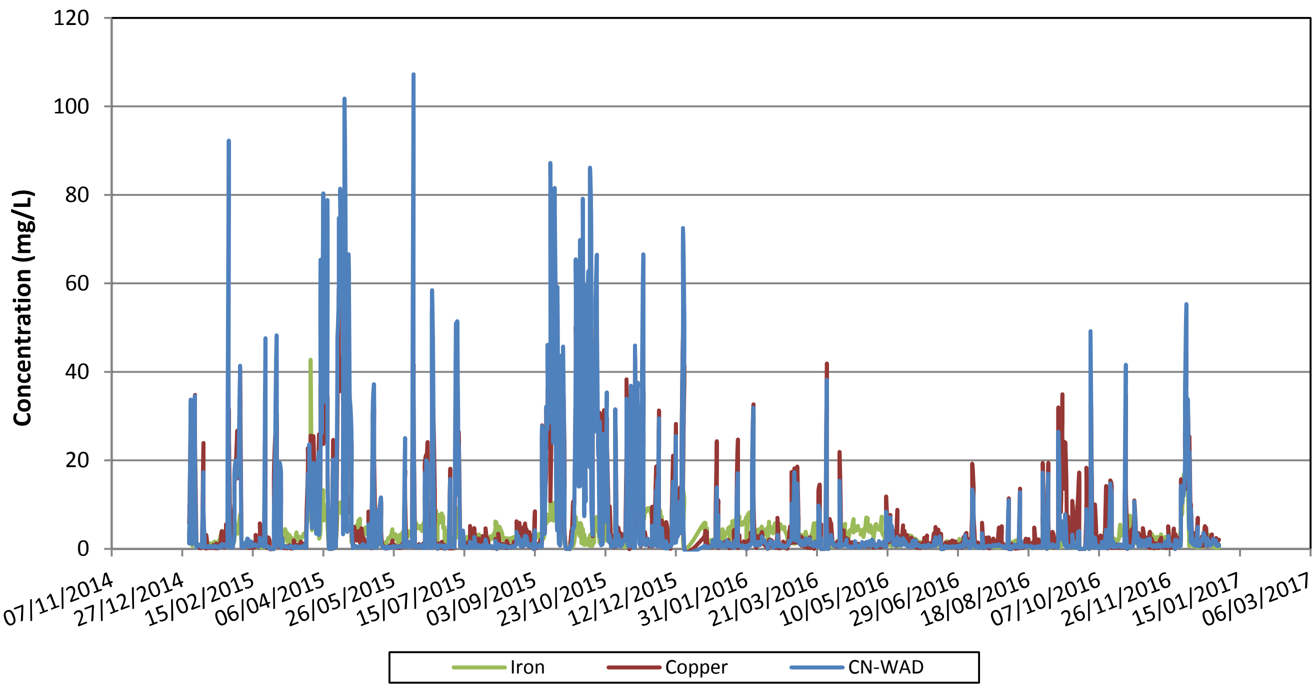


Figure 2-7: Iron, Copper and Cyanide (CN-WAD) in the Mill Effluent from 2015 to 2016



2.4.1 Additional Mill Effluent Water Quality Results

Agnico analyzed four different samples of the water fraction of Mill Effluent after cyanide destruction in order to have representative data of the tailings water being discharged to the North or South Cell TSF in 2016. These samples are taken punctually throughout the year, every quarter. The water quality analysis is completed by an external accredited laboratory.

The chemical analysis results of the additional quarterly Mill Effluent samples taken in 2016 are presented in Appendix A and key parameters are summarized in Table 2-5. Table 2-5 also compares these measurements against the average measurements made in 2015 from the quarterly Mill Effluent samples, as well as the average measurements made in the South Cell TSF Reclaim Pond in 2016.

With regard to the Mill Effluent, when comparing to the 2015 measurements, the average concentrations are generally lower in 2016 than 2015. As mentioned previously, this can be attributed to the processing of more ore from the Vault Pit than from Portage Pit. Total cyanide concentrations are decreasing during the year. Copper and iron concentrations are variable, depending on the nature of the ore processed. Ammonia and nitrate are relatively constant throughout the year. Chloride concentrations are higher in the winter months as expected and lower in the summer months.

The average concentrations in the Mill Effluent remains higher than the average measured concentrations in the South Cell in 2016. These results indicate that the main parameters of concern identified in the South Cell TSF Reclaim Pond can be traced to the Mill Effluent.

Table 2-5: Mill Effluent Concentrations Sampled Quarterly in 2016

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)						SOUTH CELL (mg/L)
	Jan. 14	Apr. 10	Jul. 9	Oct. 11	*Average 2016*	*Average 2015*	*Average 2016*
Total Cyanide (CNt)	18.3	8.75	7.13	2.92	*9.28*	*18.2*	*3.93*
Copper (Cu)	0.0389	0.0576	14.1	0.0799	*3.57*	*11.0*	*0.46*
Dissolved Copper	0.00915	0.00547	12.9	0.0468	*3.24*	*10.5*	*0.094*
Iron (Fe)	5.62	3.28	0.309	1.88	*2.77*	*5.9*	*1.01*
Dissolved Iron	4.87	2.98	0.017	1.19	*2.264*	*4.3*	*0.45*
Total Ammonia (NH_3) (mg N/L)	110	66.9	113	130	*105*	*127.3*	*42*
Nitrate (NO_3) (mg N/L)	18.3	11.7	12.6	10.6	*13.3*	*15.9*	*7.5*
Chloride (Cl)	800	470	440	520	*558*	*775*	*465*

2.5 Central Dike Downstream Pond

2.5.1 General

Since December 2015, Agnico has been depositing tailings into the South Cell (formerly Attenuation Pond) as per their water management plan. As expected, the operating water level in the South Cell is currently higher than it was when the area was operating as an Attenuation Pond only. Due to the higher water level in the South Cell, higher seepage flows are being observed downstream of Central Dike located to the east of the South Cell Tailings Storage Facility (TSF). The water is accumulating at the base of Central Dike and being mixed with snowmelt runoff water and possible underground water resurgence. In order to compensate for this unexpected accumulation, Agnico is presently recirculating the accumulated water downstream of Central Dike back to the South Cell Reclaim Pond to limit the volume of water accumulated at the base of Central Dike.

In September 2015, approximately 50,431 m^3 of pond water was transferred to Goose Pit as part of the water management plan around the Central Dike Downstream Pond. In 2016, Agnico continued to recirculate the accumulated water downstream of Central Dike back to the South Cell TSF Reclaim Pond in order to maintain a constant water elevation at approximately 115 masl in the downstream pond. No Reclaim Water was transferred to Portage or Goose Pits. Water samples from the Central Dike Downstream Pond were also routinely collected during the year (sampling point ST-S-5) as per Water License requirement.

2.5.2 Water Balance

Table 2-6 presents a monthly water balance around the Central Dike Downstream Pond for 2016 based on:

> the seepage volume from the South Cell TSF to the Central Dike Downstream Pond estimated by Agnico;

> the total volume pumped back to the South Cell TSF; and,

> a constant water level maintained in the pond.

Based on the Water Balance, the Central Dike Downstream (D/S) Pond is an open system meaning that the influent source is not entirely water originating from the South Cell TSF. Depending on the month of the year, runoff and groundwater could be added to the system.

Furthermore, in 2016, for every cubic meter of seepage, there was about 1.09 m^3 of water transferred from the D/S pond to the South Cell TSF. However, the precision of this ratio is approximate only since Agnico has no precise means to quantify the seepage flow from this area.

Agnico is still under assessment and validation for understanding of the water balance.

Table 2-6: Water Balance around Central Dike D/S Pond for 2016

Date	Estimated Seepage Flow from South Cell TSF to Central Dike D/S Pond	Volume of Water Transferred from Central Dike D/S Pond to South Cell TSF	Estimated Volume in Central Dike D/S Pond (at elev. 115 masl)	Calculated Net Inflow
	m^3/month	m^3/month	m^3	m^3/month
Jan-16	301,101	305,344	223,756	4,243
Feb-16	274,648	277,015	223,756	2,367
Mar-16	307,581	306,838	223,756	-743
Apr-16	195,032	324,633	223,756	129,601
May-16	333,385	376,728	223,756	43,343
Jun-16	274,543	385,003	223,756	110,460
Jul-16	428,731	441,435	223,756	12,704
Aug-16	354,392	395,629	223,756	41,237
Sep-16	317,734	363,024	223,756	45,290
Oct-16	494,737	503,283	223,756	8,546
Nov-16	453,165	453,439	223,756	274
Dec-16	477,285	465,316	223,756	-11,969

2.5.3 Water Quality

The water analysis taken from the Central Dike Downstream Pond are tabulated and presented in Appendix A. Table 2-7 summarizes the data for key parameters of concern and compares the measurements to the average values measured in the South Cell TSF Reclaim Pond in 2016.

The data confirm that one of the main influent streams to the Central Dike Downstream Pond is from the South Cell TSF Pond. The water in the Central Dike Downstream Pond has detectable concentrations of all of the key parameters of concern found in the South Cell TSF Reclaim Pond, but at a lower concentration. For total cyanide, copper, total ammonia, nitrate and selenium, the measured values in the South Cell TSF are higher than the values measured in the Central Dike Downstream Pond. Chloride, sulfate and total dissolved solids (TDS) measurements are slightly higher in the South Cell TSF Reclaim Pond. Only iron concentrations are higher in the Central Dike D/S pond on average. The lower concentration detected for these parameters may indicate that either some of the parameters are precipitating out of solution in the Central Dike D/S Pond, or more likely, additional non-contact water is entering the pond.

Table 2-7: Water Quality in Central Dike D/S Pond for 2016

PARAMETER	Central Dike Downstream Pond (ST-S-5) (mg/L)			South Cell TSF Reclaim Pond (ST-21) (mg/L)		
	Min	Mean	Max	Min	Mean	Max
Total Cyanide (CN)	0.097	**0.31**	0.821	0.072	**3.93**	10.79
Copper (Cu)	0.0054	**0.05**	0.2502	0.0229	**0.46**	1.882
Dissolved Copper	0.0044	**0.05**	0.2288	0.0108	**0.09**	0.2914
Iron (Fe)	1.32	**2.07**	5.07	0.16	**1.01**	2.67
Dissolved Iron	0.04	**0.17**	1.38	0.02	**0.45**	1.31
Total Ammonia-Nitrogen (mg N/L)	22.1	**27.3**	30	25.8	**34.8**	42.3
Nitrates (NO_3) (mg N/L)	0.01	**0.60**	2.06	4.32	**7.21**	12.5
Chloride (Cl)	357	**451**	533	332	**465**	630
Selenium (Se)	0.012	**0.03**	0.058	0.001	**0.07**	0.118
Dissolved Selenium	0.014	**0.04**	0.063	0.001	**0.07**	0.125
Sulfates (SO_4)	1565	**1806**	2079	1511	**1939**	2274
TDS	2287	**2582**	3081	2017	**2838**	3611

2.6 Portage and Goose Pits

Runoff water and seepages collected in Portage Pit A and Pit E continue to be transferred to the South Cell TSF Reclaim Pond in 2016. While in Goose Pit, as of June 2015, runoff water and seepages are allowed to accumulate in Goose Pit as mining is completed.

Water quality analysis of samples taken from Portage Pit A (ST-17) and Pit E (ST-19), and in Goose Pit (ST-20) in 2016 are tabulated in Appendix A. For Goose Pit, water samples were collected in the pit sump and pit lake.

Figure 2-8 presents the measured and forecasted concentration in Portage and Goose Pits for the same key parameters that are being monitored in the North and South Cell TSF Reclaim Ponds from 2013 to 2016.

From the graphs shown in Figure 2-8, the following observations can be made based on the measured and forecasted concentrations:

i. Total cyanide:

    a. The measured concentration in 2016 Portage and Goose Pits are well below 0.1 mg/L. The concentrations measured in Portage were a bit more scattered when compared to the measurements made in Goose Pit.

b. The forecasted concentration in Portage Pit in the previous model indicated a constant concentration in 2016 that is lower than the measured values.

c. For Goose Pit, the forecasted concentration indicated an increase in September 2015 (i.e. when Central Dike downstream pond water was transferred) followed by a decrease in the following months. The available measured data could not confirm the increase, but the concentrations measured in 2016 are below the forecasted results.

ii. Copper:

a. Total and dissolved copper concentrations measured in Portage and Goose Pit are generally much lower than 0.020 mg/L.

b. The forecasted concentration in Portage Pit in the previous model indicated a constant concentration in 2016 that is in the same order of magnitude than the measured values.

c. For Goose Pit, the forecasted concentration indicated an increase in September 2015 (i.e. when Central Dike downstream pond water was transferred) followed by a decrease in the following months. However, the measured total and dissolved concentrations are order of magnitude lower than the more conservative forecasted values.

iii. Iron:

a. Total concentrations of iron were detected in Portage Pit and Goose Pit, with peaks up to 3.5 mg/L in Portage and 2.2 mg/L in Goose Pit. However, the dissolved concentrations for iron were always below 0.05 mg/L. This data confirms that a large fraction of the total iron is present as a particulate form.

b. The forecasted value for dissolved iron concentration for iron in both Portage and Goose Pits are much in the same order of magnitude as the measured dissolved value.

iv. Selenium:

a. Total and dissolved selenium concentrations measured in Portage and Goose Pit are generally close to 0.001 mg/L, and always below 0.005 mg/L.

b. The forecasted concentration in Portage Pit in the previous model indicated a constant concentration in 2016 that is in the same order of magnitude than the measured values.

c. For Goose Pit, the forecasted concentration indicated an increase in September 2015 (i.e. when Central Dike downstream pond water was transferred) followed by a decrease in the following months. However, the measured total and dissolved concentrations are order of magnitude lower than the more conservative forecasted values.

v. Total Ammonia:

a. Total ammonia concentrations continued to be detected in Portage Pit. The concentrations in 2016 vary between 2 to 8 mg/L. This is to be expected considering that the pit is still active.

b. In Goose Pit, the concentrations are much lower when compared to the previous years. This is to be expected since the pit is not active since June 2015 and is undergoing natural reflooding.

c. The forecasted concentration in Portage Pit in the previous model indicated a constant concentration in 2016 that is lower than the measured value.

d. For Goose Pit, the forecasted concentration indicated an increase in September 2015 (i.e. when Central Dike downstream pond water was transferred) followed by a decrease in the following months.

The measured data follow the same trend, but the magnitude is much lower than the conservative forecasted data.

vi. Nitrate:

a. Nitrate concentrations were detected in Portage Pit and range between 5 and 15 mg/l (with a peak at 17 mg/L). This is to be expected considering that the pit is still active.

b. In Goose Pit, the measured concentrations in 2016 are less than 5 mg/L.

c. The forecasted concentration in Portage Pit in the previous model indicated a constant concentration in 2016 that is lower than the measured value.

d. The forecasted concentrations in Goose Pit are also lower than the measured value in the sump and in the pit lake.

vii. Chloride:

a. The measured chloride concentration in Portage Pit is generally between 20 to 40 mg/L, with a peak at 60 mg/L. The concentrations measured in 2016 are also similar to the values measured in 2015.

b. In Goose Pit, the measured values in the pit sump are lower than 20 mg/L. However, the measured values in the pit lake are generally above 20 mg/L. The pit sump is located at a higher elevation than the pit lake. In 2016, the pit sump received mostly runoff water from the catchment area while the pit lake received surface runoff water and seepages. Seepage to the pit is most likely the main contributor of chloride measured in the pit lake.

c. The forecasted concentration in Portage Pit in the previous model indicated a constant concentration in 2016 that is lower than the measured value.

d. For Goose Pit, the forecasted concentration indicated an increase in September 2015 (i.e. when Central Dike downstream pond water was transferred) followed by a decrease in the following months. The available measured data does not demonstrate this trend. However, in 2016, the forecasted concentrations are similar to the measured values in the pit lake.

The data presented in Figure 2-8 indicate that the previous water quality forecast model for Portage Pit did not capture the variability in concentrations in 2016 and was generally more optimistic. For Goose Pit, the previous water quality forecast model was more conservative and seems to over-estimate the impact of the Central Dike downstream pond water transfer to Goose Pit in September 2015.

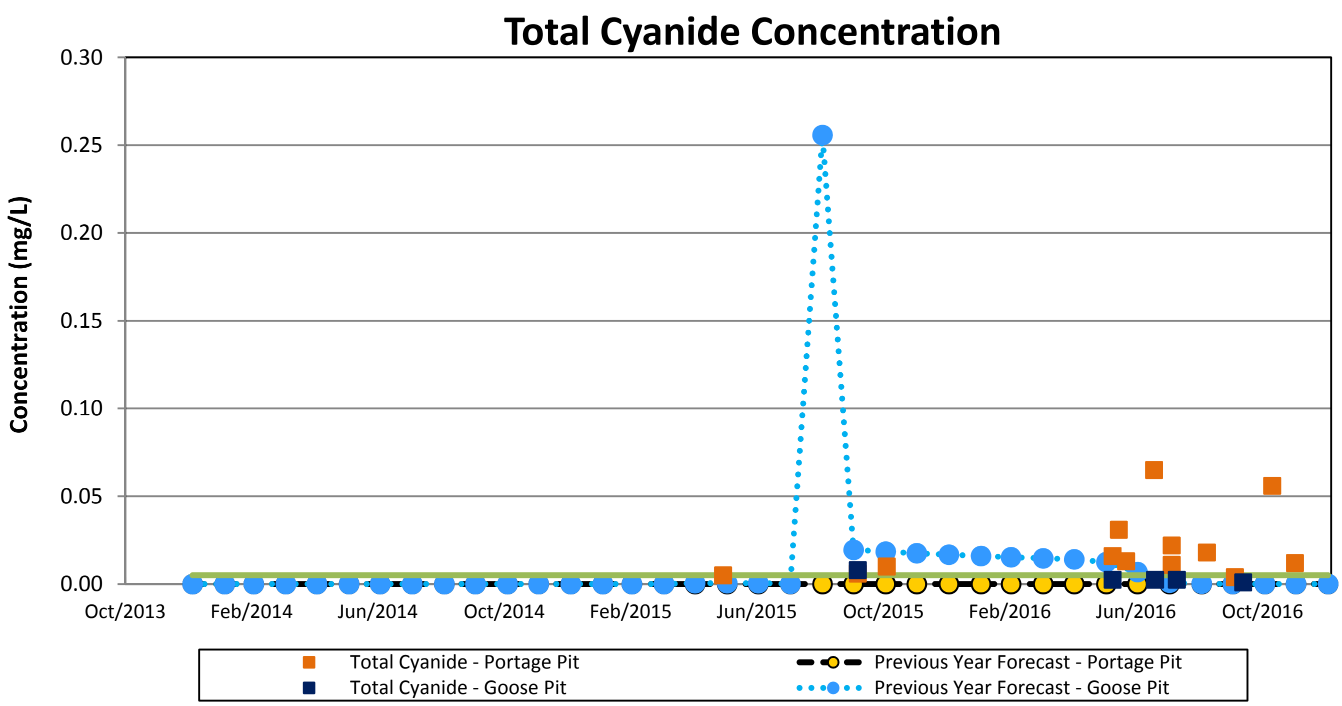
2.7 Ammonia Loading to Environment at Meadowbank

Ammonia that is found in the TSF Reclaim Water at Meadowbank originates mainly from the hydrolysis of cyanate, the by-product produced following cyanide destruction. To a lesser extent, ammonia also comes from un-reacted ammonium nitrate based explosive used in Portage, Goose and Vault pits and from the treated effluent from the mine site sewage treatment plant which is discharged to the Stormwater Management Pond. The Stormwater Management Pond is pumped twice yearly to the South Cell TSF. In 2016, as per the Water License, there was no discharge of North or South Cell TSF Reclaim Water to Third Portage Lake.

It is worth mentioning that in the month of September 2015, approximately 50,431 m^3 of Central Dike downstream pond water was transferred to Goose Pit. The concentration of ammonia measured in one sample taken that month in the South Cell TSF Reclaim Pond was 31.2 mg N/L. Thus, assuming an average concentration of 31.2 mg N/L of ammonia, the total load of ammonia transferred to Goose Pit in September is evaluated at approximately 1573 kg of ammonia (expressed as N). Again, there was no discharge of water within Goose Pit to Third Portage Lake. This additional load of ammonia in Goose Pit was taken into account in the forecasting model.

In 2016, no Reclaim Water or Central Dike Downstream Pond water was transferred from the South Cell to Portage or Goose Pits.

Figure 2-8: Concentrations in Portage and Goose Pits



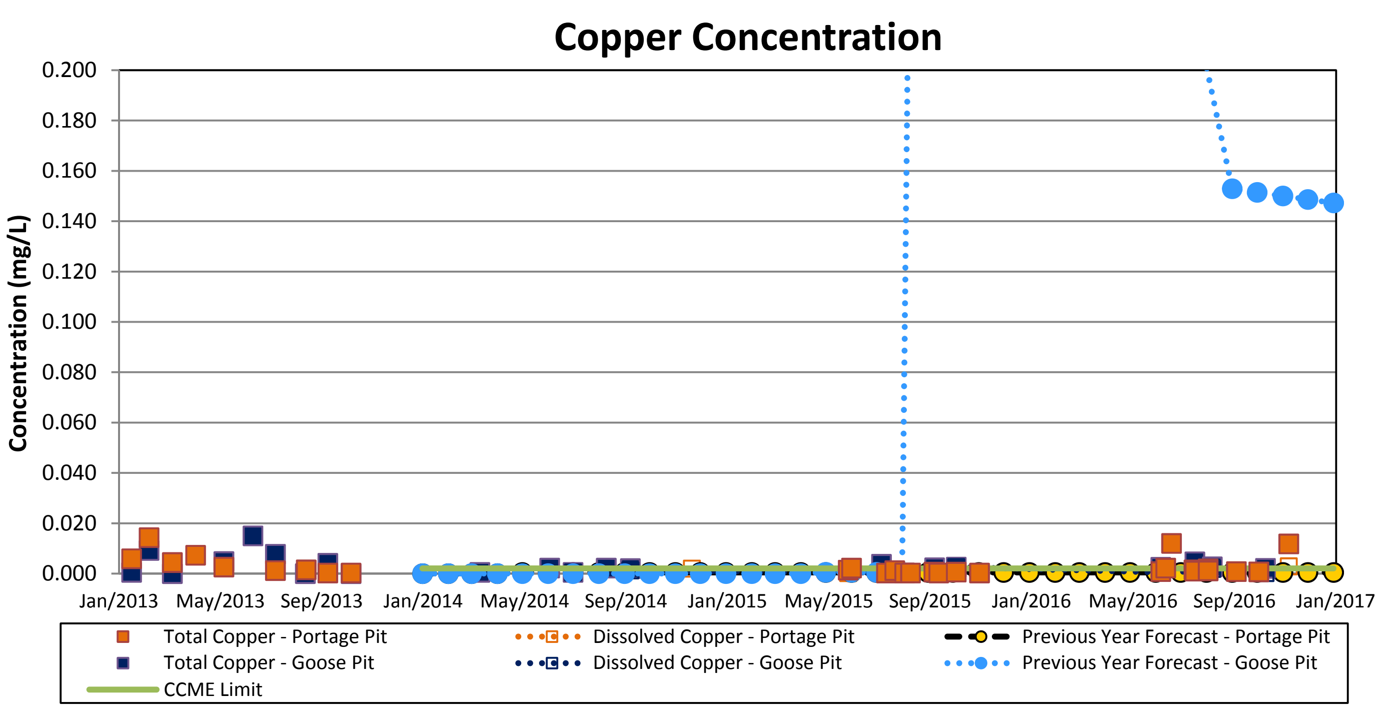
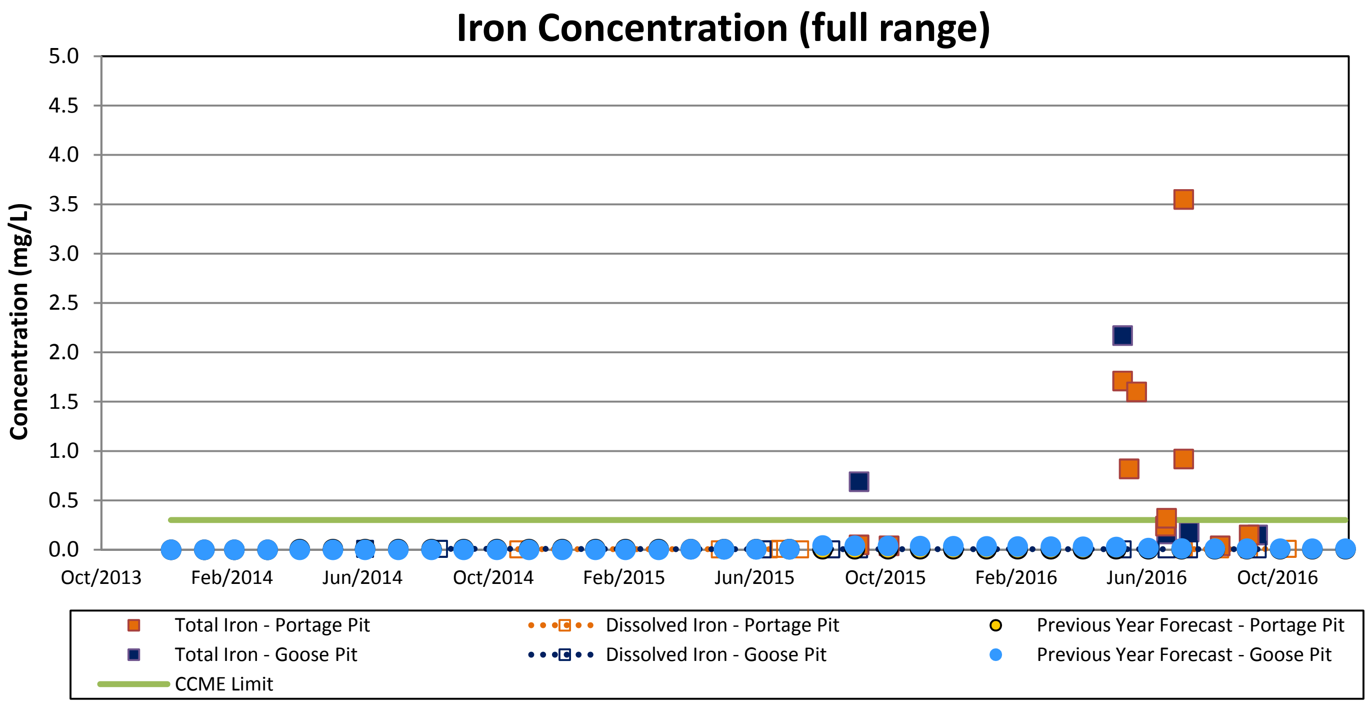


Figure 2-8: (continued) Concentrations in Portage and Goose Pits



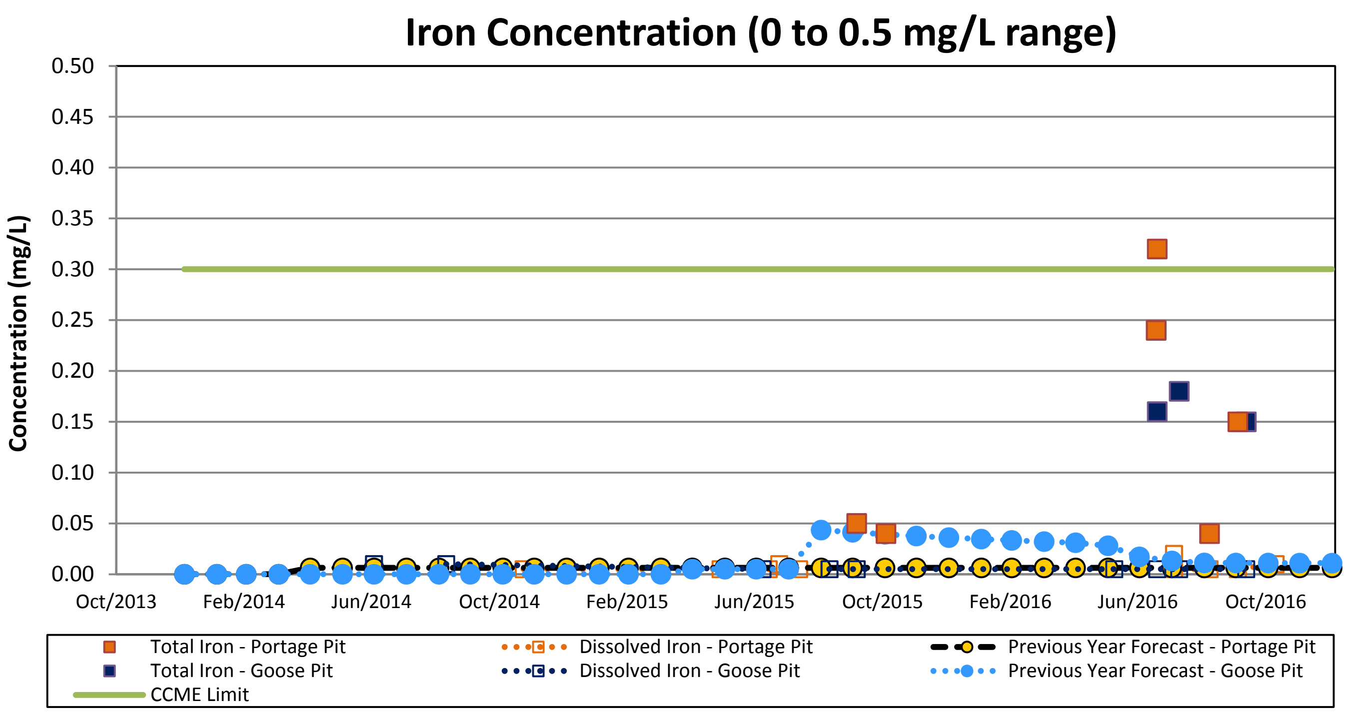
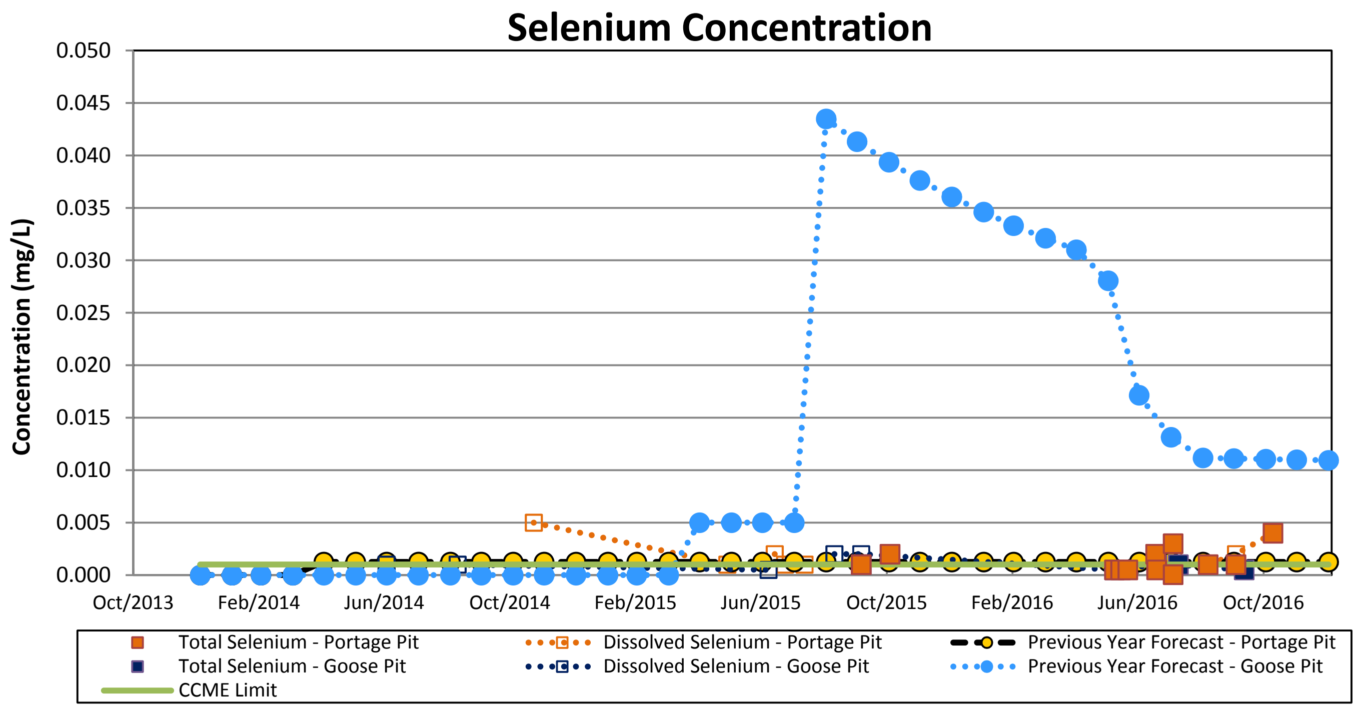


Figure 2-8: (continued) Concentrations in Portage and Goose Pits



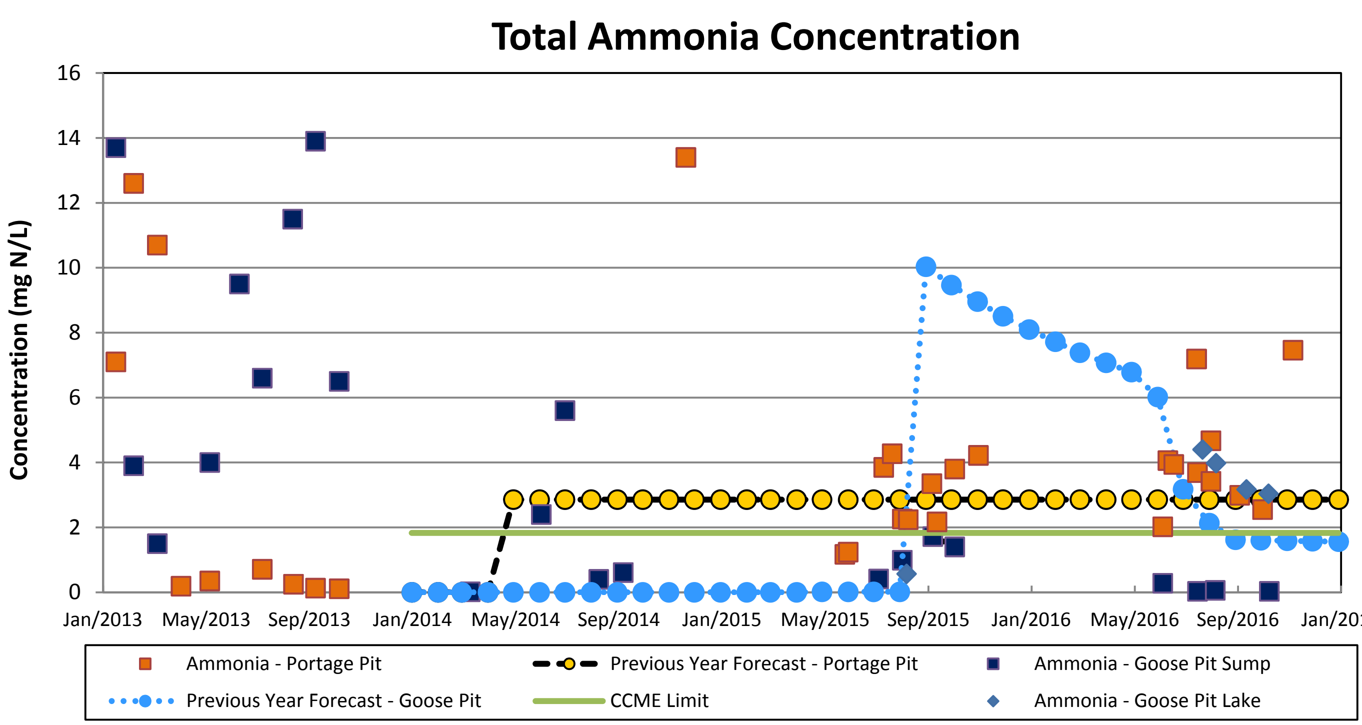
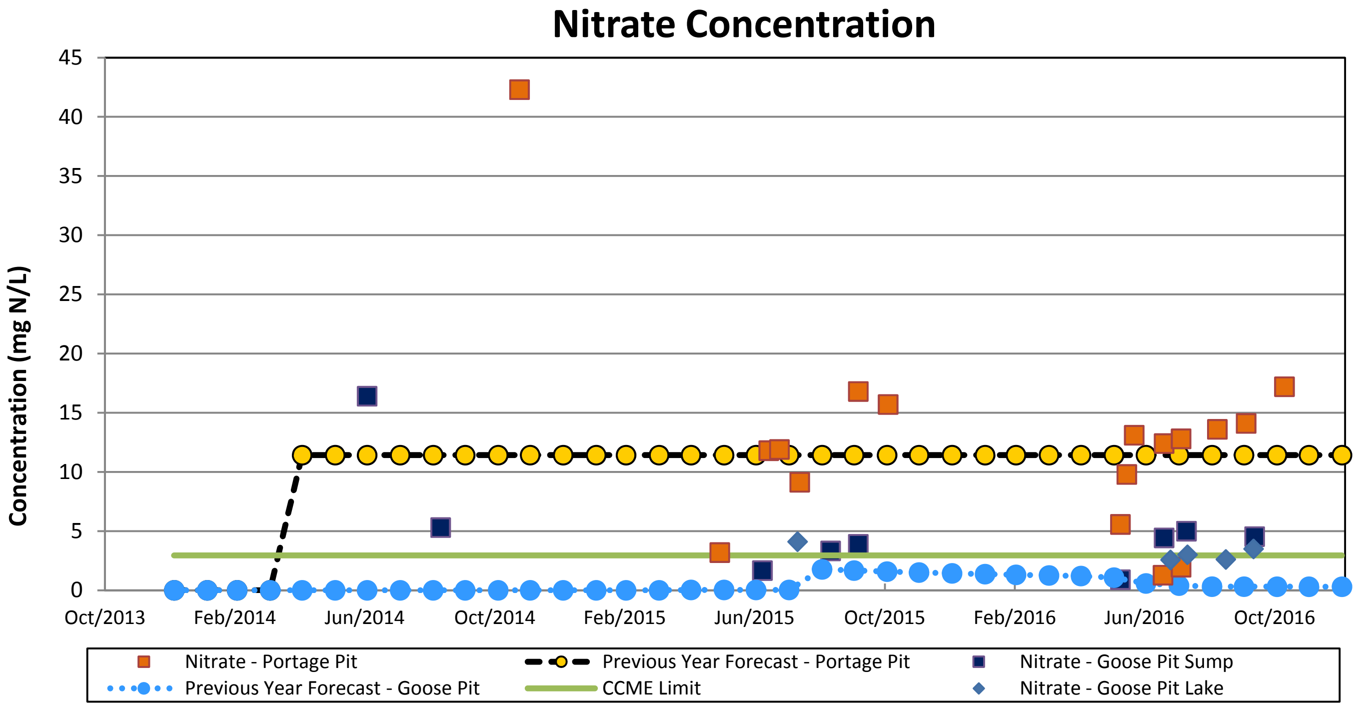
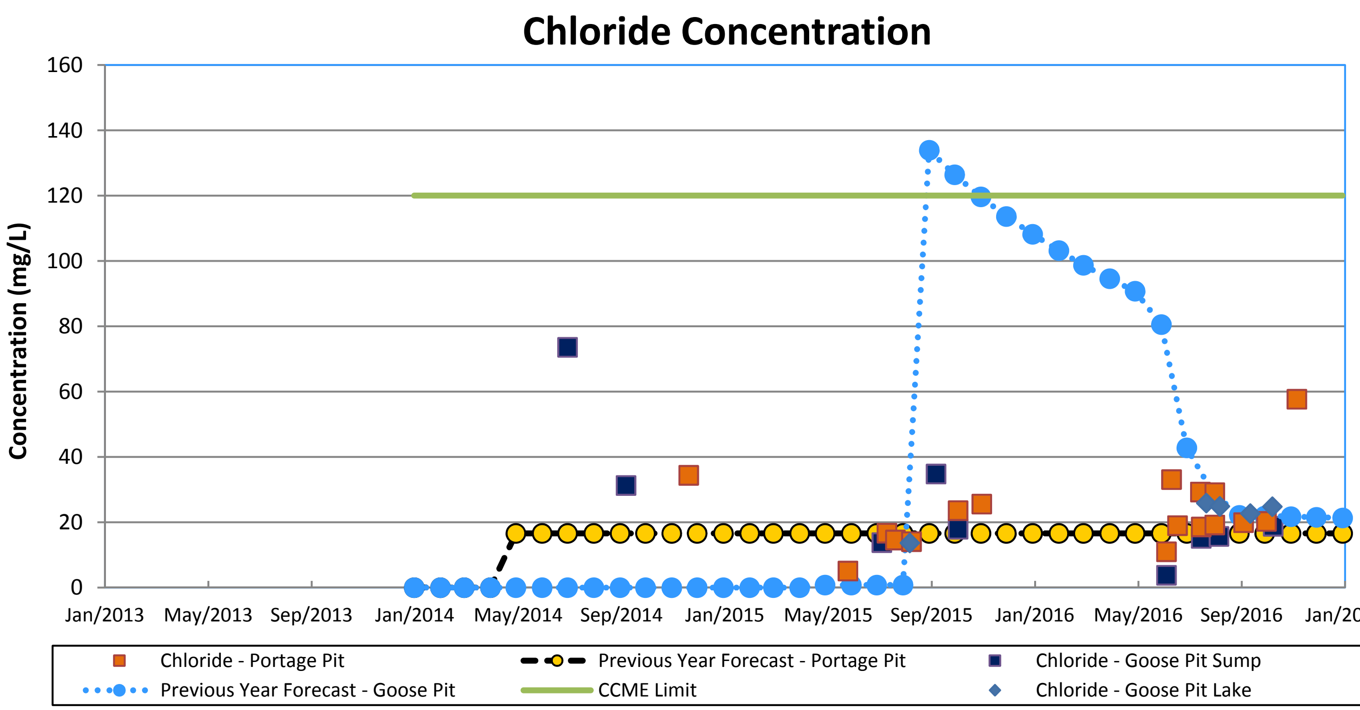


Figure 2-8: (continued) Concentrations in Portage and Goose Pits





3.0 Updated Mass Balance Model

3.1 Description

The water quality updated mass balance model presented in this Technical Note was developed to help forecast trends in water quality in the Portage Area of Meadowbank for different parameters of interest. The starting date for the model was arbitrarily set for January 2014 in order to keep in-line with the previous models. The end date of the model is set when the dikes will be breached in 2029.

This mass balance model was based on the following:

- Flows and volumes provided in the WB 2016 (Agnico, 2016);
- Assumptions presented below in section 3.2;
- Chemical analyses for ST-21 (North and South Cell TSF Reclaim Pond) (2014-2016);
- Chemical analyses for Third Portage Lake (2015);
- Chemical analyses for the Mill Effluent (quarterly samples taken in 2016);
- Chemical analyses for Portage North Pit (ST-17, Pit A) and Portage South Pit (ST-19, Pit E) (from January 2013 to November 2016);
- Chemical analysis for Goose Pit (samples taken in the sump pit and in the lake, ST-19) (from January 2013 to October 2016);
- East Dike (ST-8) seepage and Saddle Dam 3 (ST-32) sump s sampled in 2016;
- Saddle Dam 1 seepage (ST-S-2) and Portage Rock Storage Facility (RSF) runoff (ST-16) (2015 to 2016).

Furthermore, this year's water quality forecast mass balance model will also include the following changes:

- In previous water quality forecast model, because of the similarities between the actual dissolved measured concentrations and forecasted concentrations, it was assumed that the suspended fraction should settle and not be re-mobilized at the breaching of dikes. Thus, only the dissolved metals were considered in the model. However, in order to assess the impact of particulates in the water quality forecast model, both total and dissolved metal concentrations will be forecasted and compared using the total and dissolved concentrations measured at site.
- Previous water quality forecast models did not take into consideration the influence of saline seepages, and other contaminants, on the water quality at Portage and Goose pits. For this year's model, an estimation of the contaminant loads from the pit seepages will be evaluated and taken into account in the model. Please refer to section 3.6 for further details.

3.2 Assumptions

The assumptions used in the development of the mass balance model for the Portage Area of Meadowbank were the following:

i. For simplification of the model, the North and South Cell TSF Reclaim Ponds and the Portage and Goose Pits are assumed to be completely mixed systems.

ii. The main source of cyanide, copper, iron, selenium, other metals, ammonia (i.e. via the hydrolysis of cyanate), nitrate, chloride, sulfates and total dissolved solids in the TSF Reclaim Pond is the Mill Effluent.

iii. The influent loading from Portage pit, Goose pit, Stormwater Management Pond, Portage RSF, Saddle Dam 1 sump, Saddle Dam 3 sump and East Dike seepage into the Reclaim Ponds was included in this year water quality forecasting model.

iv. All other inflow contaminant concentrations from precipitation runoff are assumed to be negligible and have similar water characteristics as Third Portage Lake[1] water.

v. The water quality of the Mill Effluent is assumed to be constant over time for all parameters, except for ammonia, chloride, sulfates and total dissolved solids (TDS). For ammonia, the water quality for this parameter will continue to vary due to the hydrolysis of cyanate to ammonia. For chloride, the water quality for this parameter will continue to increase due to the continued use of calcium chloride as a dust suppressant in the mill and crusher. For sulfates, the oxidation of sulphide produced in the ore will continue to contribute to the sulfate loading in the Mill Effluent. The overall TDS in the Mill Effluent will continue to increase due to the increase in ammonia, chloride and sulfate.

vi. Following tailings deposition in the North and South Cell TSF, it is assumed that the water accumulated in these areas is transferred to Portage Pit and will have a water quality similar to non-contact runoff water.

vii. For simplification of the model, the parameters are assumed to be inert: they do not degrade or react with other elements in the system, with the exception of cyanide.

viii. Cyanide modeling:

- The pH in the South Cell TSF Reclaim Pond is on average at 7.9 during the summer months, and on average 8.1 for the year (2016). The pH in the North Cell TSF Reclaim Pond is on average 7.8 per year.
- For cyanide, in 2016, the average total cyanide concentration in the mill effluent was 9.2 mg/L. In order to have a more conservative estimate, for the purpose of the model, it is assumed that the Mill Effluent will meet at a minimum Agnico's CN-WAD operational target of 15 mg/L at all times, which is assumed to correspond to a total cyanide concentration of 18.2 mg/L based on the effluent analysis made in 2015 at an accredited lab.
- The total cyanide in the TSF Reclaim Pond is comprised of free cyanide and metal-cyanide complexes (weak and strong metal cyanide complexes). As per discussions with Agnico, most of

[1] 2016 water quality data continue to show that the concentrations observed in Third Portage Lake were on average lower than those in the North Cell TSF Reclaim Pond. It was therefore assumed that any input of contaminants from Third Portage Lake would be negligible.

the iron- and metal-cyanide complexes are precipitated in the mill. However, since the reaction is not complete or perfect, some dissolved iron- and metal-cyanide complexes are expected to remain in the Mill Effluent. Therefore it was assumed that 10% of the total cyanide concentration was bound as strong iron-cyanide complexes, and that another 10% of the total cyanide concentration was present as weak metal-cyanide complexes (cyanide bound with copper, zinc, and nickel). The balance is present as free cyanide (i.e. HCN and CN^-). This agrees with values observed at other gold mine tailings sites (Simovic, 1984). These same proportions are assumed to apply to the cyanide at the Mill Effluent.

- For this model, natural cyanide degradation is only considered for the summer months.

ix. For this analysis, it is assumed that no treatment will take place at the North or South Cell TSF Reclaim Pond or at the Portage or Goose Pits during operations and closure.

3.3 Limitations

The limitations of the Meadowbank water quality mass balance model and ensuing results and conclusions presented in this Technical Note are listed below:

i. In order to simplify the model, the mass balance model assumes that the pond and pits are completely mixed systems. Consequently, the results from this model provide an indication of the concentrations in the ponds and pits and should not to be considered as an absolute value at this time. Future monitoring results both for flows and water quality will provide for a better indication of concentrations of contaminants.

ii. The mass balance model is based on the water quality analysis results provided by Agnico:

- Water quality data provided for ST-21 is taken from samples collected at the surface of the North and South Cell TSF Reclaim Pond. As indicated in section 2.3.4, the concentrations provided by Agnico for ST-21 seems to be representative of the entire TSF Reclaim Pond water quality.
- Water quality data measured from samples taken of the Mill Effluent.

iii. The model does make some allowances for the impact that changes in the TSF will have on the TSF Reclaim Pond water quality over time (i.e. water body surface area on natural cyanide degradation in the summer months, free water volume in the pond on the forecasted concentration measurements).

iv. The model is based on a monthly time-step and the resulting concentrations provided represent monthly values.

v. It should be noted that at this point, given the limitations, assumptions and data currently available, the model should be used as a preliminary means to evaluate the impact of Mill Effluent on the future water quality in the North and South Cell TSF Reclaim Pond and Portage and Goose Pits.

vi. Furthermore, this model is intended as an initial model for the mass balance in the Portage Area and should be updated and calibrated as additional water quality data, pond volumes and flows in the Portage Area become available. Refer to section 6.3 for recommendations on improving the mass balance.

3.4 Input Parameters

3.4.1 General

The mass balance model for the Portage area of Meadowbank was developed to forecast the long-term concentration of cyanide, copper, iron, ammonia, nitrate and chloride in the North and South Cell TSF Reclaim Pond and in the pits. Since 2015, the report also evaluated a broader selection of parameters: alkalinity, hardness, aluminum, silver, arsenic, barium, cadmium, chromium, manganese, mercury, molybdenum, nickel, lead, selenium, zinc, fluoride, sulphate and total dissolved solids.

The mass balance model is based on the assumptions presented in section 3.2 and on the following input parameters:

- Mill effluent concentration;
- Initial concentration in the North and South Cells TSF Reclaim Pond;
- Initial concentration in the Portage and Goose Pits sumps;
- Runoff from the Portage RSF;
- Sumps from Saddle Dam 1, Saddle Dam 3 and East Dike seepage;
- Runoff water quality similar to Third Portage Lake;
- Stormwater Management Pond concentration (only ammonia and nitrate) used to compute the influent loading to the TSF Reclaim Pond;
- Shake flask extraction leaching test results conducted in 2016 on tailings from ores from Portage and Vault Pit (concentration in the liquid portion) were used to compute the loading coming from the leaching of the tailings.
- Agnico 2016 Water Balance which defines all of the input and output flows in the North and South Cell TSF, Central Dike downstream pond, Portage Pit and Goose Pit.

3.4.2 Mill Effluent Concentration

Table 3-1 presents the Mill Effluent concentrations considered for the input parameters of the mass balance. The average of the four samples taken in 2016 was used in the model. Total and dissolved metals considered for the model are also shown. The key parameters are also compared to the values used in the previous water quality forecast models based on the 2015, 2014, 2013 and 2012 WMP.

Table 3-1: Mill Effluent Concentrations Selected for the Mass Balance Model

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)				
	For 2016 WMP Forecast	2015 WMP Forecast	2014 WMP Forecast	2013 WMP Forecast	2012 WMP Forecast
Alkalinity	66 (as $CaCO_3$)	74.75 (as $CaCO_3$)			
Hardness	1313 (as $CaCO_3$)	1690 (as $CaCO_3$)			

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)					
	For 2016 WMP Forecast		2015 WMP Forecast	2014 WMP Forecast	2013 WMP Forecast	2012 WMP Forecast
Aluminum (Al) (total/dissolved)	0.326	0.119	0.116 (dissolved)			
Silver (Ag) (total/dissolved)	0.005	0.005	0.028 (dissolved)			
Arsenic (As) (total/dissolved)	0.026	0.026	0.0337 (dissolved)			
Barium (Ba) (total/dissolved)	0.128	0.122	0.1245 (dissolved)			
Cadmium (Cd) (total/dissolved)	0.00031	0.00031	0.00197 (dissolved)			
Chromium (Cr) (total/dissolved)	0.001	0.0001	0.0005 (dissolved)			
Copper (Cu) (total/dissolved)	3.569 (for North Cell in 2014: 9.9)	3.240 (for North Cell in 2014: 9.0)	10.503 (dissolved)	6.795 (dissolved)	7.8 (dissolved)	28.3 (dissolved)
Iron (Fe) (total/dissolved)	0.832 (30% of 2.772)	0.679 (30% 0f 2.264)	0.43 (dissolved)	0.14 (dissolved)	0.8 (dissolved)	11.8 (dissolved)
Manganese (Mn) (total/dissolved)	0.013	0.008	0.00714 (dissolved)			
Mercury (Hg) (total/dissolved)	0.000005	0.000005	0.000016 (dissolved)			
Molybdenum (Mo) (total/dissolved)	0.966	0.943	0.8555 (dissolved)			
Nickel (Ni) (total/dissolved)	0.024	0.021	0.423 (dissolved)			
Lead (Pb) (total/dissolved)	0.002	0.0004	0.00037 (dissolved)			
Selenium (Se) (total/dissolved)	0.166	0.169	0.202 (dissolved)			
Strontium (Sr) (total/dissolved)	2.13	2.05				
Thallium (Zn) (total/dissolved)	0.00003	0.00002				
Uranium (U) (total/dissolved)	0.013	0.012				

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)					
	For 2016 WMP Forecast		2015 WMP Forecast	2014 WMP Forecast	2013 WMP Forecast	2012 WMP Forecast
Zinc (Zn) (total/dissolved)	0.003	0.001	0.139 (dissolved)			
Fluoride (F)	0.645		0.545			
Nitrate (NO3)	13 (mg N/L) (for North Cell in 2014: 32)		15.925 (mg N/L)	27.9 (mg N/L)	31.6 (mg N/L)	9.9 (mg N/L)
Total Cyanide (CNt)	18[1]		18.1675	111	15	16.7
Total Ammonia (NH_3-NH_4)	North Cell: + 15 South Cell: + 40 (mg N/L/month)		+ 50 (mg N/L/month)	+41 (mg N/L/month)	+45 (mg N/L/month)	17.1 (mg N/L)
Chloride	North Cell: Winter: +2000 Summer: +500 South Cell: Winter: +300 Summer: +75 (in mg/L/month)		North Cell: Winter:+2000 Summer: +1000 South Cell: Winter: +700 Summer: +350 (in mg/L/month)	+1500 (mg/L/month)	+600 (mg/L/month)	674
Sulphate (SO_4)	North Cell: +600 South Cell: + 1400 (mg/L/month)		+ 1600 (mg/L/month)	+2400 (mg/L/month)		
Total dissolved solids	North Cell: Winter:+3929 Summer: +1444 South Cell: Winter: +1937 Summer: +1564 (in mg/L/month)		North Cell: Winter:+4964 Summer: +3307 South Cell: Winter: +2810 Summer: +2230 (in mg/L/month)	-		

Please note the items below on the parameters used for the 2016 updated water quality forecast model:

> **Ammonia:** To evaluate the concentration of ammonia that may be added to the TSF Reclaim Pond on a monthly basis, the difference in concentration of CN-WAD before and after the cyanide destruction system was evaluated. In 2016, on average, 108 mg/L of CN-WAD was removed and converted to cyanate (CNO^-), compared to 122 mg/L in 2015. Assuming that 70% of the cyanate is

[1] Average total cyanide concentration measured from the four mill effluent sample in 2016 was 9.3 mg/L. In order to be more conservative in the forecasting, the same value used in last year's model was used.

hydrolyzed to ammonia (NH_3), it was evaluated that on average approximately 41 mg N/L of ammonia was added to the Mill Effluent. For the purpose of the model, it is assumed that 40 mg N/L of ammonia is added to the Mill Effluent every month when tailings are deposited in the South Cell TSF. This additional ammonia load is added to the load already present in the Reclaim Water. When tailings were previously deposited in the North Cell TSF in 2014 and 2015, it was assumed that 15 mg N/L of ammonia was added to the Mill Effluent. This value was selected based on the measured values from the North Cell TSF Reclaim Pond.

> **Nitrate:** A higher nitrate concentration is considered in the Mill Effluent when tailings were deposited in the North Cell TSF in 2014. This value was selected based on the measured values from the North Cell TSF Reclaim Pond.

> **Chlorides:** Calcium chloride is used on site each year in the winter months as an anti-freeze solution on the ore and a dust suppressant in the Mill dome. This contributes to an increase in chloride concentration observed in the Mill Effluent and Reclaim Pond. Based on the measured data, the chloride concentration decreased in the Mill Effluent in 2016. To account for this trend, when tailings were deposited previously in the North Cell TSF in 2014 and 2015, it was assumed that 500 mg/L of chloride is added to the Mill Effluent during the summer months (June, July, August, and September) and 2000 mg/L during the winter months. In the South Cell, 75 mg/L is assumed to be added in the summer months while 300 mg/L is added in the winter months. This additional chloride load is added to the load already present in the Reclaim Water. These values were selected by adjusting the model to fit with the measured chloride values in the Reclaim Ponds in 2015 and 2016.

> **Sulfates:** Measured data showed that sulfate tends to accumulate in the Mill Effluent and Reclaim Pond. The sulfate most likely originates from the oxidation of sulfide in the ore. To account for this trend, 1400 mg SO_4/L is added per month in the Mill Effluent when the tailings are deposited in the South Cell TSF. When tailings were deposited previously in the North Cell TSF in 2014 and 2015, 600 mg/L SO_4/L was assumed to be added per month in the Mill Effluent. These values were selected by adjusting the model to fit with the measured values in the Reclaim Ponds from 2014 to 2016.

> **TDS:** The concentration of the total dissolved solids (TDS) added in the Mill Effluent is the sum of chloride, sulfate, ammonia, and sodium equivalent.

> **Copper:** A higher copper concentration is considered in the Mill Effluent for the year 2014 when tailings were deposited in the North Cell TSF. This value was selected based on the measured values from the North Cell TSF Reclaim Pond.

> **Iron**: In order to obtain the forecasted concentrations that are in the same order of magnitude as the measured values found in the North and South Cell TSF, the model uses 30% of the average total and dissolved iron concentrations measured on average in the Mill Effluent in 2016.

3.4.3 Concentrations used in the Model

As noted previously, the mass balance model arbitrarily begins in January 2014 to fit the previous models. The initial concentrations selected for the following streams are based on the following:

> North Cell TSF Reclaim Pond corresponds to the January 8th, 2014 chemical analysis results from station ST-21.

> Concentrations selected for the South Cell TSF Reclaim Pond (former Attenuation Pond) correspond to the 12-month (2014) average concentration results from station ST-18 (current Attenuation Pond). When there was no or little data available, the average values from 2010 to 2014 were used. In general, the concentrations observed in the Attenuation Pond had little variation from one month to the other.

> The initial concentrations of all parameters in the Portage and Goose were assumed to be the average of 2013. For Portage Pit, the average concentrations measured in 2013 in Pit E (ST-19) were used. For Goose Pit, the average concentrations measured in 2013 in the Goose Pit sump (ST-20) were used.

For the other water inputs, the water quality was based on the following:

> Runoff from the Portage RSF is based on the average concentration measured in 2015 and 2016 at sampling station ST-16.

> Saddle Dam 1 sump that is transferred to the North Cell is based on the average concentration measured in 2015 and 2016 at sampling station ST-32.

> Saddle Dam 3 sump that is transferred to the South Cell is based on the average concentration measured in 2016 at sampling station ST-32.

> East dike seepage quality is based on the average concentrations measured in 2016 at sampling station ST-8.

> Stormwater Management Pond quality is based on the average value measured in 2013, specifically for ammonia and nitrate.

> Surface runoff water is assumed to be of similar quality as Third Portage Lake. The water quality for Third Portage Lake is based on the average concentration obtained in summer 2015 in the East Basin.

> The average leaching rate inferred from the results obtained from the Shake Flask Extraction (SFE) Leach Tests conducted on the tailings in 2016 were used to account for possible leaching of contaminants from the tailings.

Table 3-2 summarizes the water quality characteristics used in the water quality forecast model based on total metals and dissolved metals respectively. Measurements that are higher than CCME guidelines for Protection of Aquatic Life are also highlighted in the table, which are used for comparison purpose only.

Table 3-2: Concentrations used in the Water Quality Forecast Model

PARAMETERS	UNITS	RECLAIM ST-21 NORTH CELL	ATTEN. POND / SOUTH CELL	PORTAGE RSF TO NORTH CELL	SADDLE DAM 1 SUMP TO NORTH CELL	SADDLE DAM 3 SUMP TO SOUTH CELL	EAST DIKE SEEPAGE TO PORTAGE	STORM WATER MGMT POND	THIRD PORTAGE LAKE	PORTAGE PIT ST-19	GOOSE PIT ST-20	LEACHING OF TAILS PORTAGE / GOOSE / VAULT (kg/ton)	CCME GUIDELINES	WATER LICENSE MEADOWBANK MAX. AVG. CONC.
		January-08-14	Average 2014	Average 2015/16 sampled at ST-16	Average 2015/16 sampled at ST-S-2	Average 2016 sampled at ST-32	Average 2016 sampled at ST-8	Average 2013	Average- East Basin Summer 2015	Average 2013	Average 2013	From SFE Leach Test-Avg 2016 tests	Long Term, Based on 3PL quality	Part F of License
Alkalinity	mg $CaCO_3$/L	135	106	68	56	40	29	0 (4)	9.1	72.2	129.8	3.50E-02	n/a	n/a
Hardness	mg $CaCO_3$/L	1329	362	176	182	235	40	0 (4)	12	274	130	1.85E-01	n/a	n/a
Total dissolved solids	mg/L	1329	1437	301	315	379	42	0 (4)	22	320	326	0 (4)	n/a	1400
Total Aluminum (Al)	mg/L	0.119 (1)	0.010 (1)	0.256	0.372	0.243	0.042	0 (4)	0.0075	0.1720	0.3708	1.53E-04	0.1	1.5
Dissolved Aluminum (Al)	mg/L	0.072	0.006	0.256 (5)	0.372 (5)	0.243 (5)	0.042 (5)	0 (4)	0.0018	0.0088	0.0092	1.53E-04	0.1	1.0
Total Silver (Ag)	mg/L	0.0001 (1)	0.0001 (1)	0.0001	0.0001	0.0001	0.0001	0 (4)	0.000005	0.00005	0.00005	1.08E-06	0.00025	n/a
Dissolved Silver (Ag)	mg/L	0.000	0.000	0.0001 (5)	0.0001 (5)	0.0001 (5)	0.0001 (5)	0 (4)	0.000005	0.00005	0.00006	1.08E-06	0.00025	n/a
Total Arsenic (As)	mg/L	0.032 (1)	0.008 (1)	0.027	0.019	0.001	0.001	0 (4)	0.0005	0.0202	0.0099	5.28E-06	0.005	0.3
Dissolved Arsenic (As)	mg/L	0.021	0.005	0.001	0.019 (5)	0.001 (5)	0.001 (5)	0 (4)	0.0005	0.0131	0.0010	5.28E-06	0.005	0.3
Total Barium (Ba)	mg/L	0.094 (1)	0.051 (1)	0.020	0.018	0.044	0.008	0 (4)	0.0037	0.0110	0.0219	1.32E-05	n/a	n/a
Dissolved Barium (Ba)	mg/L	0.084	0.045	0.017	0.018 (5)	0.044 (5)	0.008 (5)	0 (4)	0.0037	0.0172	0.0190	1.32E-05	n/a	n/a
Total Cadmium (Cd)	mg/L	0.00160	0.00010	0.00007	0.00004	0.00008	0.00002	0 (4)	0.000003	0.000240	0.000000	0 (4)	0.00004	0.002
Dissolved Cadmium (Cd)	mg/L	0.00134	0.00009	0.00003	0.00004 (5)	0.00008 (5)	0.00002 (5)	0 (4)	0.000003	0.000298	0.000014	0 (4)	0.00004	0.002
Total Chromium (Cr)	mg/L	0.0008	0 (4)	0.002	0.003	0.004	0.001	0 (4)	0.0001	0.0027	0.0026	7.75E-08	0.001	n/a
Dissolved Chromium (Cr)	mg/L	0.001	0 (4)	0.002 (5)	0.003 (5)	0.004 (5)	0.001 (5)	0 (4)	0.0001	0.0027	0.0026	7.75E-08	0.001	n/a
Total Copper (Cu)	mg/L	9.135	0.033 (1)	0.035	0.012	0.016	0.001	0 (4)	0.0006	0.0042	0.0069	2.40E-06	0.002	0.1
Dissolved Copper (Cu)	mg/L	9.053	0.005	0.026	0.012 (5)	0.016 (5)	0.001 (5)	0 (4)	0.0005	0.0009	0.0010	2.40E-06	0.002	0.1
Total Iron (Fe)	mg/L	0.140 (1)	0.047 (1)	0.965	1.165	2.575	0.100	0 (4)	0.017	1.5	0.7	2.42E-04	0.3	n/a
Dissolved Iron (Fe)	mg/L	0.030	0.010	0.214	1.165 (5)	2.575 (5)	0.100 (5)	0 (4)	0.005	0.009	0.006	2.42E-04	0.3	n/a
Total Manganese (Mn)	mg/L	0.065 (1)	2.898 (1)	0.523	0.289	1.525	0.012	0 (4)	0.002	0.257	0.108	1.47E-05	n/a	n/a
Dissolved Manganese (Mn)	mg/L	0.060	2.644	0.641	0.289 (5)	1.525 (5)	0.012 (5)	0 (4)	0.00117	0.230	0.094	1.47E-05	n/a	n/a
Total Mercury (Hg)	mg/L	0.000000	0.000117	0.000178	0.000225	0.000033	0.000010	0 (4)	0.000003	0.000080	0.000005	5.00E-09	0.000026	0.0004
Dissolved Mercury (Hg)	mg/L	0.000200	0.000100	0.000010	0.000225 (5)	0.000033 (5)	0.000010 (5)	0 (4)	0.0000025	0.000031	0.000028	5.00E-09	0.000026	0.0004
Total Molybdenum (Mo)	mg/L	0.596 (1)	0.026 (1)	0.013	0.014	0.002	0.001	0 (4)	0.0002	0.0664	0.0082	4.92E-05	0.073	n/a
Dissolved Molybd. (Mo)	mg/L	0.583	0.025	0.014	0.014 (5)	0.002 (5)	0.001 (5)	0 (4)	0.00018	0.1303	0.0101	4.92E-05	0.073	n/a
Total Nickel (Ni)	mg/L	0.277 (1)	0.041 (1)	0.040	0.027	0.249	0.001	0 (4)	0.00059	0.00394	0.07973	7.00E-07	0.025	0.2
Dissolved Nickel (Ni)	mg/L	0.253	0.038	0.041	0.027 (5)	0.249 (5)	0.001 (5)	0 (4)	0.00049	0.03140	0.02981	7.00E-07	0.025	0.2
Total Lead (Pb)	mg/L	0.002 (2)	0.000 (1)	0.001	0.004	0.006	0.0003	0 (4)	0.00003	0.00131	0.00192	8.50E-08	0.001	0.1
Dissolved Lead (Pb)	mg/L	0.002	0.000	0.000	0.004 (5)	0.006 (5)	0.0003 (5)	0 (4)	0.00003	0.00015	0.00020	8.50E-08	0.001	0.1
Total Selenium (Se)	mg/L	0.075 (1)	0.003 (1)	0.001	0.002	0.001	0.001	0 (4)	0.00003	0.00183	0.00080	1.17E-05	0.001	n/a
Dissolved Selenium (Se)	mg/L	0.072	0.003	0.001	0.002 (5)	0.001 (5)	0.001 (5)	0 (4)	0.00003	0.00250	0.00106	1.17E-05	0.001	n/a
Total Strontium (Sr)	mg/L	0.743 (3)	0 (4)	0.151	0 (4)	0 (4)	0 (4)	0 (4)	0.0132	0 (4)	0 (4)	2.70E-04	n/a	n/a
Dissolved Strontium (Sr)	mg/L	0.743 (3)	0 (4)	0.151 (5)	0 (4)	0 (4)	0 (4)	0 (4)	0.01345	0 (4)	0 (4)	2.70E-04	n/a	n/a
Total Thallium (Tl)	mg/L	0.005 (3)	0 (4)	0.002	0.003	0 (4)	0.005	0 (4)	0.000005	0.0020	0.0016	3.80E-08	0.0008	n/a
Dissolved Thallium (Tl)	mg/L	0.005 (3)	0 (4)	0.004	0.003 (5)	0 (4)	0.005 (5)	0 (4)	0.000005	0.0020	0.0016	3.80E-08	0.0008	n/a
Total Uranium (U)	mg/L	0.010 (3)	0 (4)	0.007	0 (4)	0 (4)	0 (4)	0 (4)	0.000049	0 (4)	0 (4)	3.67E-06	0.015	n/a
Dissolved Uranium (U)	mg/L	0.010 (3)	0 (4)	0.007 (5)	0 (4)	0 (4)	0 (4)	0 (4)	0.00005	0 (4)	0 (4)	3.67E-06	0.015	n/a

PARAMETERS	UNITS	RECLAIM ST-21 NORTH CELL	ATTEN. POND / SOUTH CELL	PORTAGE RSF TO NORTH CELL	SADDLE DAM 1 SUMP TO NORTH CELL	SADDLE DAM 3 SUMP TO SOUTH CELL	EAST DIKE SEEPAGE TO PORTAGE	STORM WATER MGMT POND	THIRD PORTAGE LAKE	PORTAGE PIT ST-19	GOOSE PIT ST-20	LEACHING OF TAILS PORTAGE / GOOSE / VAULT (kg/ton)	CCME GUIDELINES	WATER LICENSE MEADOWBANK MAX. AVG. CONC.
		January-08-14	Average 2014	Average 2015/16 sampled at ST-16	Average 2015/16 sampled at ST-S-2	Average 2016 sampled at ST-32	Average 2016 sampled at ST-8	Average 2013	Average- East Basin Summer 2015	Average 2013	Average 2013	From SFE Leach Test- Avg 2016 tests	Long Term, Based on 3PL quality	Part F of License
Total Zinc (Zn)	mg/L	0.010 (1)	0.010 (1)	0.003	0.114	0.007	0.004	0 (4)	0.002	0.016	0.015	1.00E-06	0.03	0.4
Dissolved Zinc (Zn)	mg/L	0.001	0.001	0.001	0.114 (5)	0.007 (5)	0.004 (5)	0 (4)	0.00063	0.003	0.001	1.00E-06	0.03	0.4
Chloride	mg/L	1035	98	10	8	20	1	0 (4)	0.793	26.117	24.978	0 (4)	120	1000
Fluoride (F)	mg/L	0.180	0.565	0.190	0.208	0.350	0.073	0 (4)	0.0793	0.3900	0.4922	3.25E-04	0.12	n/a
Sulphate (SO_4)	mg SO_4/L	2115	542	33	146	182	10	0 (4)	5	224	77	2.7E-01	n/a	n/a
Total Cyanide (CNt)	mg/L	8	0.346	0.003	0.011	0.009	0.004	0 (4)	0.0005	0.0393	0.0033	0 (4)	0.005	0.5
Total Ammonia (NH_3 + NH_4)	mg N/L	37	10	0.560	0.746	1.303	0.010	9.6	0.015	3.6	7.9	4.95E-03	1.83	16
Nitrate (NO_3)	mg N/L	26	1	8	9	8	0	0.1	0.0331	12.7	5.1	8.05E-04	2.94	20

Notes :

(1) No total concentration value measured. Estimated using dissolved concentration value divided by the ratio of dissolved/total concentration values from sample taken in July 1, 2014 from the North Cell.
(2) Used dissolved concentration value when the value is higher than the total concentration measured.
(3) No data available for sample taken on Jan 8, 2014. Use data sampled on July 1 2014.
(4) No data. Assume negligible.
(5) No dissolved concentration measurements. Use total concentration measurements.
(6) xxxxx Indicate values higher than CCME Guidelines (Long Term) based on Third Portage Lake water quality. Provided as a guide to help identify potential parameters of concern.

3.5 Cyanide Decay

The water quality model developed during this study takes natural cyanide degradation into account: the most important mechanism in the natural degradation of cyanide is the volatilization of hydrogen cyanide (HCN). In fact, tests carried out in Canada found that volatilization of HCN accounted for 90% of cyanide removed from solution in a tailings impoundment (Botz and Mudder, 2000).

Oxidation of cyanide ions (CN-) to orthocyanate (OCN) with atmospheric oxygen is possible but extremely slow when compared to HCN volatilization. Similarly, the probability of microbial degradation of cyanide to carbon dioxide, ammonia, nitrite and nitrate is low due to the limited presence of microorganisms and low nutrient levels in tailings water.

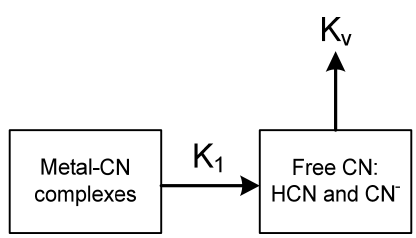
Cyanide volatilization can be summarized as a two (2) step process presented in Figure 3-1 below:

i. First, metal-cyanide complexes dissociate to free cyanide (HCN and CN^-) based on a first-order decay constant (k_1). Note that: (1) equilibrium between HCN and CN- is based on pH; (2) a first order decay constant signifies that the final concentration (Cf) can be estimated as, Cf=Cie-kt, where k is the first order decay constant.);

i. It is then followed by HCN volatilization based on a first-order decay constant (k_v).

ii. Both decay constants k_1 and k_v depend on the presence of UV light (sun) and air (wind), and water temperature and pH. The volatilization decay constant, k_v, also depends on the surface area to volume ratio of the pond.

Figure 3-1: Cyanide Volatilization Process



Since both constants depend to a great extent on temperature, UV light and air, separate constants were determined for summer (May to October) and winter (November to April) conditions. The decay constants were based on laboratory values recorded by Simovic (1984). The assumptions made for the development of the cyanide decay constants were the following:

> Summer conditions: an average water temperature of 10°C, presence of air and UV light. Furthermore, since metal-CN dissociation and HCN volatilization by air and UV is particularly important in the summer months, the decay constant factors in the physical property of the tailings impoundment, represented by the open surface area to volume ratio. Multiplying the decay constant by this ratio takes into account the accelerated reaction due to a large exposed surface area of the Reclaim Pond.

> Winter conditions: no natural cyanide degradation occurs.

- The pH in the Reclaim Pond is maintained constant at 8.0, which means that most (94%)[1] of the free cyanide will be present as HCN. Note that as the pH decreases, the proportion of free cyanide as HCN increases, which increases cyanide degradation through volatilization.
- As stated in section 3.2, it was assumed that 10% of the total cyanide concentration was bound as iron-cyanide complexes, another 10% as metal (copper, nickel and zinc) cyanide complexes, and 80% as free cyanide. This agrees with values observed at other gold mine tailings impoundments.

It should be noted that these decay constants (referred to as k_0) were established based on an hourly time step, and were not deemed reliable for longer time-periods (i.e. months). Therefore, the summer and winter decay constants obtained based on volatilization conditions and assumptions, were calibrated so as to represent more accurately and conservatively the expected cyanide concentrations on a monthly time-step.

Table 3-3 presents the assumptions and cyanide decay constants used in the water quality model.

Table 3-3: Natural Cyanide Degradation – Assumptions and Constants

DECAY CONSTANT	DESCRIPTION	WINTER CONDITIONS[2]			SUMMER CONDITIONS		
		Conditions	k_0	Calibrated value (k)	Conditions	k_0	Calibrated value (k)
K_1	Metal-CN dissociation	4° No air No UV	n/a	n/a	10° Air (wind) UV (sunlight)	0.01443/hr	2.11/month
K_V (3)	HCN volatilization		n/a	n/a		2.382 cm/hr	58.0 m/month

[1] The dissociation constant for HCN is pKa = $10^{-9.2}$.
[2] During the winter, most of the Reclaim Pond is covered in ice and/or snow. Assume no natural degradation of cyanide is occurring.
[3] In the summer k_v strongly depends on the presence of air and UV, and thus it also depends on the surface area to volume ratio (A/V). Therefore, the k_v value for the summer season has units of cm/h or m/month and should be multiplied by A/V.

3.6 Portage and Goose Pit Groundwater Seepage Loading

In previous water quality forecast model, it was assumed that the pit water quality transferred to the TSF Reclaim Pond was constant over time. The pit water quality was based on the yearly average measurements. However, the field measurements taken of the pit water shows a certain variability influence by pit activity and contaminant loadings from groundwater seepages. In order to model this variability in the pit water quality over time, for the current water quality forecast model based on the 2016 WMP, a first attempt will be made to estimate the contaminant loads originating from the underground water seepages and surface runoff flowing across the Potentially Acid Generating (PAG) pit rock surface area collected in Portage Pit and Goose pits.

In order to build a detail model to account for the seepages and runoff collected in Portage Pit and Goose Pit, the following information would be required:

> Groundwater water quality data;
> Groundwater seepage flow volume into the pits;
> Percent of the surface area of the pit wall covered by PAG rock;
> Leaching characteristics of the PAG rock surface area;
> Percentage of the seepage flow coming into contact with the PAG rock surface area;
> Percentage of the surface runoff coming into contact with the PAG rock surface area.

Agnico has groundwater quality data taken from monitoring wells surrounding the Portage and Goose Pits. However, there is no information on the seepage flowrate into the pits as it is difficult to measure. Furthermore, further investigation would be required to obtain the information necessary to assess the impact of the pits' PAG rock surface area on the pit water quality.

Due to the complexity in building such a model, a simpler and conservative approach was taken to account for the contaminant loads originating from underground water seepages and surface runoff on PAG rock surface area. The method consists in calculating the contaminant loading rate per month flowing into the pits based on a monthly mass balance around the pit using the following information:

> Runoff volume flowing into and pumped out of Portage and Goose Pits in 2015 and 2016;
> Estimated water volume in Portage and Goose Pits in 2015 and 2016; and,
> Concentration measurements from samples taken in Portage Pit (Pit A, ST-17) and Goose Pit (sump, ST-20) in 2015 and 2016 on a monthly basis. The measurements made in the pit sump implicitly measure the impact on groundwater seepage and surface water contact on PAG rock on the pit sumps water quality.

A monthly mass balance was then performed around the pits and a contaminant load was calculated to take in account the changes in measured concentration observed in the monthly grab sample for that month. Contaminant loadings were estimated for each month of the year. The following assumptions were taken in estimating the contaminant loads:

> No samples were taken during the winter months in the pits due to difficulties in accessing the pits for sampling during that time of the year. It is assumed that contaminant loadings during the winter months are negligible since seepage flows into the pit are very low during this period and forms an ice sheet along the pit wall.
> Measured concentrations taken in the pit for a given month is assumed to be representative of the average concentrations for that month.

> Monthly contaminant loadings was estimated by calculating the difference between the load estimated in the pit lake for the month (i.e. measured concentration multiplied by the sum of the pit volume and pit water transferred to the TSF Reclaim Pond for the month) and the initial load estimated for the previous month. A positive value indicates an increase in contaminant loads to the pit water.

> When a negative load was calculated, the absolute value was considered in order to have a conservative loading estimate.

> Contaminant loads were estimated based on the 2015 and 2016 flow and concentration measurements taken at the pits. For any given month, the contaminant loads retained for the model is based on the average of the estimated loading rate evaluated using 2015 and 2016 data, multiplied by an adjustment factor to obtain forecasted values that are in the same order of magnitude as the measured values.

> In order to have a conservative loading estimate to the pit, it is assumed that the contaminant loads from the seepage will remain constant throughout the years until the pits are completely flooded. In reality, the seepage rate into the pit should decrease as the water level rises in the pit since the hydraulic head between the pit and the surrounding groundwater level will decrease. By making this assumption, the model assumes a conservative contaminant loading from the seepages to the pit over the entire life of mine.

Table 3-4 and 3-5 presents the estimated contaminant loading rates for each parameter to Portage Pit and Goose Pit respectively. This data was used in this year's water quality forecast model to take into account the underground water seepages and surface runoff in contact with PAG rock.

Table 3-4: Estimated Contaminant Loading Rates to Portage Pit

Parameters (kg/month)	Jan - May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alkalinity	--	245	3768	2089	1916	1834	8097	--
Hardness	--	334	15808	8052	4658	12370	20859	--
Total dissolved solids	--	697	31945	14246	12312	11936	24288	--
Total Aluminum (Al)	--	0.00	32.36	10.83	14.79	3.74	327.71	--
Total Silver (Ag)	--	0.00	0.00	0.00	0.00	0.00	0.00	--
Total Arsenic (As)	--	2.13	25.60	0.61	0.03	1.69	3.82	--
Total Barium (Ba)	--	0.00	0.25	0.17	0.29	0.96	2.04	--
Total Cadmium (Cd)	--	0.00	0.01	0.00	0.00	0.00	0.06	--
Total Chromium (Cr VI)	--	0.00	0.10	0.19	0.23	0.00	11.01	--
Total Copper (Cu)	--	0.01	0.02	0.04	0.01	0.03	0.54	--
Total Iron (Fe)	--	0.00	69.63	34.57	44.16	8.88	1129.10	--
Total Manganese (Mn)	--	0.00	1.06	2.51	1.24	7.80	35.57	--
Total Mercury (Hg)	--	0.00	0.00	0.00	0.00	0.00	0.01	--
Total Molybdenum (Mo)	--	0.00	3.92	1.42	1.50	11.38	1.20	--
Total Nickel (Ni)	--	0.08	1.58	1.39	0.60	1.65	4.74	--
Total Lead (Pb)	--	0.00	0.00	0.00	0.22	0.18	0.41	--
Total Selenium (Se)	--	0.00	0.00	0.02	0.06	0.06	0.21	--
Total & Dissolved Strontium (Sr)	--	0.00	0.00	0.00	0.00	0.00	0.00	--
Total & Dissolved Thallium (Tl)	--	0.00	0.03	0.00	0.00	0.16	0.01	--
Total& Dissolved Uranium (U)	--	0.00	0.00	0.00	0.00	0.00	0.00	--
Total Zinc (Zn)	--	0.02	0.24	0.01	0.04	0.01	1.45	--
Dissolved Aluminum (Al)	--	0.01	0.04	0.23	0.07	0.42	0.15	--
Dissolved Silver (Ag)	--	0.00	0.00	0.00	0.00	0.00	0.00	--
Dissolved Arsenic (As)	--	0.13	1.02	1.12	0.70	0.06	1.16	--
Dissolved Barium (Ba)	--	0.02	0.64	1.01	0.58	0.78	1.05	--
Dissolved Cadmium (Cd)	--	0.00	0.00	0.02	0.00	0.01	0.04	--
Dissolved Chromium (Cr VI)	--	0.00	0.10	0.19	0.23	0.00	11.01	--
Dissolved Copper (Cu)	--	0.00	0.06	0.07	0.02	0.06	0.12	--
Dissolved Iron (Fe)	--	0.02	0.40	0.50	0.18	0.50	0.25	--
Dissolved Manganese (Mn)	--	0.18	4.16	7.92	3.57	4.15	1.63	--
Dissolved Mercury (Hg)	--	0.00	0.00	0.00	0.00	0.00	0.00	--
Dissolved Molybdenum (Mo)	--	0.15	1.78	6.70	1.48	0.82	2.55	--
Dissolved Nickel (Ni)	--	0.06	0.66	1.35	0.28	0.37	0.72	--
Dissolved Lead (Pb)	--	0.00	0.01	0.01	0.01	0.02	0.00	--
Dissolved Selenium (Se)	--	0.00	0.01	0.08	0.02	0.00	0.10	--
Dissolved Zinc (Zn)	--	0.00	0.04	0.05	0.05	0.05	0.25	--
Chloride (Cl)	--	21	1109	440	394	809	2059	--
Fluoride (F)	--	0.24	28.23	9.79	7.96	5.79	34.97	--
Sulphate (SO4)	--	182	12661	5177	5651	8314	10586	--
Total Cyanide (CNt)	--	0.02	1.06	0.61	0.50	0.32	2.86	--
Total Ammonia ($NH_3 + NH_4$)	--	5	309	96	61	7	280	--
Nitrate (NO_3)	--	13.00	979.68	340.71	312.33	510.60	142.48	--

Table 3-5: Estimated Contaminant Loading Rates to Goose Pit

Parameters (kg/month)	Jan - May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alkalinity	--	5280	8621	2719	638	2593	--	--
Hardness	--	11478	31585	1202	17802	12686	--	--
Total dissolved solids	--	19054	47207	9340	25975	12900	--	--
Total Aluminum (Al)	--	119.10	107.03	2.52	0.46	18.95	--	--
Total Silver (Ag)	--	0.00	0.00	0.00	0.00	0.00	--	--
Total Arsenic (As)	--	0.02	0.05	0.08	0.01	0.22	--	--
Total Barium (Ba)	--	1.14	1.41	0.16	0.11	2.10	--	--
Total Cadmium (Cd)	--	0.00	0.01	0.01	0.00	0.01	--	--
Total Chromium (Cr VI)	--	0.95	0.92	0.00	0.00	0.20	--	--
Total Copper (Cu)	--	0.24	0.33	0.16	0.01	0.05	--	--
Total Iron (Fe)	--	205.12	188.18	3.54	0.98	37.41	--	--
Total Manganese (Mn)	--	10.35	0.88	3.76	0.27	12.82	--	--
Total Mercury (Hg)	--	0.00	0.00	0.00	0.00	0.00	--	--
Total Molybdenum (Mo)	--	0.25	0.61	0.05	0.04	0.86	--	--
Total Nickel (Ni)	--	1.07	3.97	0.17	1.49	4.74	--	--
Total Lead (Pb)	--	0.01	0.00	0.00	0.00	0.00	--	--
Total Selenium (Se)	--	0.05	0.06	0.01	0.01	0.00	--	--
Total & Dissolved Strontium (Sr)	--	0.00	30.29	8.90	5.81	3.46	--	--
Total & Dissolved Thallium (Tl)	--	0.09	0.05	0.00	0.00	0.15	--	--
Total & Dissolved Uranium (U)	--	0.0	0.8	0.3	0.2	0.2	--	--
Total Zinc (Zn)	--	0.66	0.62	0.01	0.01	0.30	--	--
Dissolved Aluminum (Al)	--	0.28	0.13	0.05	0.06	0.01	--	--
Dissolved Silver (Ag)	--	0.00	0.00	0.00	0.00	0.00	--	--
Dissolved Arsenic (As)	--	0.02	0.01	0.00	0.01	0.00	--	--
Dissolved Barium (Ba)	--	0.11	2.50	0.07	0.78	0.77	--	--
Dissolved Cadmium (Cd)	--	0.00	0.00	0.00	0.00	0.00	--	--
Dissolved Chromium (Cr VI)	--	0.95	0.92	0.00	0.00	0.20	--	--
Dissolved Copper (Cu)	--	0.05	0.06	0.12	0.06	0.10	--	--
Dissolved Iron (Fe)	--	0.47	0.22	0.08	0.10	0.02	--	--
Dissolved Manganese (Mn)	--	7.93	2.95	2.64	6.39	0.47	--	--
Dissolved Mercury (Hg)	--	0.00	0.00	0.00	0.00	0.00	--	--
Dissolved Molybdenum (Mo)	--	0.21	0.90	0.02	0.43	0.11	--	--
Dissolved Nickel (Ni)	--	0.43	4.34	0.39	1.37	4.78	--	--
Dissolved Lead (Pb)	--	0.01	0.01	0.00	0.00	0.01	--	--
Dissolved Selenium (Se)	--	0.05	0.08	0.01	0.10	0.05	--	--
Dissolved Zinc (Zn)	--	0.05	0.02	0.01	0.01	0.00	--	--
Chloride (Cl)	--	872	4117	736	3556	1257	--	--
Fluoride (F)	--	27.55	101.14	10.99	41.45	6.83	--	--
Sulphate (SO4)	--	5739	21121	2913	12597	7509	--	--
Total Cyanide (CNt)	--	0.57	0.07	0.05	0.03	0.72	--	--
Total Ammonia ($NH_3 + NH_4$)	--	64	161	17	194	41	--	--
Nitrate (NO_3)	--	85.07	439.18	113.77	144.62	10.42	--	--

4.0 Water Quality Forecast Results

4.1 Results

The results of the mass balance model around the North and South Cell TSF Reclaim Ponds, Portage Pit and Goose Pit are presented in the Figures 4-1 to 4-12, for total cyanide, total and dissolved copper, total and dissolved iron, total and dissolved selenium, ammonia, nitrate, chloride, sulfate and total dissolved solids. The graphs show the forecasted monthly concentrations of the parameters from 2014 to 2029. A total of two (2) graphs are presented per parameter: the first shows the forecasted concentration in the North and South Cells TSF Reclaim Ponds and the second shows the forecasted concentration in the Portage and Goose Pits, assuming that the water is pumped without treatment.

The Water License and Canadian Council of Ministers of the Environment (CCME) limits (refer to Table 2-1) were also included in the figures, where applicable. For items with no CCME guideline, Agnico will meet site specific criteria (or background within the range of natural variability) developed through review of the final closure plan by regulatory agencies.

Again, it is important to remember that the results presented in Figures 4-1 to 4-12 are based on the concentrations presented in Tables 3-1 and 3-2. It is also important to note that the results from this model assume that no treatment of the Reclaim Pond effluent is undertaken and provide only a forecast of the concentrations of the selected parameters. These results must be reviewed while keeping in mind the assumptions and limitations described in sections 3.2 and 3.3.

4.2 Discussions

4.2.1 Key Dates

The mass balance model presented in this Technical Note is based on the WB 2016. The following key dates are important to keep in mind while reviewing the forecasted concentration data presented in Figures 4-1 to 4-12:

- November 2014: The former Attenuation Pond becomes the South Cell and TSF Reclaim Pond.
- June 2015: Start of natural re-flooding of Goose Pit with surface runoff water only.
- September 2015: Transfer of 50,431 m^3 of Central Dike Downstream Pond water to Goose Pit.
- October 2015: End of deposition in the North Cell TSF.
- September 2017: North Cell TSF Reclaim Pond is completely empty. The pond is maintained empty in the subsequent years by transferring the accumulated runoff water to the South Cell TSF Reclaim Pond.
- July 2018: Start of water transfer from South Cell TSF Reclaim Pond to Portage Pit
- September 2018: End of deposition in the South Cell TSF.
- October 2018: South Cell TSF Reclaim Pond is completely empty. The pond is maintained empty in the subsequent years by transferring the accumulated runoff water to Portage Pit.
- October 2018 to July 2025: Pumping water from Third Portage Lake to Portage Pit every summer and allow runoff water, ground water and East Dike Seepage to accumulate in the pit.
- July 2020 to June 2025: Pumping water from Third Portage Lake to Goose Pit every summer and allow runoff water and ground water to accumulate in the pit.

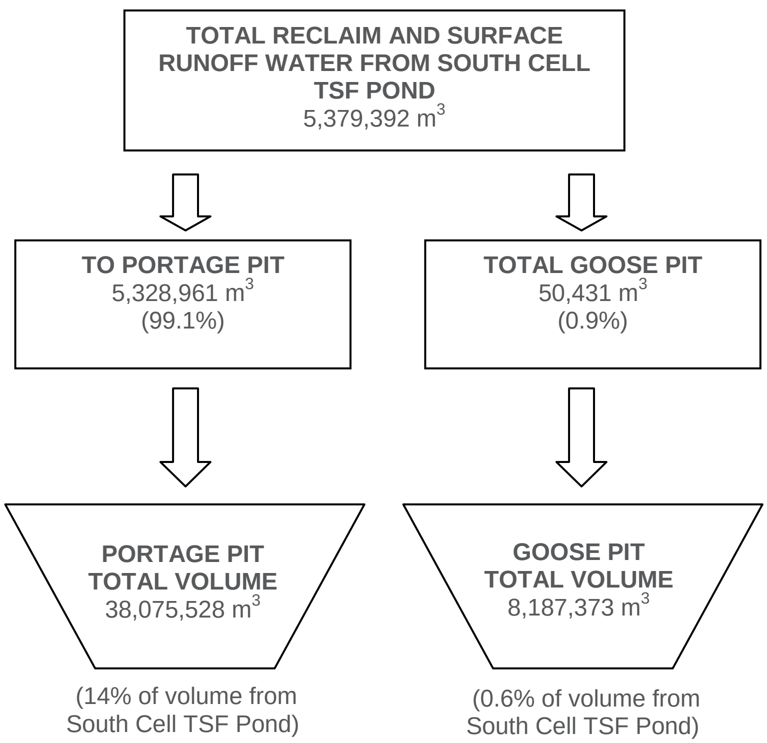
> July 2025: Water level in Goose Pit is higher than 130 masl. Goose pit is now hydraulically linked with Portage Pit

4.2.2 Volumes Transferred

Based on the WB 2016, the Reclaim Water from South Cell will be transferred to Portage Pit from July to October 2018. After, runoff accumulating in the North and South Cells will be transferred to Portage Pit until closure (2029). A total volume of about 5,328,961 m^3 of water will be transferred to Portage Pit. Approximately 806,143 m^3 will be Reclaim Water that originated mainly from the Mill Effluent and transferred to Portage Pit in 2018. The balance will be runoff water collected from the restored North and South TSF Cells from 2019 to 2028.

Furthermore, in September 2015, some Central Dike Downstream Pond water was transferred to Goose Pit (approx. 50,431 m^3) as part of the water management approach to deal with the high seepage volume flowing through the Central Dike.

As shown in the figure below, almost 99% of the South Cell TSF Reclaim and runoff water are transferred to Portage Pit. Note that for Goose Pit, the volume shown considers a water level at 130 masl and the volume for Portage Pit takes into account the Goose Pit volume between elevation 130 to 133.5 masl.



4.2.3 Forecasted Concentrations in the North and South Cell TSF Reclaim Pond

Table 4-1 summarizes the observations noted in Figures 4-1 to 4-12, specifically for the forecasted concentrations of parameters of concern in the Reclaim Pond (North and South cells).

Table 4-1: Summary of Forecasted Concentrations in the Reclaim Pond

PARAMETER		FORECASTED CONCENTRATIONS (mg/L)				WATER LICENSE PART F (CCME) (mg/L)
		NORTH CELL TSF RECLAIM POND		SOUTH CELL TSF RECLAIM POND		
		Jan. 2014 (initial)	2013 to 2017	August 2014[1] (initial)	2014 to 2018	
Total Cyanide (CN)		8.33	Fluctuate from 0.0005 to 12.7	0.35	Fluctuate from 0.049 to 14	0.5 (free CN 0.005)
Copper (Cu)	Tot.	9.135	Fluctuate from 0.004 to 19.6	0.033	Fluctuate from 0.006 to 3.9	0.1 (0.002)
	Diss.	9.053	Fluctuate from 0.004 to 17.8	0.005	Fluctuate from 0.0012 to 3.6	
Iron (Fe)	Tot.	0.14	Fluctuate from 0.09 to 2.9	0.047	Fluctuate from 0.05 to 2.2	n/a (0.3)
	Diss.	0.03	Fluctuate from 0.03 to 2.6	0.01	Fluctuate from 0.0045 to 1.6	
Selenium (Se)	Tot.	0.075	Fluctuate from 0.0003 to 0.39	0.003	Fluctuate from 0.001 to 0.22	n/a (0.001)
	Diss.	0.072	Fluctuate from 0.0003 to 0.39	0.003	Fluctuate from 0.0006 to 0.22	
Ammonia (NH_3)		36.8 (mg N/L)	Fluctuate from 0.1 to 116	9.6 (mg N/L)	Fluctuate from 2 to 116	16 (0.86) (mg N/L)
Nitrate (NO_3)		25.5 (mg N/L)	Fluctuate from 0.6 to 67	1.25 (mg N/L)	Fluctuate from 0.9 to 18	20 (2.9) (mg N/L)
Chloride (Cl)		1035	Fluctuate from 2 to 4493	98.2	Fluctuate from 24 to 779	1000 (120)
Sulphate (SO_4)		2115	Fluctuate from 12 to 5448	541.5	Fluctuate from 132 to 4626	n/a (n/a)

[1] Values of November were not available, so the average from January to October 2014 was used.

PARAMETER	FORECASTED CONCENTRATIONS (mg/L)				WATER LICENSE PART F (CCME) (mg/L)
	NORTH CELL TSF RECLAIM POND		SOUTH CELL TSF RECLAIM POND		
	Jan. 2014 (initial)	2013 to 2017	August 2014[1] (initial)	2014 to 2018	
TDS	1329	Fluctuate from 45 to 9897	1437	Fluctuate from 346 to 4526	1400 (n/a)

Based on the model for forecasting concentrations in the North and South Cell TSF Reclaim Pond, the following notes and observations can be made:

i. The fluctuations observed from 2014 to 2018 are primarily due to seasonal variability (runoff from nearby areas, snow and ice melt, temperature, etc.).

ii. Natural degradation of cyanide during summer plays a significant role in reducing the measured concentration of total cyanide in the TSF Reclaim Ponds and it is taken into account in the forecasting model.

iii. For ammonia, it is important to note that (1) the mass balance model developed here does not include seasonal variability (sunlight, microbial or algae degradation of ammonia, etc.), and (2) ammonia concentrations can vary significantly depending on temperature, pH, sunlight, algae activity, etc. Ammonia concentrations may be lower in the summer and higher in the winter. The forecasted concentrations between 2014 and 2016 are more conservative than the measured values for that same period.

iv. Similarly, for nitrate, it is important to remember that (1) the mass balance model developed here does not include seasonal variability, and (2) ammonia decomposes to nitrate, therefore nitrate concentrations can vary significantly depending on temperature, pH, sunlight, algae activity, etc. Nitrate concentrations may be lower in the winter and higher in the summer. The forecasted values between 2014 to mid-2015 are in the same range as the measured values in the North Cell. However, since the end of deposition in the North Cell, the nitrate concentration has been decreasing and this trend is captured in the forecast. For the South Cell, the forecasted values are in the same range as the measured value, up until the summer of 2016. A drop in nitrate concentration is measured in the South Cell, which is not captured in the forecast model.

v. There is not a significant difference between the total and dissolved forecasted concentrations for copper, iron and selenium.

vi. Guidelines:

   a. For comparison purposes, the forecasted concentrations in the North and South Cells TSF Reclaim Ponds for almost all the parameters are above the Water License discharge criteria.

   b. For comparison purposes, almost all forecasted concentrations in the North and South Cells TSF Reclaim Ponds for the parameters of concern are also above the CCME guidelines for the protection of aquatic life.

   c. However, it is important to note that no water in the TSF Reclaim Pond from June 2014 to July 2018 is discharged to the environment. Thus, the Water License discharge criteria are not applicable but rather are used as a comparison herein. Also, the dikes around Portage and Goose Pits will only be breached once the water quality in the pits meets the CCME guidelines or site specific criteria.

4.2.4 Forecasted Concentration in Portage and Goose Pits

Table 4-2 presents the forecasted concentration of all parameters for Portage and Goose Pits in December 2028 at mine closure. The first forecasted values were obtained by the mass balance approach and the second set of values were obtained with the geochemical modeling tool PHREEQC, simulating equilibrium concentration in the pits at closure, before dike breaching.

Based on the model for forecasting of the concentrations in Portage and Goose Pits, the following notes and observations can be made (note that items i. to iv. concern the forecast model using the mass balance approach, while items v. to x. concern results obtained with the PHREEQC analysis):

i. In last year's water quality forecast, only dissolved metal concentrations were forecasted. For this year's forecast, both dissolved and total concentrations are considered. Furthermore, in last year's water quality forecast, silver, copper, selenium, ammonia and total nitrogen were identified as parameters that exceeded the CCME guidelines at the end of the pit filling period. For this year's forecast, most forecasted concentrations meets the CCME guidelines in December 2028 except for the following parameters:

   a. **Total Aluminum** (new)**:** Slightly higher forecasted total concentration than the CCME guidelines in Portage Pit, Goose Pit and mixed pit conditions. However, the dissolved fraction is forecasted to be below the CCME guidelines.

   b. **Total Arsenic** (new): Higher forecasted total concentration than the CCME guidelines in Portage Pit and mixed pit conditions. However, the dissolved fraction is forecasted to be below the CCME guidelines.

   c. **Chromium** (new): Both the total and dissolved forecasted concentrations are slightly higher than the CCME guidelines in Portage Pit, Goose Pit and mixed pit conditions.

   d. **Copper**: Total and dissolved forecasted concentrations remains higher than the CCME guidelines in Portage Pit, Goose Pit and mixed pit conditions.

   e. **Total iron** (new): Slightly higher forecasted total concentration than the CCME guidelines in Portage Pit, Goose Pit and mixed pit conditions. However, the dissolved fraction is forecasted to be below the CCME guidelines.

   f. **Selenium**: Total and dissolved forecasted concentrations remains slightly higher than the CCME guidelines in Portage Pit and mixed pit conditions.

   g. **Silver**: Silver forecasted concentrations are lower than the CCME guidelines compared to last year's forecast. This year's model considers a lower silver loading from the mill effluent based on the measurements taken of the Mill Effluent in 2016.

   h. **Fluoride** (new): Forecasted concentration is equal or slightly higher than the CCME guidelines in Portage Pit, Goose Pit and mixed pit conditions.

   i. **Total Ammonia**: Ammonia forecasted concentrations are lower than the CCME guidelines compared to last year's forecast. This year's model considers a lower ammonia loading from the mill effluent based on the measurements taken in the North and South Cell TSF Reclaim Pond.

   j. **Total Nitrogen Equivalent**: For this parameter, a threshold concentration based on the classification of an oligotrophic lake in terms of nutrient concentration was used for comparison purpose. Third Portage Lake is considered as a highly oligotrophic lake. The CCME guidelines do not have a specific criterion for this parameter. The sum of the forecasted concentrations for total ammonia nitrogen and total nitrate nitrogen remains more elevated than this threshold concentration in Portage Pit, Goose Pit and mixed pit conditions.

For all of the new parameters identified above, the higher forecasted concentrations can be attributed to the additional loads to Portage Pit and Goose Pit from seepages and surface runoff that are considered in this year's water quality forecast model. The analytical results from the groundwater sampled around the Portage and Goose Pits also confirm this observation. Parameters such as aluminum, arsenic, chromium and zinc are measured in very low but detectable concentrations in the groundwater. Chloride and fluoride are also present in the groundwater sampled around the Portage and Goose Pit (ref. Agnico 2015).

ii. Forecasted copper concentrations are higher than the CCME guidelines in Goose Pit. The load for this contaminant originates from the transfer from the Central Dike Downstream Pond water to Goose Pit in September 2015, which was required to manage the volume of seepage through Central Dike. Since no other transfers from the TSF are planned, no additional contaminant load is expected in Goose Pit.

iii. It is important to note that the water quality in the pits will be subject to CCME guidelines or site specific criteria once the water level in the Goose and Portage Pits are equal to the water level in Third Portage Lake, and the dikes are breached.

iv. It is also important to note that once the water elevation in the pits reaches a level above 130 m, both Portage and Goose Pits will be hydraulically connected. This should help in attenuating some of the concentrations in Portage Pit. As shown in Table 4-2, when assuming complete mixing of both pits, the concentrations of the parameters listed in item i. are reduced, but not sufficiently to meet the CCME guidelines.

v. When using the USGS geochemical modelling tool PHREEQC (USGS 2015) to evaluate the equilibrium concentration of dissolved copper in the water column, the forecasted concentration is evaluated to be lower than 0.00001 mg/L in both pits, much lower than the CCME guideline. Thus, at equilibrium, most of the copper could precipitate out as an oxide, hydroxide or co-precipitate and adsorb to amorphous ferrihydrite.

vi. When using the USGS geochemical modelling tool PHREEQC (USGS 2015) to evaluate the equilibrium concentration of the other metal parameters listed in item i., except for selenium, the equilibrium concentration are significantly lower than the CCME guidelines. Thus, at equilibrium, most of these metals could precipitate out as an oxide, hydroxide or co-precipitate and adsorb to amorphous ferrihydrite.

vii. Selenium remains a possible parameter of concern since its forecasted concentration in Portage Pit at closure is close to the CCME guidelines.

viii. Fluoride is a possible parameter of concern since its forecasted concentration in Portage Pit and Goose Pit at closure is close to the CCME guidelines.

ix. For comparative purpose only, the total nitrogen equivalent concentration (i.e. sum of ammonia and nitrate) is higher than the threshold concentration for classification of an oligotrophic lake (i.e. a lake characterized by a low accumulation of dissolved nutrient salts, supporting but a sparse growth of algae and other organisms, and having a high oxygen content owing to the low organic content) in terms of nutrient concentration (Nurnberg 1996), even after the using the PHREEQC modeling tool. However, both the mass balance model and PHREEQC modeling tool do not take into account any natural nitrogen degradation cycle that could occur over the summer months. However, if an increase in ammonia and nitrate concentrations is observed in the TSF Reclaim Ponds and in the pit water after transfer, the total nitrogen issue will have to be re-assessed at closure. Natural degradation could be sufficient to reduce the total nitrogen concentration, or active treatment solutions such as mechanical aeration could be implemented. Note that there is no specific CCME guideline for total nitrogen equivalent.

x. There are no CCME guidelines for sulfate and TDS. As for chlorides, it meets the CCME guidelines. The forecasted concentrations for these parameters however will be higher than the background concentrations measured in Third Portage Lake. The forecasted results for these two parameters are represented in Figure 4-10 to 4-12.

Consequently, the parameters listed in item i. are parameters that will be monitored and re-evaluated in next year's water quality forecast. Silver is not a parameter of concern at this moment. However, most of these parameters are below the CCME guidelines when looking at the dissolved fraction of these parameters and/or the equilibrium concentrations evaluated using PHREEQC. The parameters that remain a concern are selenium and fluoride, which have forecasted concentrations near the CCME guidelines.

4.2.5 Comparison of Forecasted Values

Figures 4-13 to 4-16 compare the different forecasted concentrations in the North and South Cells for dissolved copper and chloride assessed using Agnico Water Balance model developed in 2012, 2013, 2014, 2015 and the most recent WB 2016. The figures also show the evolution of the forecasted concentration against the actual measured concentration of copper and chlorides.

Based on these figures, the following notes and observations can be made:

i. Since 2012/2013, the Water Balance model provided by Agnico has improved and is reflecting more accurately the volumes of water managed around the North and South Cells TSF.

ii. For each water quality update, an effort is made to adjust the model to align the forecasted value with the measured values. As shown in the figures 4-13 and 4-14, the dissolved copper concentrations that were initially forecasted in the North and South cells are much higher than the values measured on site. The model was adjusted using dissolved copper concentrations measured in the TSF and in the Mill Effluent to calibrate the model.

iii. Unlike copper which can precipitate out of solution as a copper hydroxide precipitate, chloride builds up in a closed loop system. The water quality forecast model initially under estimated its build-up in the TSF Reclaim Pond. The model was then adjusted to account for this build-up.

The site Water Balance and Water Quality Forecast model will continue to be updated on a yearly basis, using the actual volumes and measured concentrations to calibrate the models.

Table 4-2: Summary of Forecasted Concentrations in Portage and Goose Pits

PARAMETERS	UNITS	CCME GUIDELINES	3rd PORTAGE LAKE (avg. Summer 2015)	AT CLOSURE, BEFORE BREACHING DEC. 2028 – PORTAGE PIT: Mass Balance Conc.	PORTAGE PIT: PHREEQC Eq. Conc.	GOOSE PIT: Mass Balance Conc.	GOOSE PIT: PHREEQC Eq. Conc.	ASSUME COMPLETE MIX: Mass Balance Conc.	ASSUME COMPLETE MIX: PHREEQC Eq. Conc.
pH (assumed)			7.17		7.8		7.6		7.8
Alkalinity	mg $CaCO_3$/L	n/a	9	18	17	40	8	21	13
Hardness	mg $CaCO_3$/L	n/a	12	54	53	130	17	68	48
Total dissolved solids	mg/L	n/a	22	94		204		113	
Total Aluminum (Al)	mg/L	0.10	0.01	0.15	0.0003	0.38	0.0002	0.19	0.0002
Dissolved Aluminum (Al)	*mg/L*	*0.10*	*0.0075*	*0.0094*		*0.0037*		*0.0084*	
Total Silver (Ag)	mg/L	0.00025	0.000005	0.00009	0.00006	0.00004	0.00001	0.00008	0.00005
Dissolved Silver (Ag)	*mg/L*	*0.00025*	*0.000005*	*0.00009*		*0.00004*		*0.00008*	
Total Arsenic (As)	mg/L	0.005	0.00051	0.0121	0.0000	0.0013	0.0000	0.0102	0.0000
Dissolved Arsenic (As)	*mg/L*	*0.005*	*0.0005*	*0.0023*		*0.0007*		*0.0020*	
Total Barium (Ba)	mg/L	n/a	0.0036575	0.0069	0.0068	0.0116	0.0038	0.0077	0.0058
Dissolved Barium (Ba)	*mg/L*	*n/a*	*0.0037*	*0.0070*		*0.0105*		*0.0076*	
Total Cadmium (Cd)	mg/L	0.00004	0.0000025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dissolved Cadmium (Cd)	*mg/L*	*0.00004*	*0.0000*	*0.0000*		*0.0000*		*0.0000*	
Total Chromium (Cr)	mg/L	0.001	0.000113	0.0040	0.0007	0.0033	0.0000	0.0039	0.0004
Dissolved Chromium (Cr)	*mg/L*	*0.001*	*0.0001*	*0.0040*		*0.0032*		*0.0038*	
Total Copper (Cu)	mg/L	0.002	0.000595	0.0441	0.00001	0.0140	0.000002	0.0388	0.00001
Dissolved Copper (Cu)	*mg/L*	*0.002*	*0.0006*	*0.0399*		*0.0122*		*0.0350*	
Total Iron (Fe)	mg/L	0.30	0.02	0.4704	0.00000001	0.6807	0.00000001	0.5076	0.00000001
Dissolved Iron (Fe)	*mg/L*	*0.30*	*0.0173*	*0.0247*		*0.0095*		*0.0220*	
Total Manganese (Mn)	mg/L	n/a	0.00155	0.0196	0.00000	0.0445	0.0000	0.0240	0.0000
Dissolved Manganese (Mn)	*mg/L*	*n/a*	*0.0016*	*0.0103*		*0.0324*		*0.0142*	
Total Mercury (Hg)	mg/L	0.000026	0.000003	0.000009	0.000008	0.000004	0.0000005	0.000008	0.000007
Dissolved Mercury (Hg)	*mg/L*	*0.000026*	*0.0000*	*0.000006*		*0.000005*		*0.000006*	

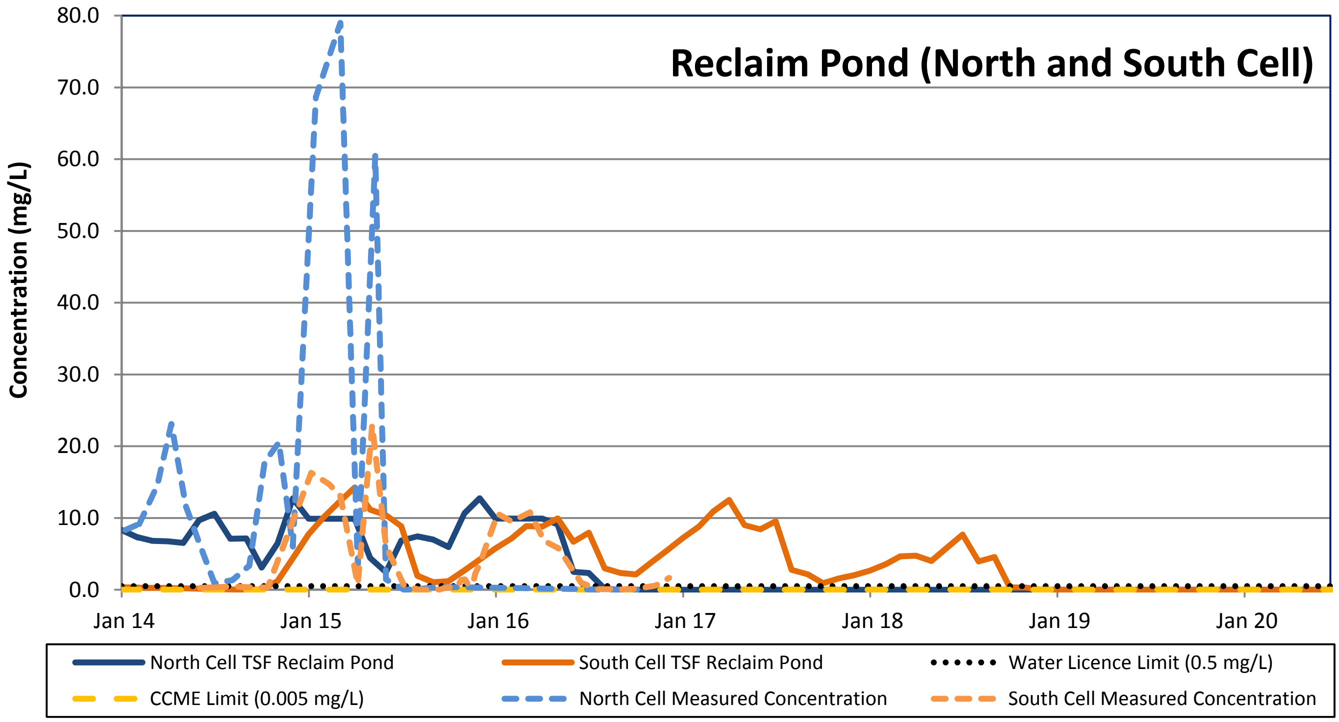
PARAMETERS	UNITS	CCME GUIDELINES	3rd PORTAGE LAKE (avg. Summer 2015)	AT CLOSURE, BEFORE BREACHING DEC. 2028					
				PORTAGE PIT		GOOSE PIT		ASSUME COMPLETE MIX	
				Mass Balance Conc.	PHREEQC Eq. Conc.	Mass Balance Conc.	PHREEQC Eq. Conc.	Mass Balance Conc.	PHREEQC Eq. Conc.
Total Molybdenum (Mo)	mg/L	0.073	0.000194	0.0195	0.0173	0.0059	0.0021	0.0171	0.0142
Dissolved Molybdenum (Mo)	*mg/L*	*0.073*	*0.0002*	*0.0172*		*0.0056*		*0.0151*	
Total Nickel (Ni)	mg/L	0.025	0.000593	0.0043	0.0001	0.0180	0.0000	0.0068	0.0001
Dissolved Nickel (Ni)	*mg/L*	*0.025*	*0.0006*	*0.0020*		*0.0177*		*0.0048*	
Total Lead (Pb)	mg/L	0.001	0.000025	0.0003	0.0000	0.0001	0.0000	0.0003	0.0000
Dissolved Lead (Pb)	*mg/L*	*0.001*	*0.0000*	*0.0001*		*0.0001*		*0.0001*	
Total Selenium (Se)	mg/L	0.001	0.000025	0.0025	0.0020	0.0007	0.0010	0.0022	0.0020
Dissolved Selenium (Se)	*mg/L*	*0.001*	*0.0000*	*0.0024*		*0.0010*		*0.0022*	
Total Strontium (Sr)	mg/L	n/a	0.013	0.0442	0.0440	0.0939	0.0200	0.0530	0.0400
Dissolved Strontium (Sr)	*mg/L*	*n/a*	*0.0135*	*0.0434*		*0.0939*		*0.0524*	
Total Thallium (Tl)	mg/L	0.0008	0.000005	0.0003	0.0003	0.00046	0.00001	0.0003	0.0003
Dissolved Thallium (Tl)	*mg/L*	*0.0008*	*0.000005*	*0.0003*		*0.00046*		*0.0003*	
Total Uranium (U)	mg/L	0.015	0.000049	0.0003	0.0003	0.0025	0.0001	0.0007	0.0003
Dissolved Uranium (U)	*mg/L*	*0.015*	*0.000045*	*0.0003*		*0.0025*		*0.0007*	
Total Zinc (Zn)	mg/L	0.03	0.0015	0.0023	0.00002	0.0039	0.00001	0.0026	0.00002
Dissolved Zinc (Zn)	*mg/L*	*0.03*	*0.0015*	*0.0010*		*0.0008*		*0.0010*	
Chloride	mg/L	120	0.7925	7	7	19	3	9	6
Fluoride (F)	mg/L	0.12	0.07925	0.12	0.12	0.37	0.37	0.17	0.17
Sulphate (SO4)	mg SO4/L	n/a	5.1	61	62	88	14	66	54
Total Cyanide (CNt)	mg/L	0.005	0.0005	0.00009	0.00002	0.00010	0.00000	0.00009	0.00002
Total Ammonia (NH_3 + NH_4)	mg N/L	1.83	0.0145	1.41	1.41	0.92	0.92	1.32	1.32
Nitrate (NO_3)	mg N/L	2.94	0.03305	1.01	1.01	1.29	1.29	1.06	1.06
Total N equivalent	mg N/L	0.35 (1)	0.04755	2.41	2.41	2.20	2.20	2.38	2.38

Notes:

1) Value based on the threshold concentration for classification of an oligotrophic lake in terms of nutrient concentrations (Nurnberg 1996).

xxxx Mass balance forecasted concentration or PHREEQC analysis concentration higher than the CCME guidelines.

Figure 4-1: Total Cyanide Forecasted Concentration



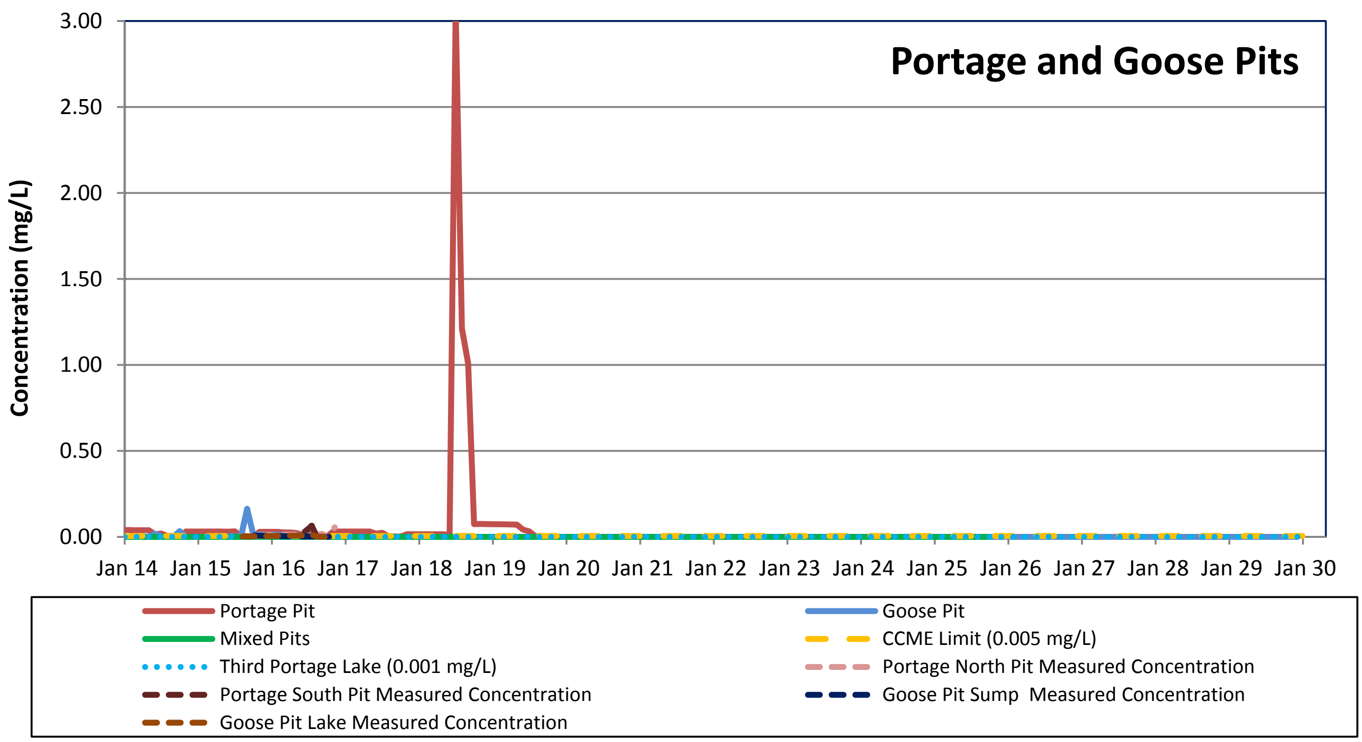
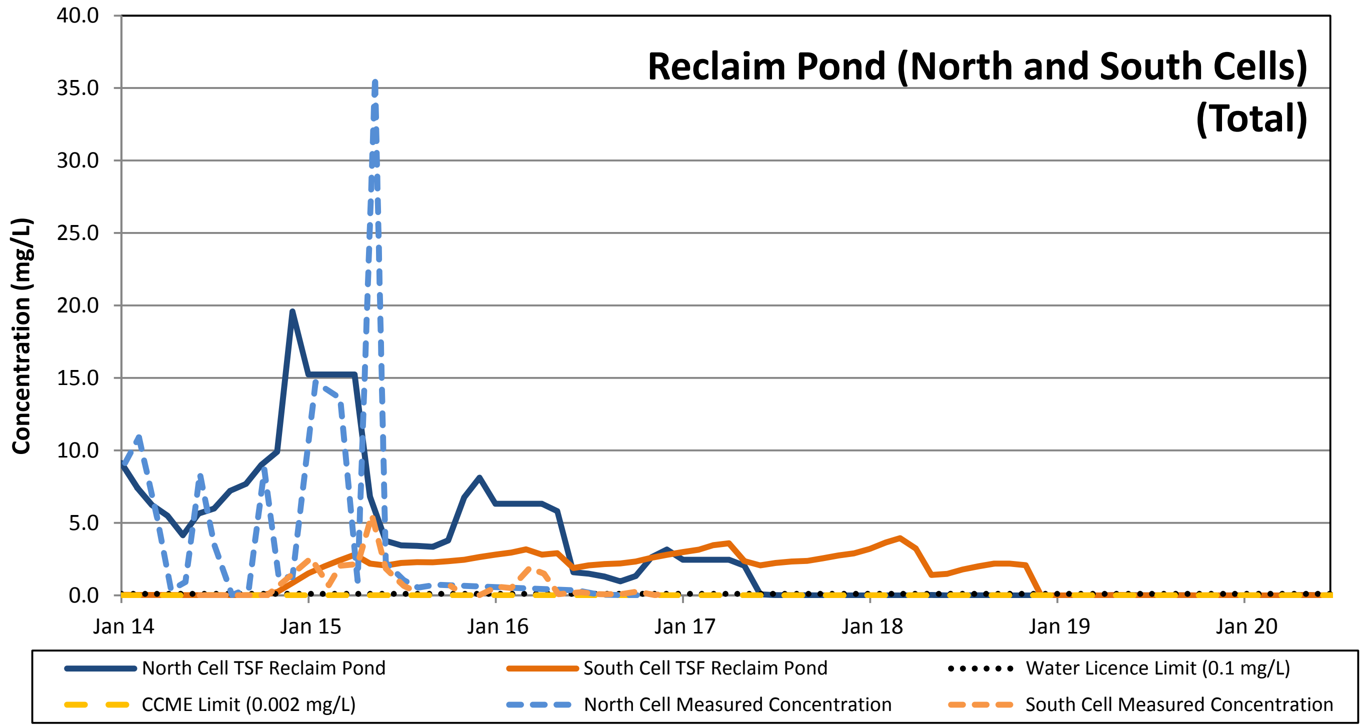


Figure 4-2: Total Copper Forecasted Concentration



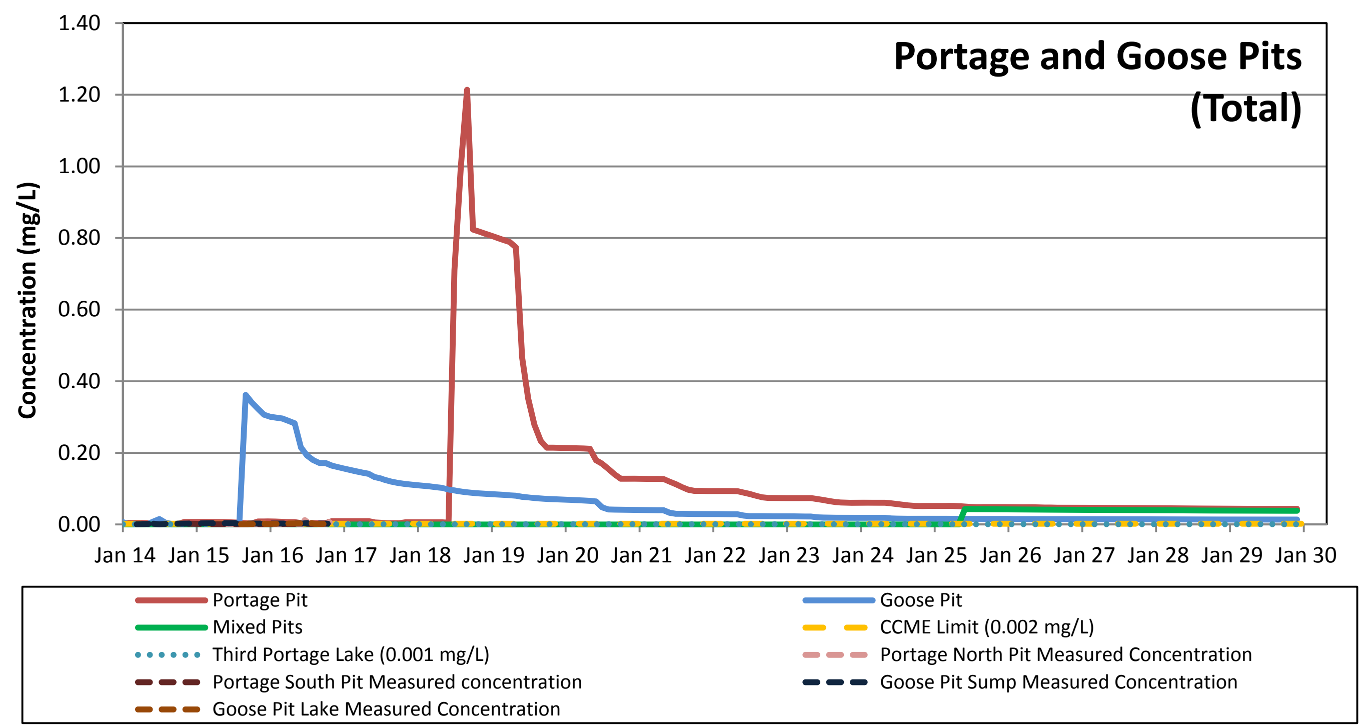
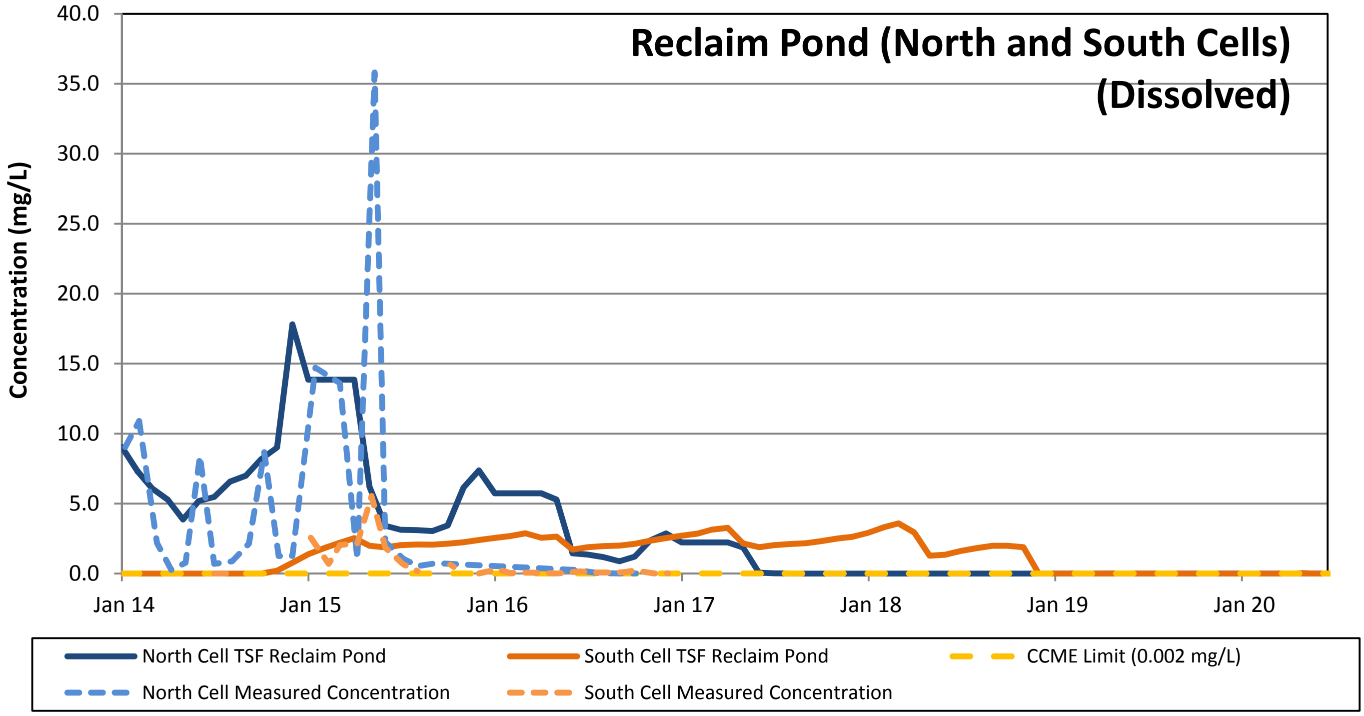


Figure 4-3: Dissolved Copper Forecasted Concentration



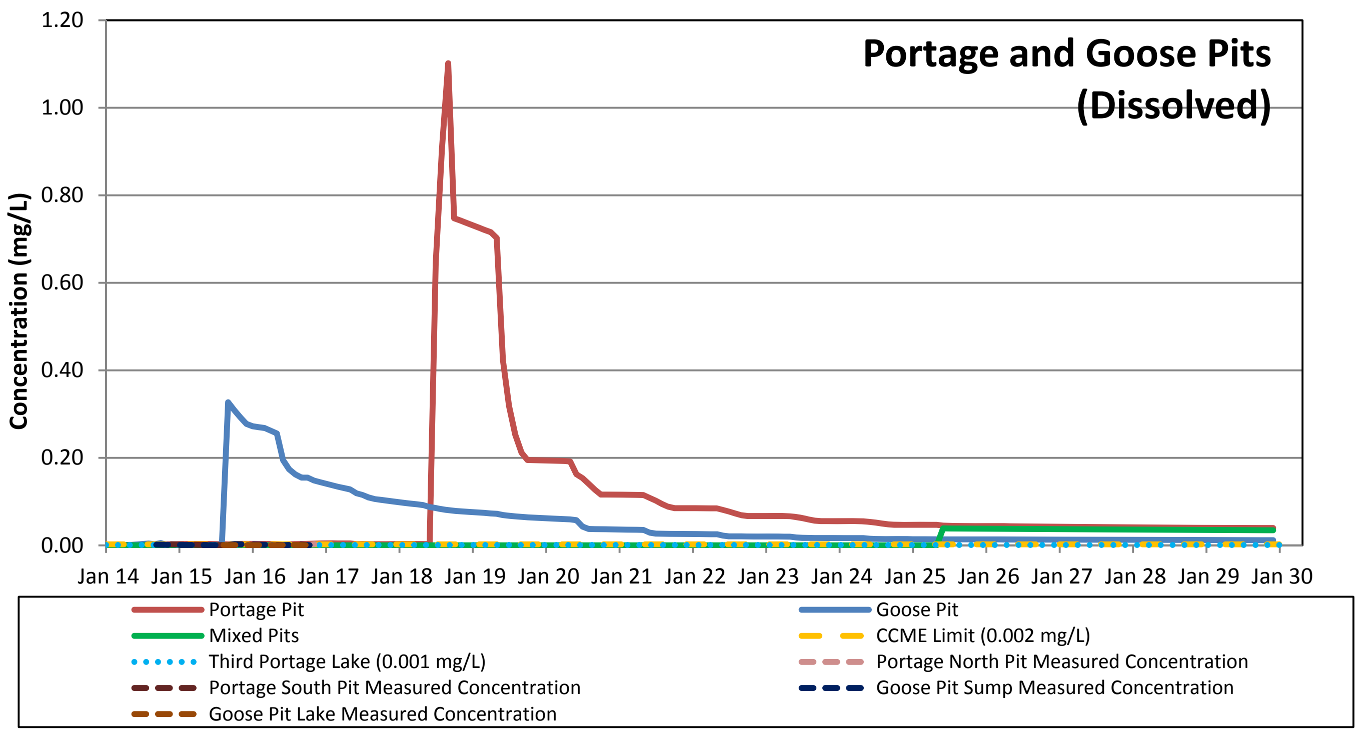
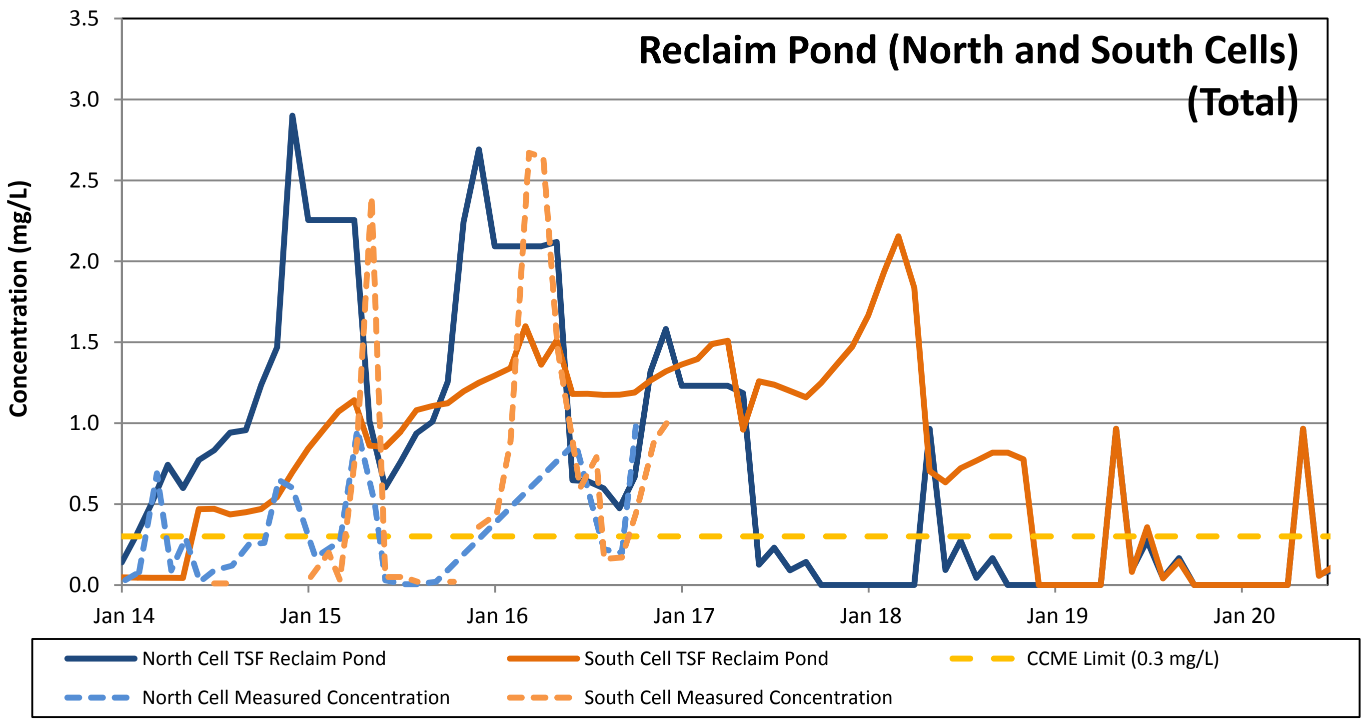


Figure 4-4: Total Iron Forecasted Concentration



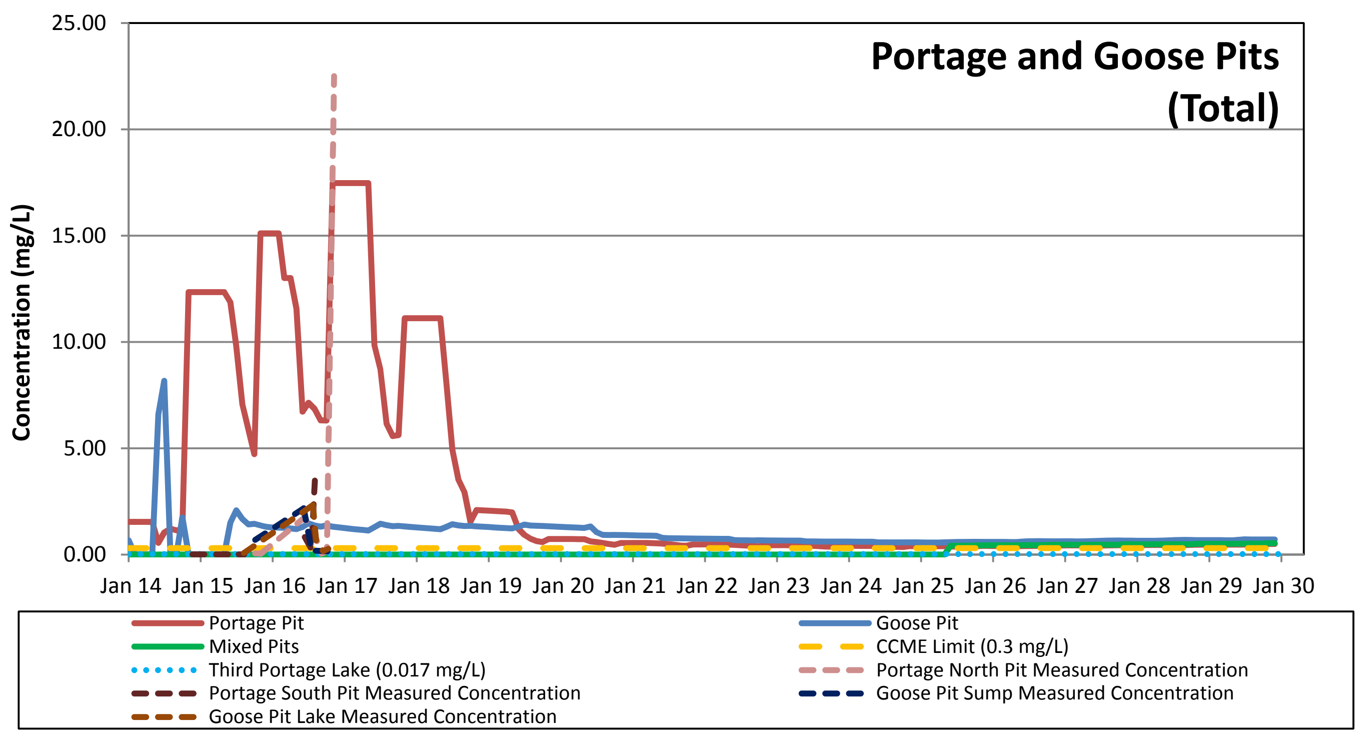
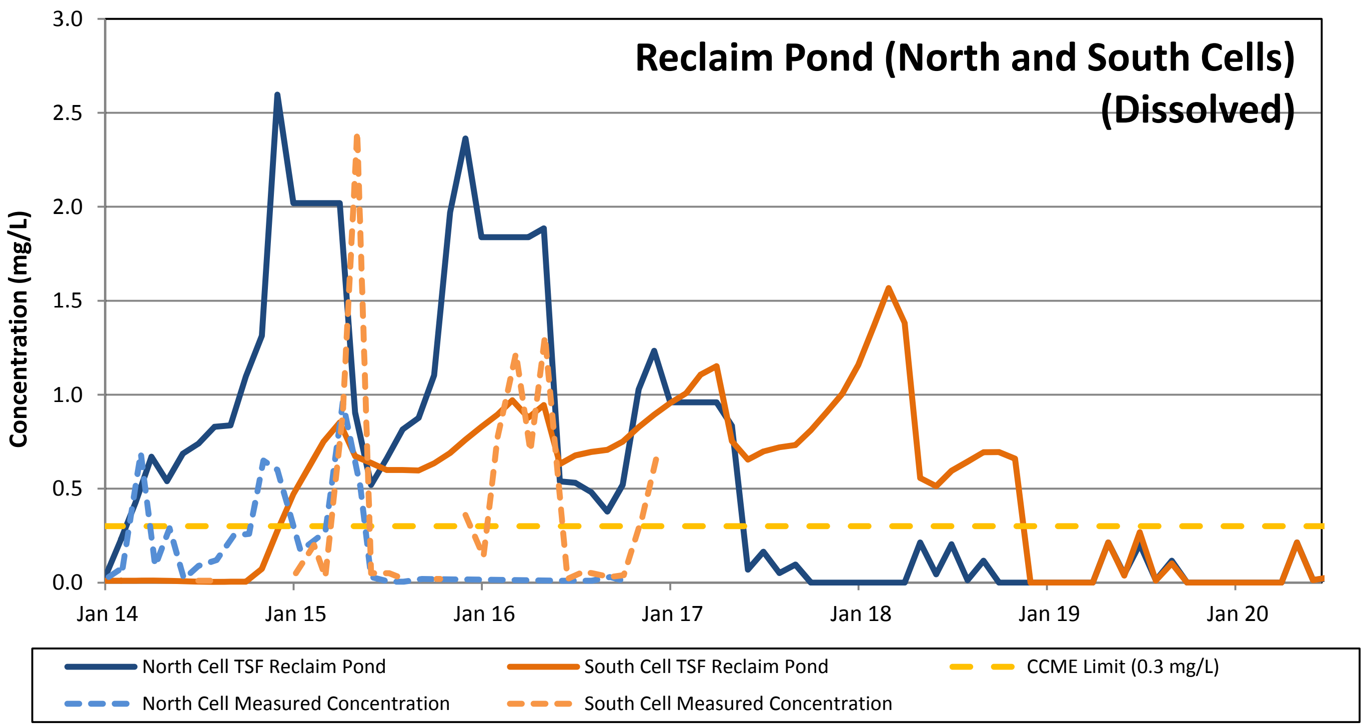


Figure 4-5: Dissolved Iron Forecasted Concentration



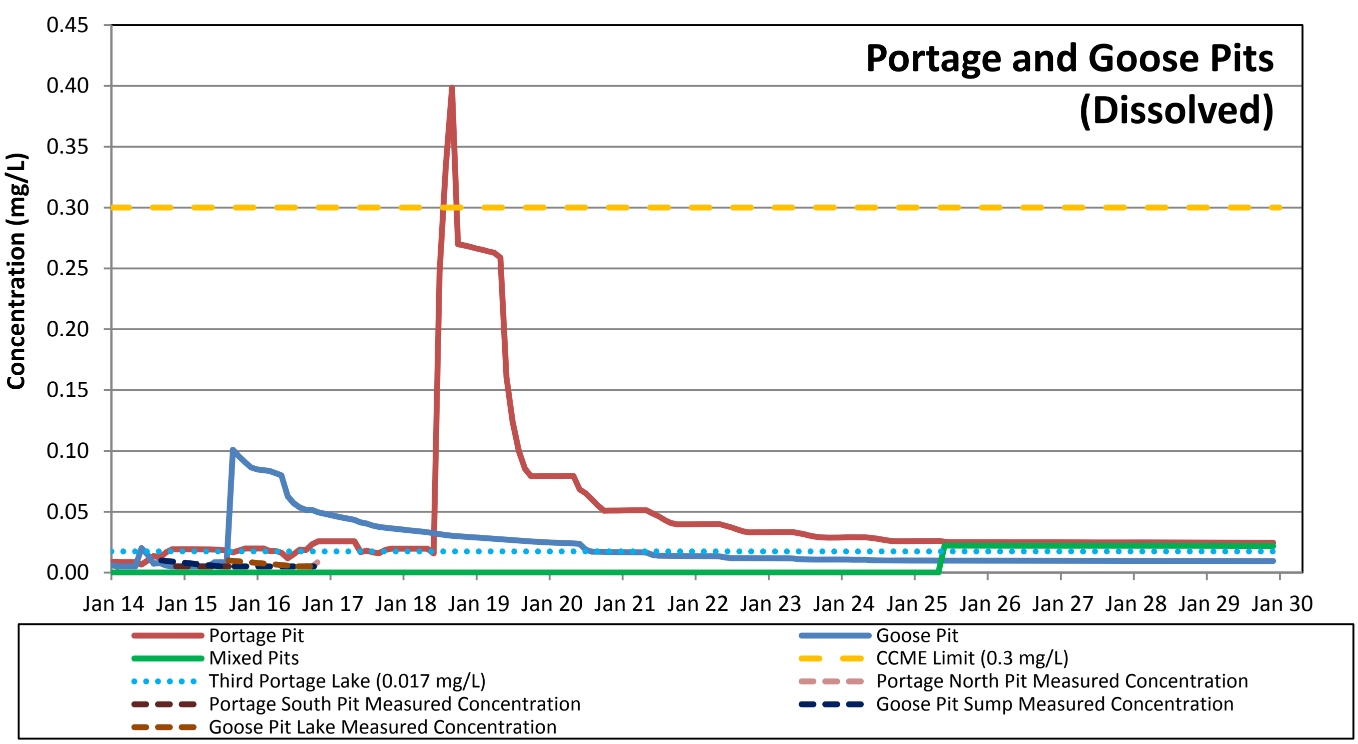
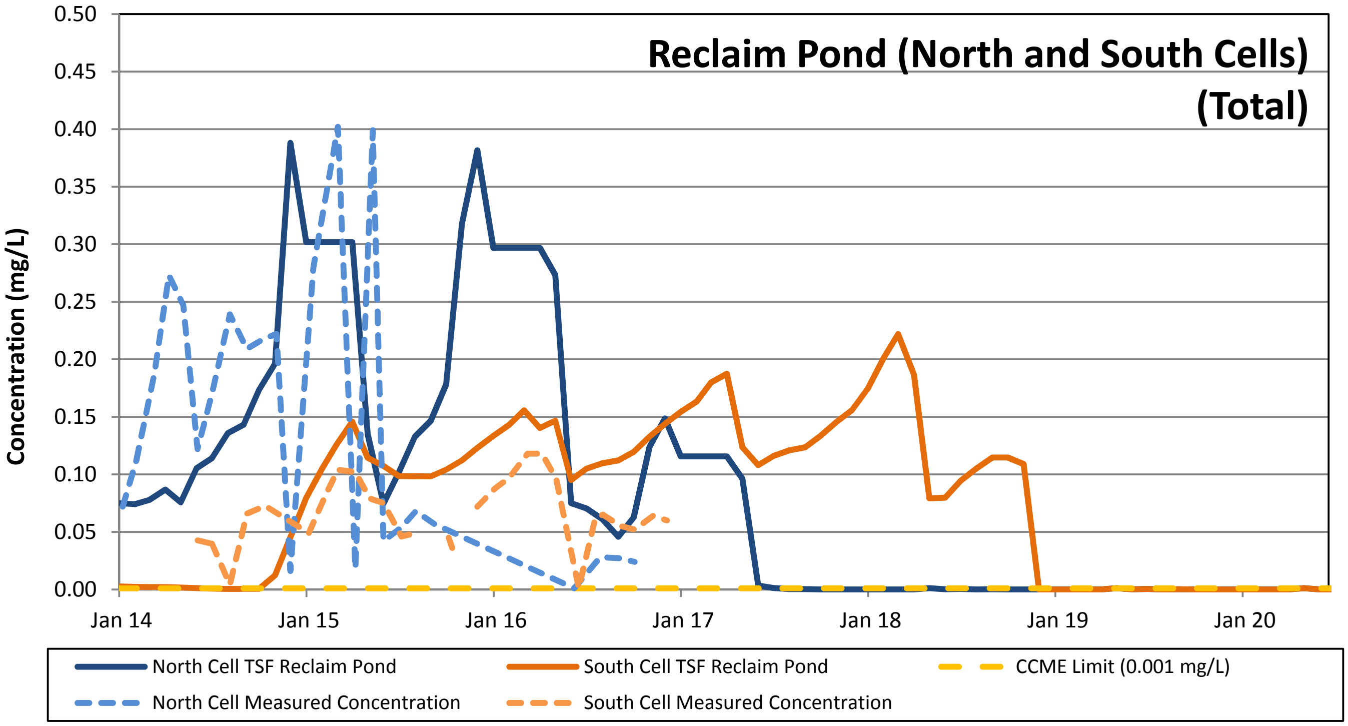


Figure 4-6: Total Selenium Forecasted Concentration



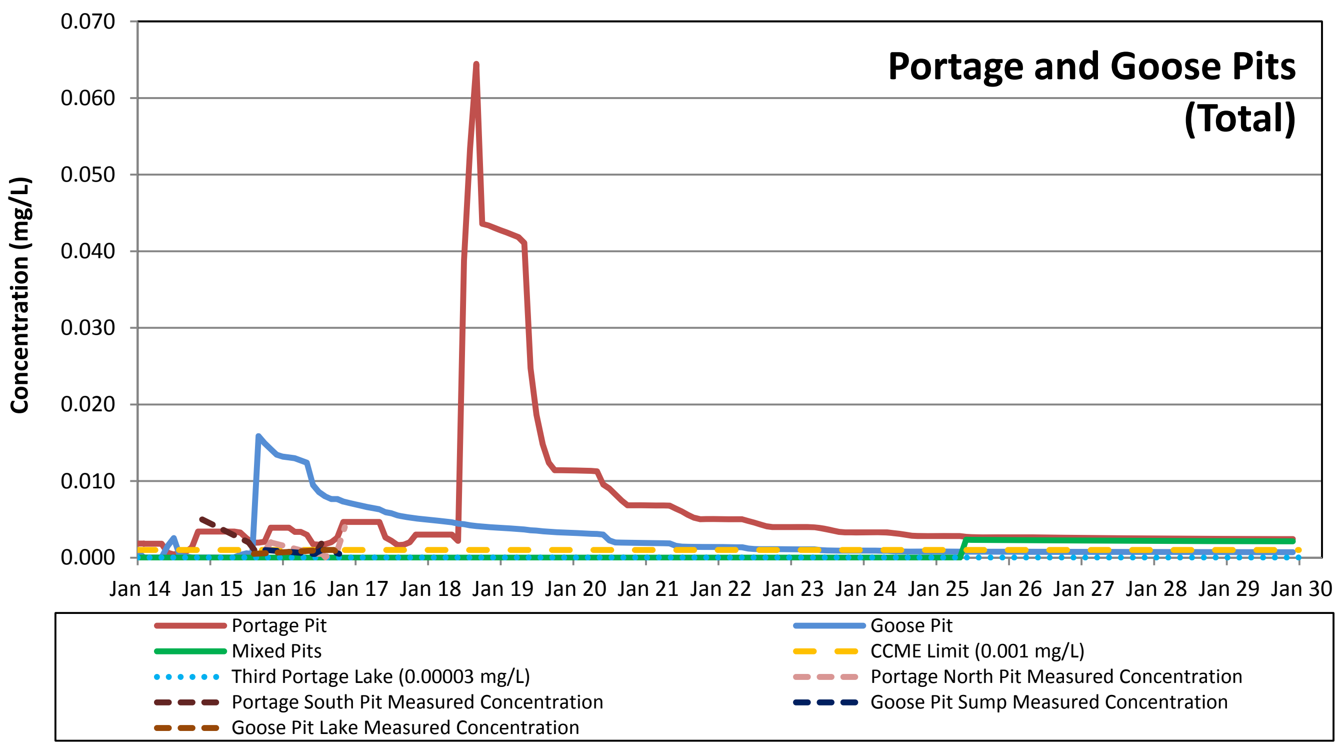
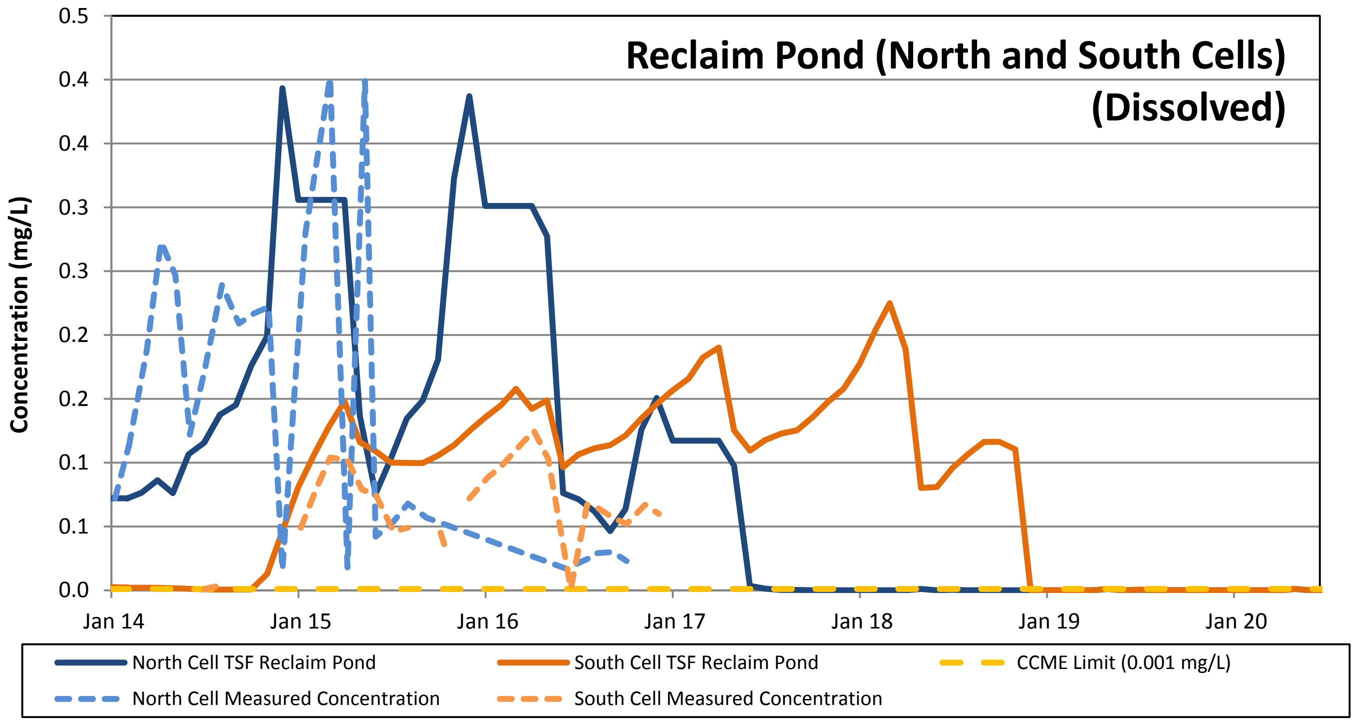


Figure 4-7: Dissolved Selenium Forecasted Concentration



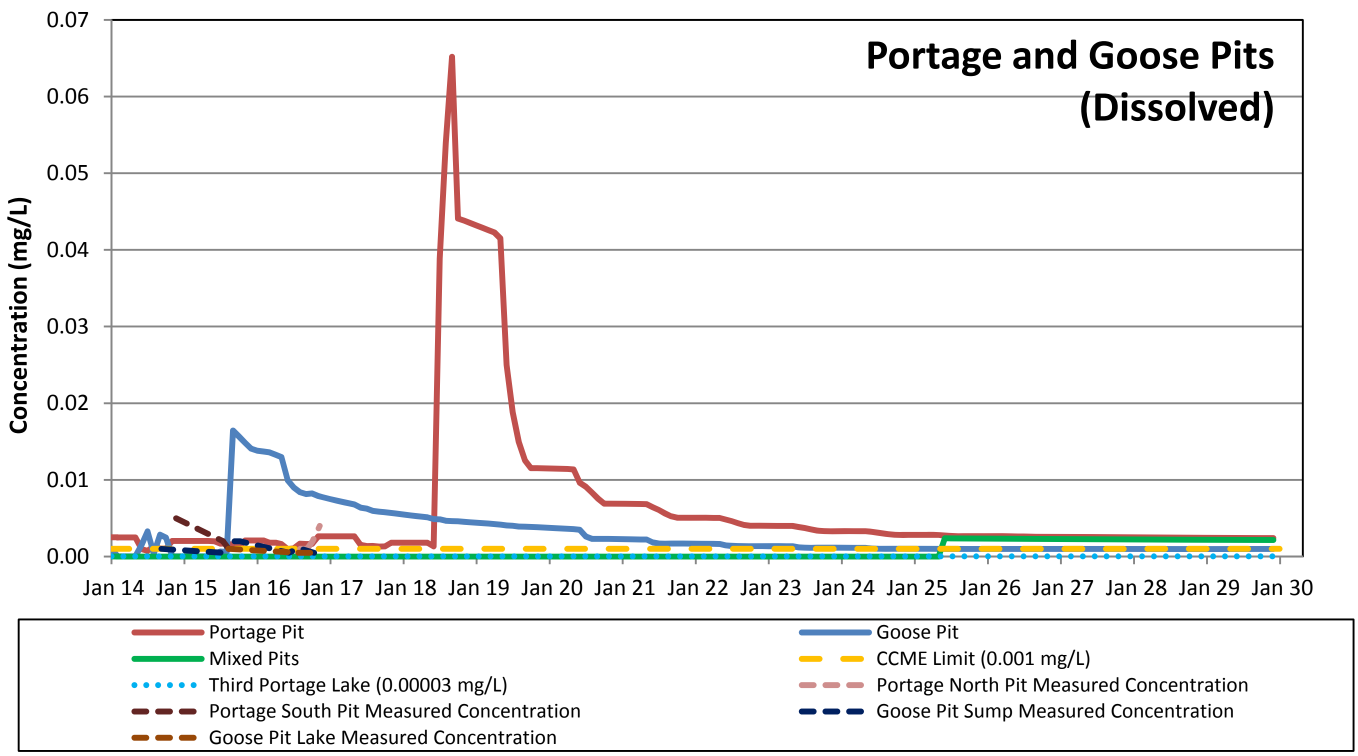
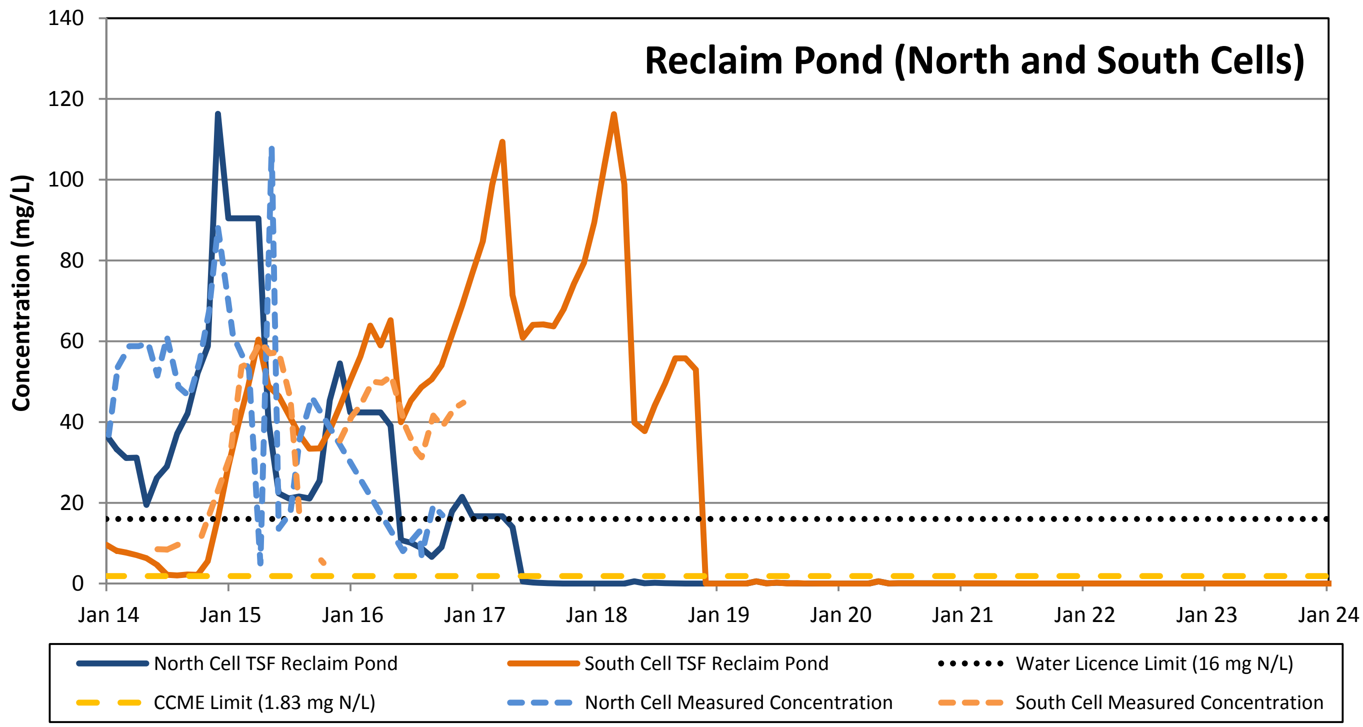


Figure 4-8: Total Ammonia Forecasted Concentration



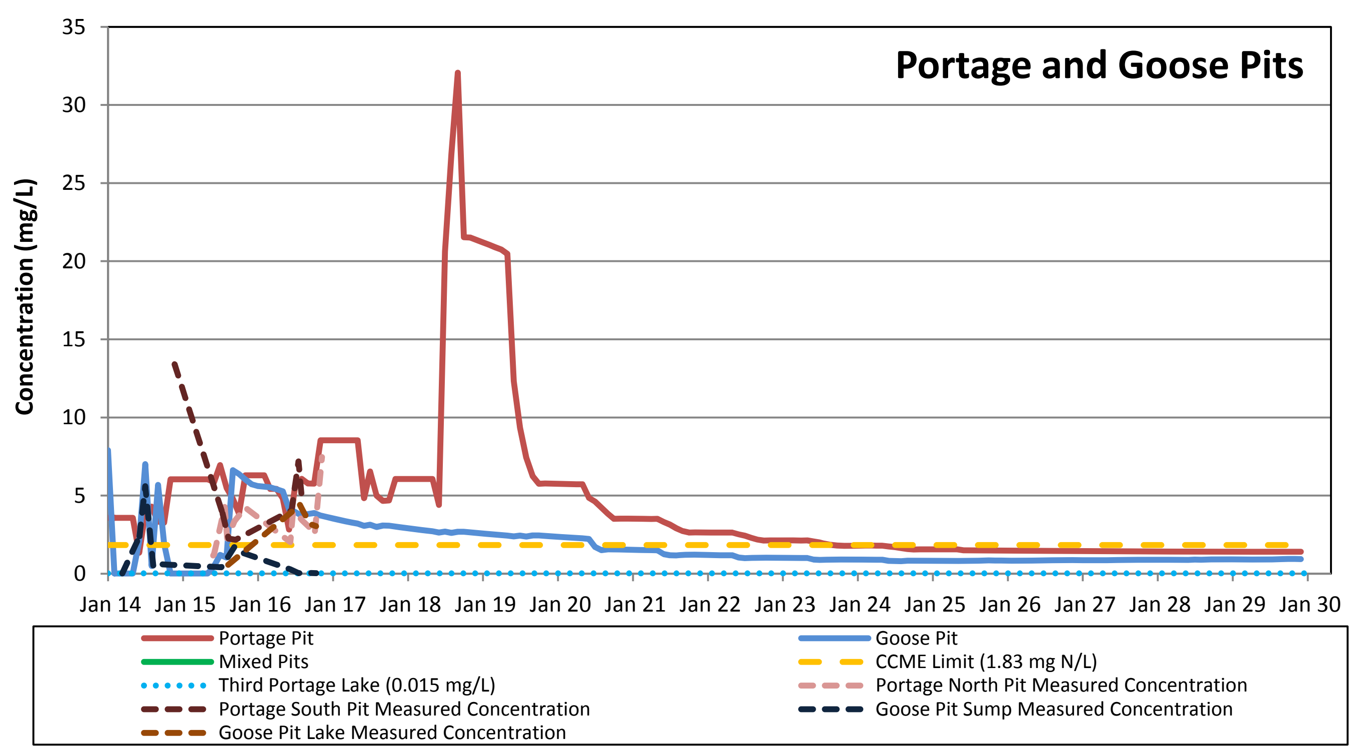
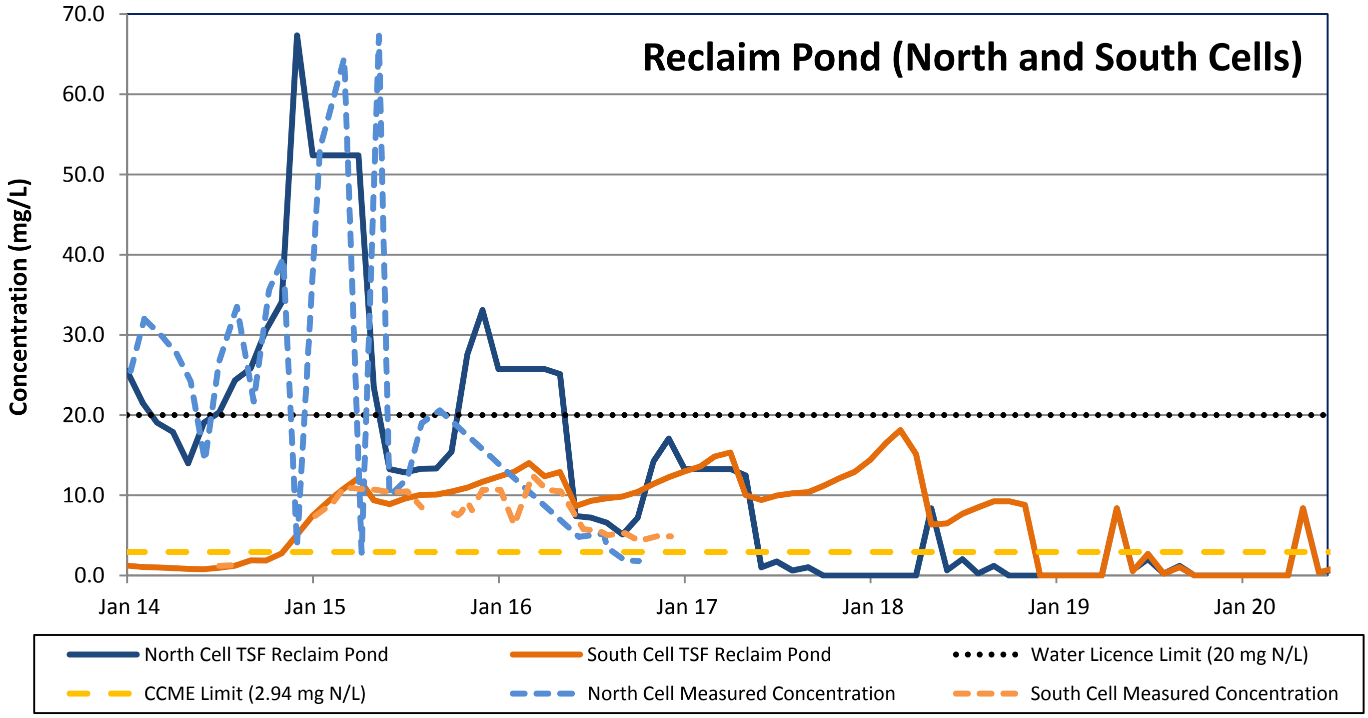


Figure 4-9: Nitrate Forecasted Concentration



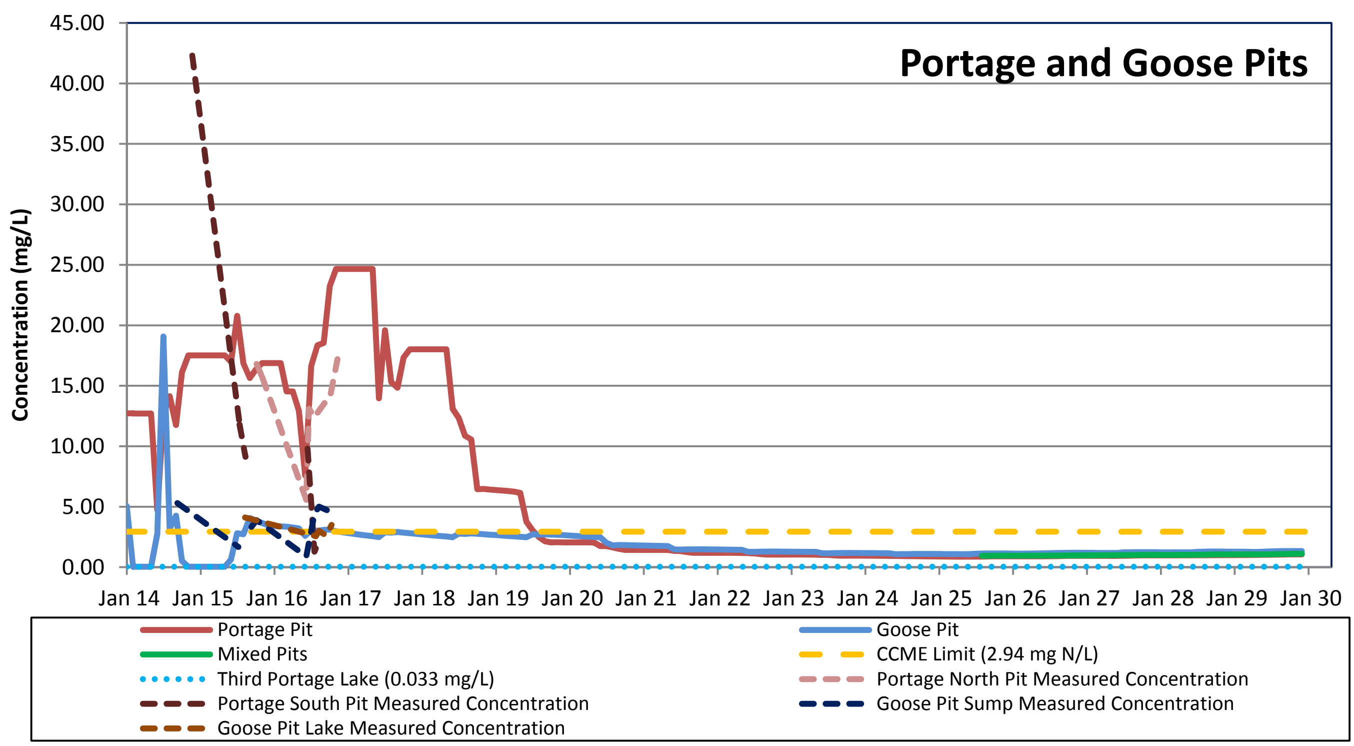


Figure 4-10: Chloride Forecasted Concentration

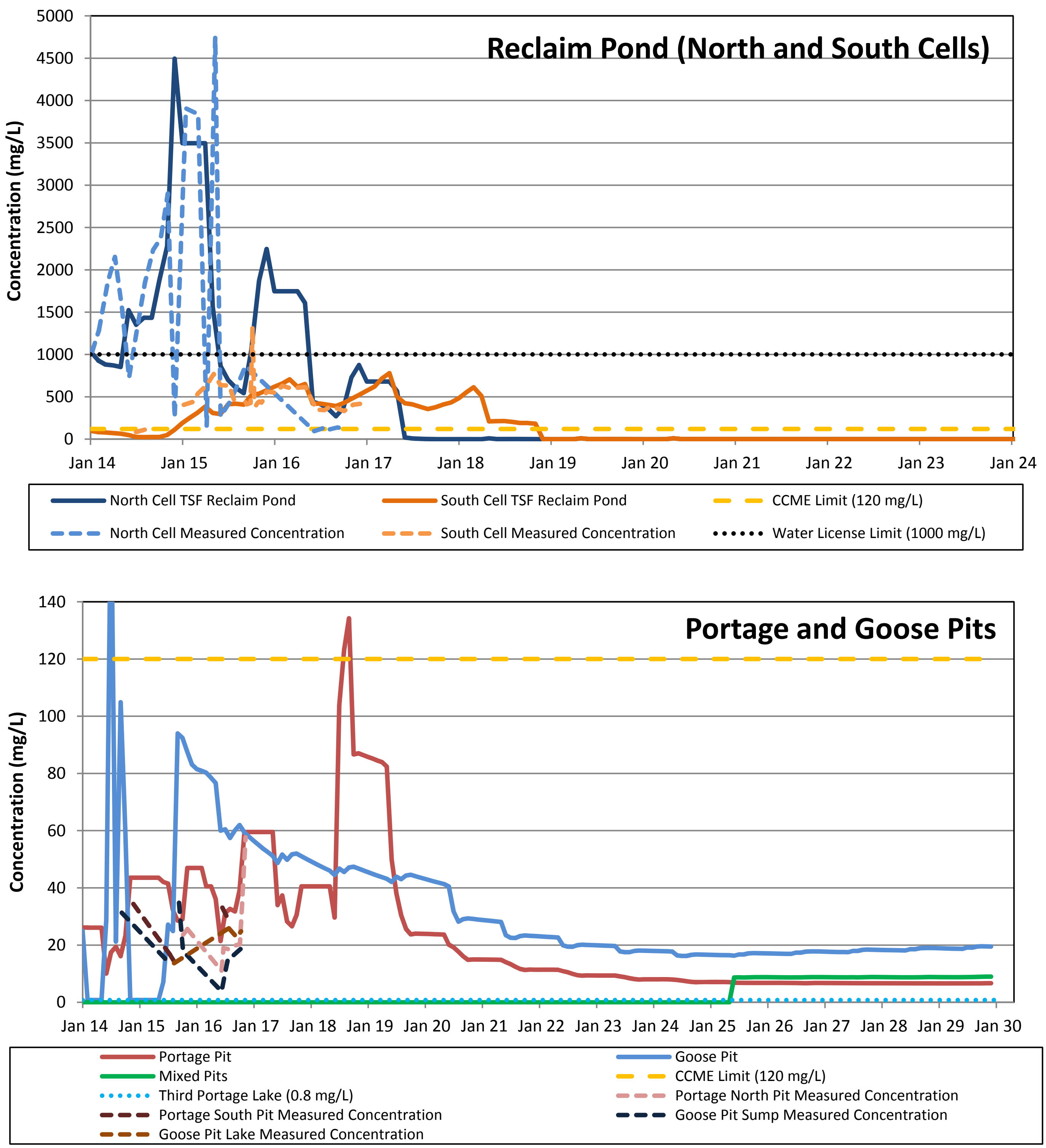
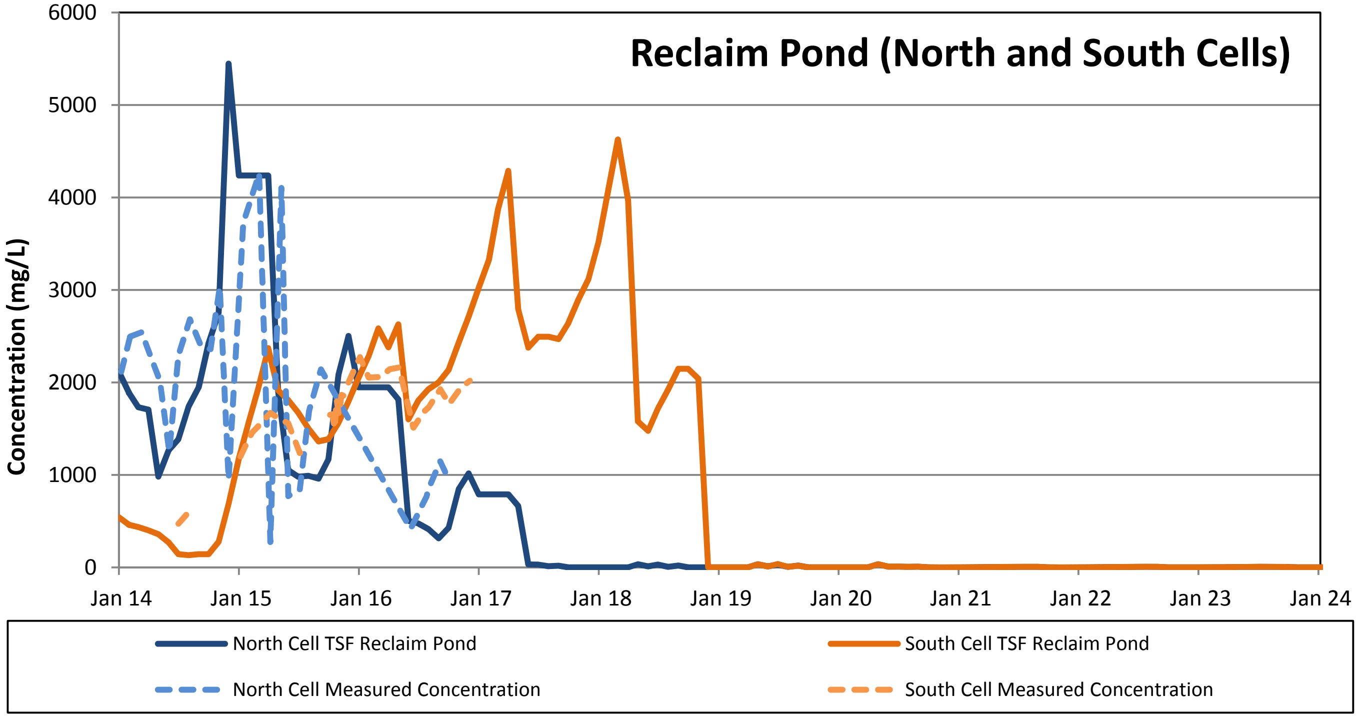


Figure 4-11: Sulphate Forecasted Concentration



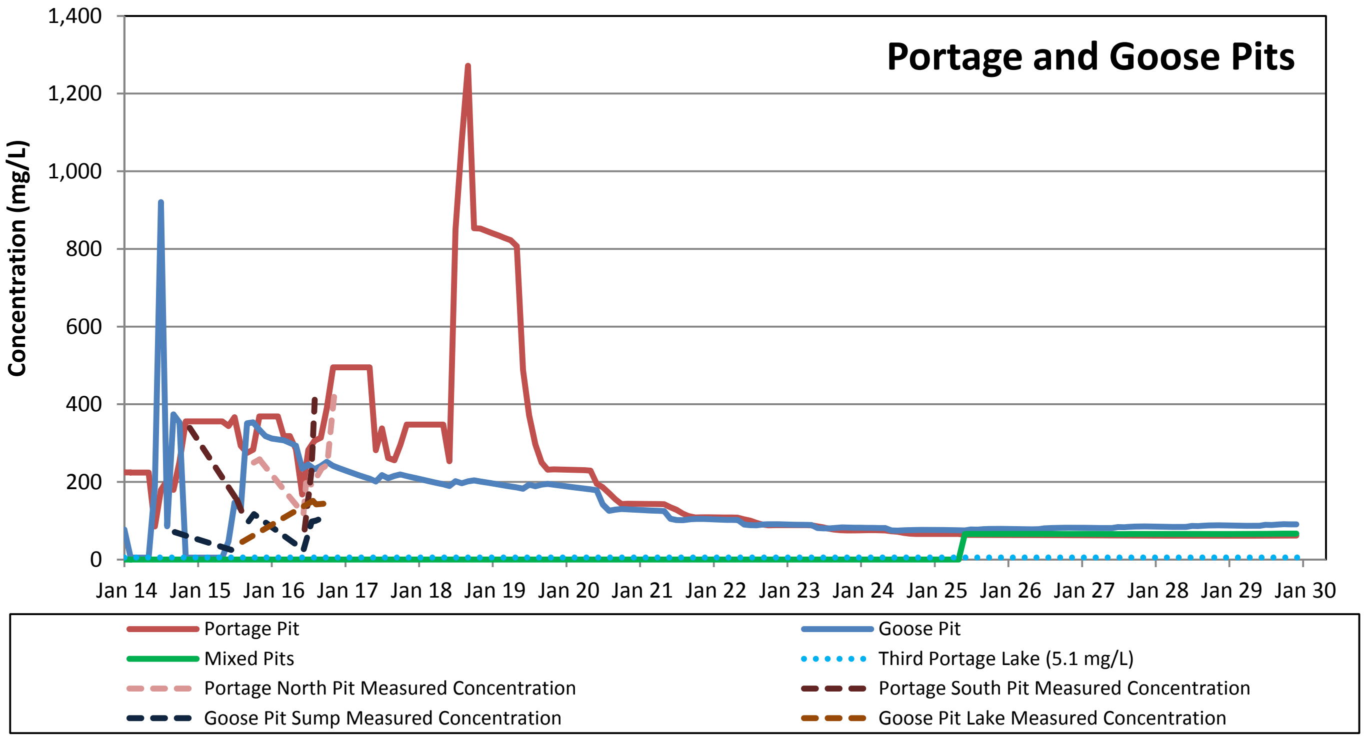
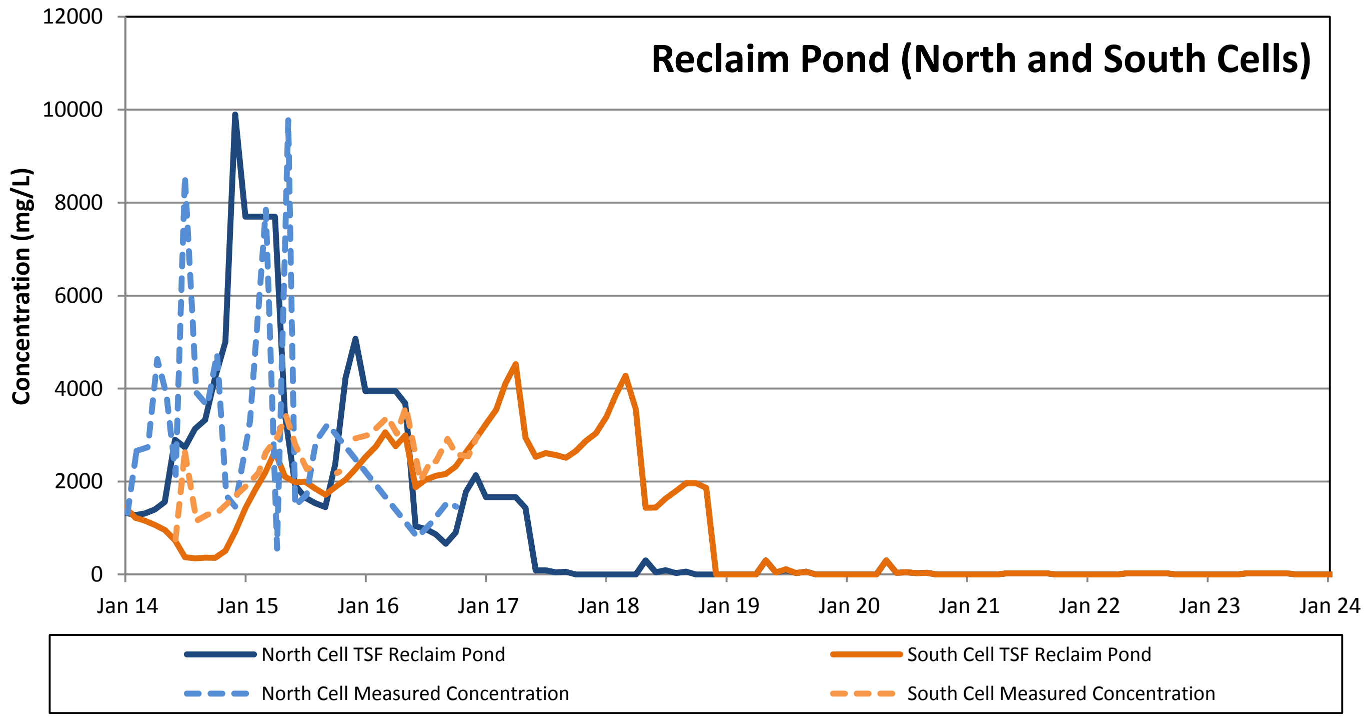


Figure 4-12: Total Dissolved Solids Forecasted Concentration



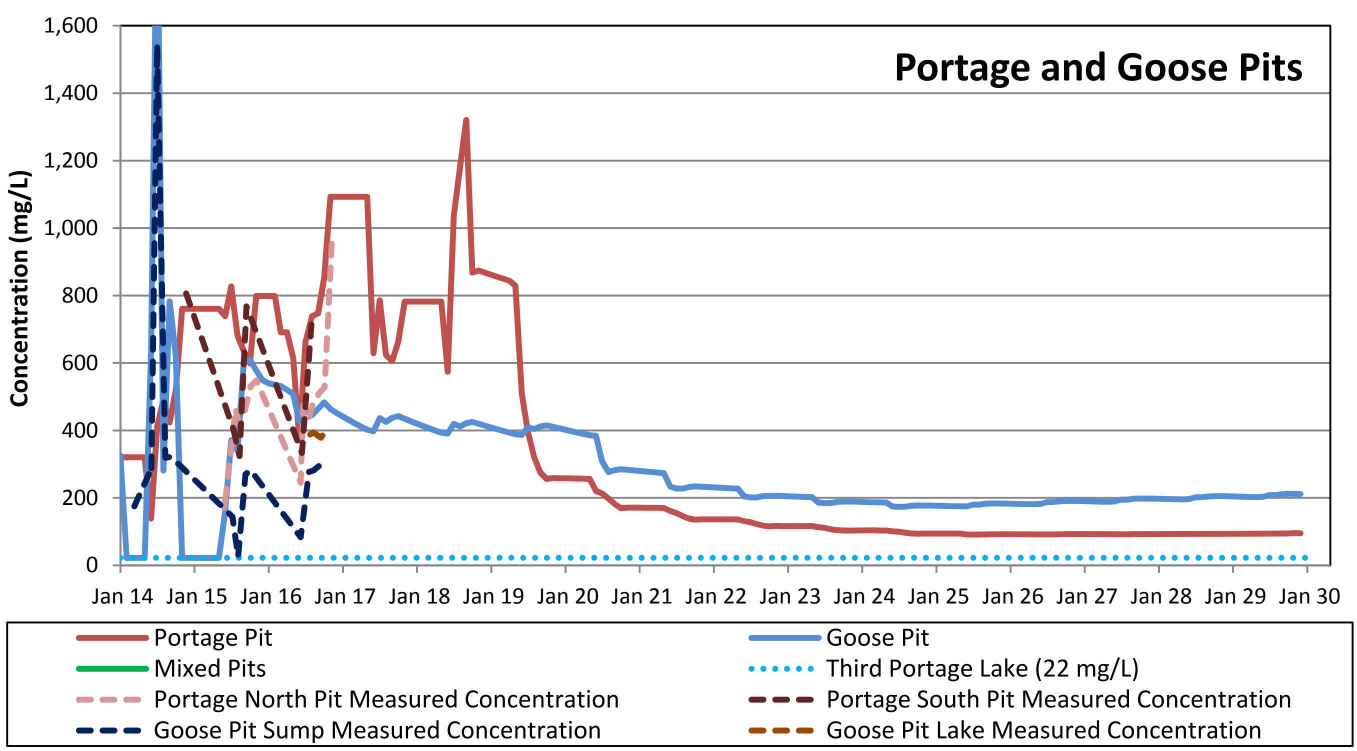


Figure 4-13: Comparison of Forecasted Dissolved Copper – North Cell TSF Reclaim Pond

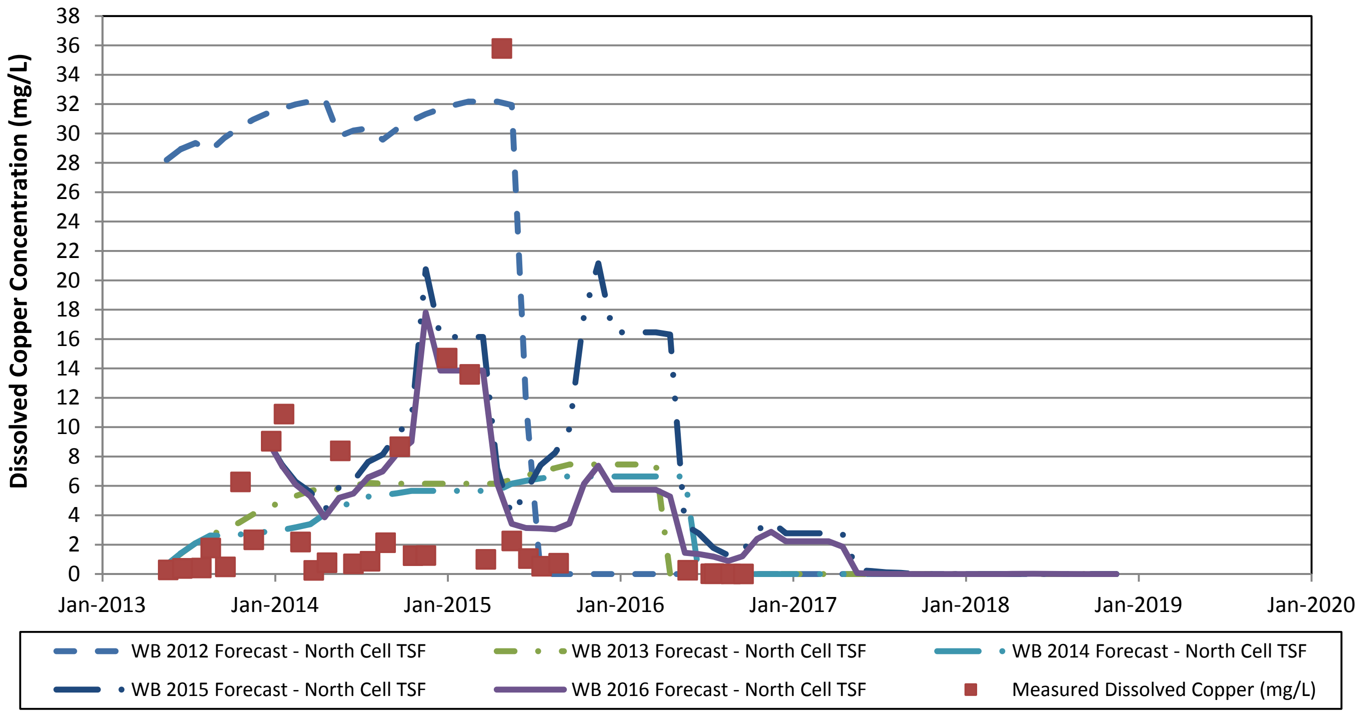


Figure 4-14: Comparison of Forecasted Dissolved Copper – South Cell TSF Reclaim Pond

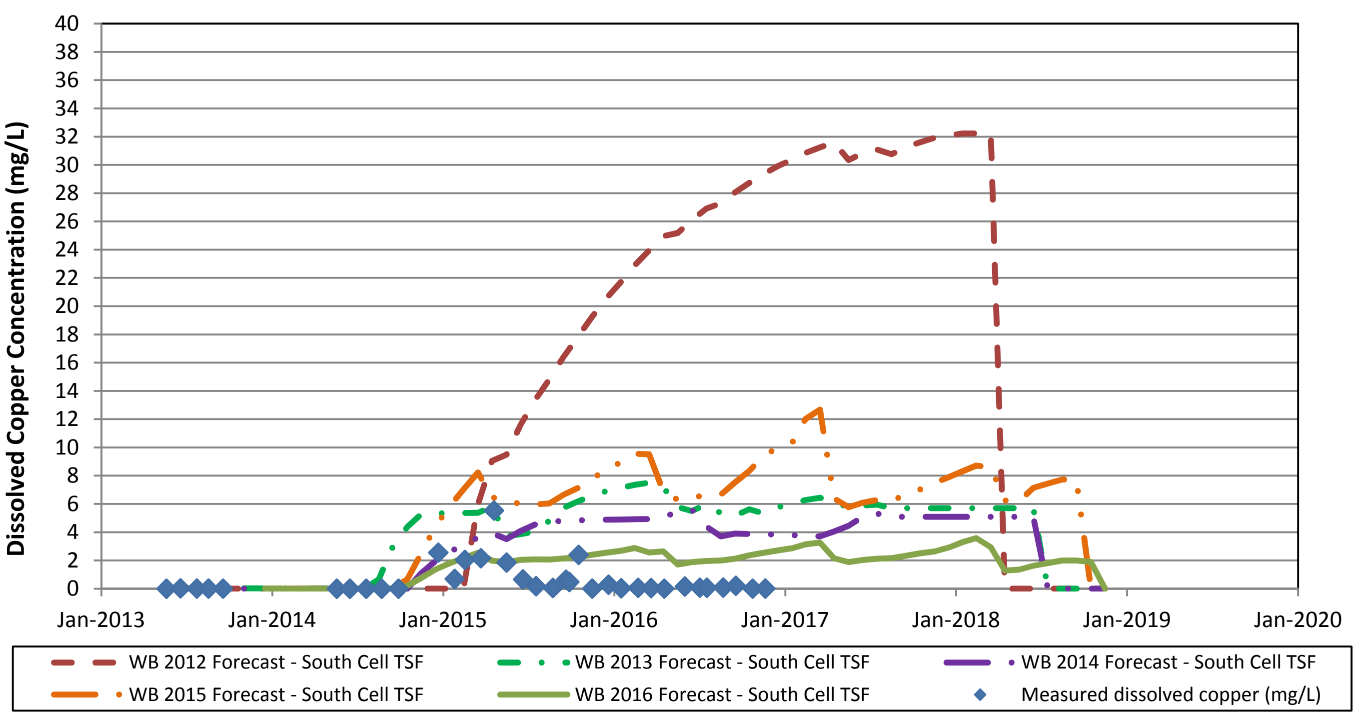


Figure 4-15: Comparison of Forecasted Chloride – North Cell TSF Reclaim Pond

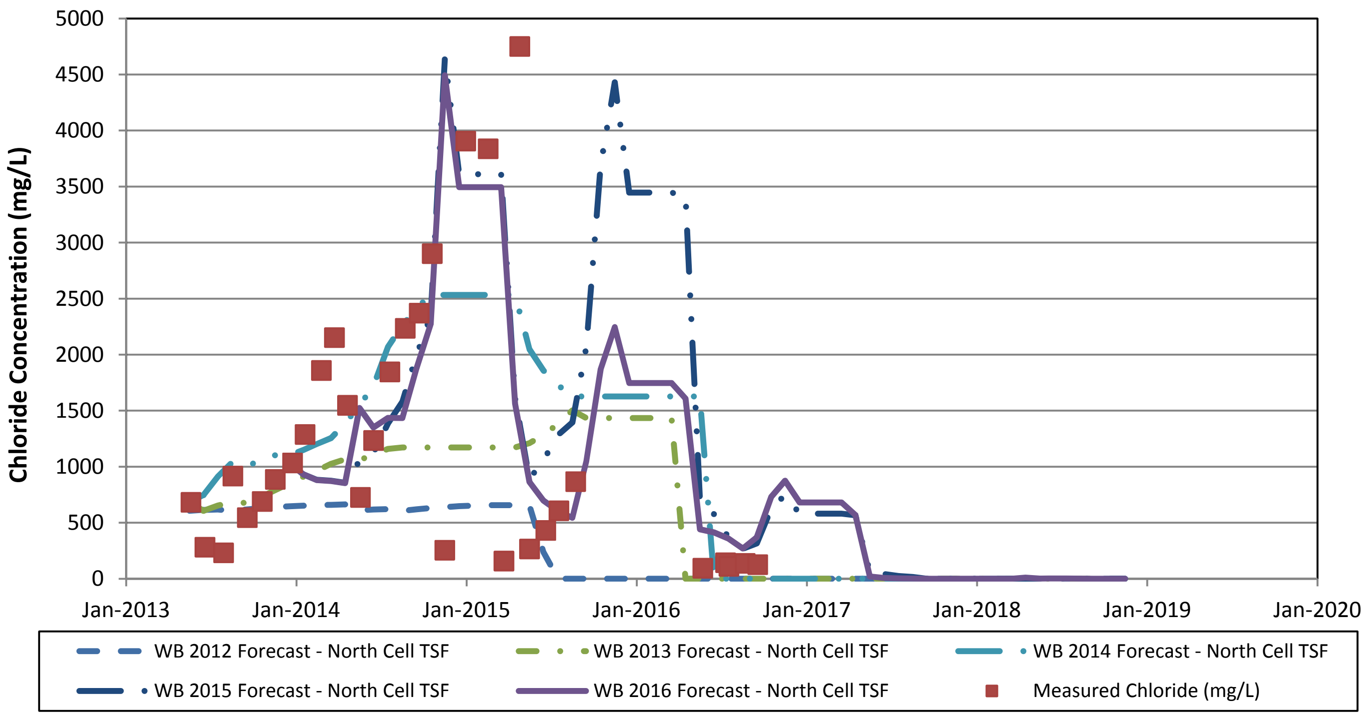
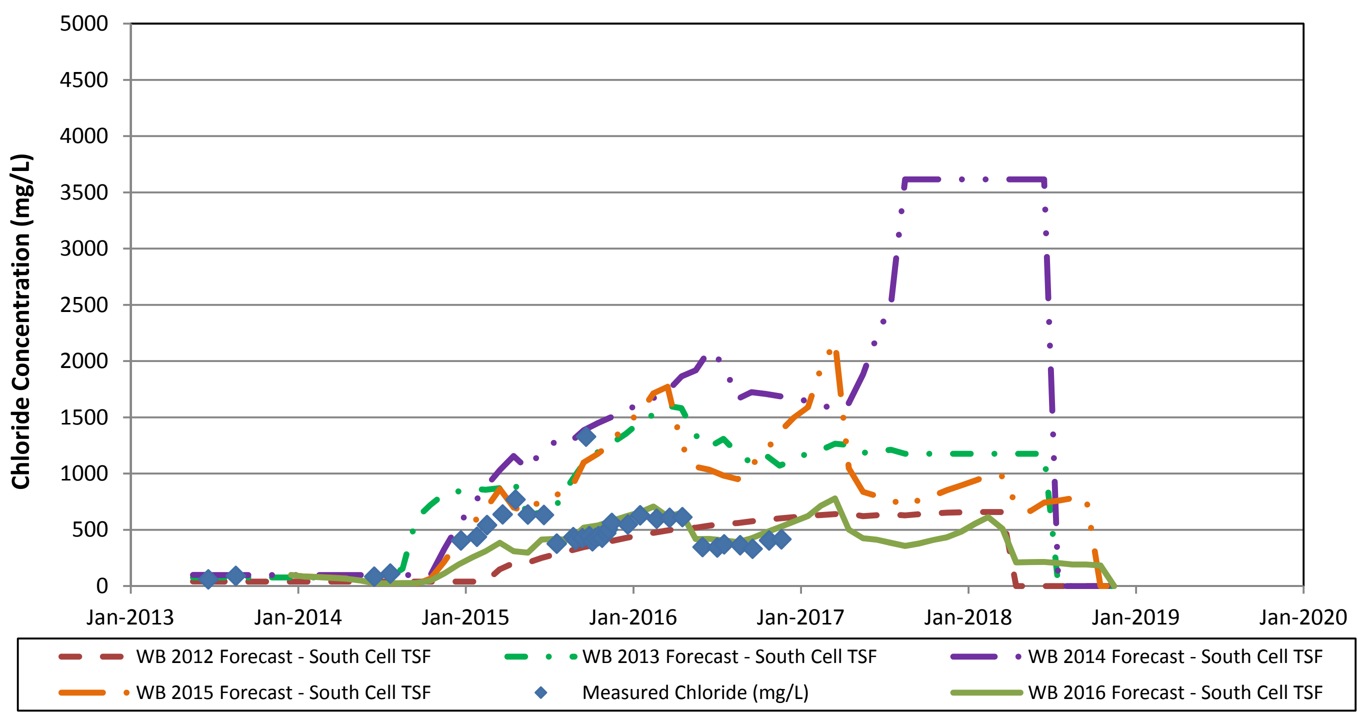


Figure 4-16: Comparison of Forecasted Chloride – South Cell TSF Reclaim Pond



4.3 Treatment Requirements

4.3.1 Possible Treatment Approach

Based on the results of the water quality forecast mass balance presented in section 4.2.4, treatment may be required for heavy metals, fluoride, arsenic, selenium and total nitrogen. Treatment could be undertaken at the South Cell TSF Reclaim Pond or in the Portage Pit.

> If high metal concentrations persist, such as iron, copper, aluminum and chromium, they can be removed through pH adjustment: caustic or lime can be added to the effluent to increase the pH to 9, causing the formation of metal hydroxide precipitates, which settle out. The different treatment options that may be considered to implement the precipitation of heavy metals are listed below:

- The existing Attenuation Pond water treatment plant (WTP) can be modified for copper precipitation with the addition of lime or caustic dosing system. The water from the South Cell TSF pond can be pumped to the WTP for treatment, with the treated water recycled back to the pond. Alternatively, the pH of the mill effluent could be raised prior to discharge to the TSF.
- Treatment in situ at South Cell TSF Reclaim Pond or at Portage pit.
- pH adjustment of the treated water will be required prior to its release or reconnection to the surface water by dike breaching.
- TSS removal will be an important part of the treatment system. As the forecasted data showed, a fraction of the metal present in the water column is as a particulate.

> If fluoride and/or arsenic concentrations could present an issue, one of the most efficient techniques to reduce their concentration is by coagulation-clarification/filtration process. Possible treatment options includes the following:

- The existing Attenuation Pond water treatment plant (WTP) can be used to coagulate and clarify the reclaim water. The water from the South Cell TSF pond can be pumped to the WTP for treatment, with the treated water recycled back to the pond.
- For fluoride, aluminum sulphate can be used to adsorb the ion and co-precipitate onto the aluminum hydroxide floc.
- For arsenic, it can be co-precipitated using an iron based coagulant, such as ferric sulphate, to form a ferric-arsenate precipitate.
- A small portable treatment unit could also be installed on the outskirts of Portage Pit.

> Selenium is present in the reclaim water mostly as a selenate (Se(VI)) species. If selenium remains an issue, one possible treatment option is to adsorb the selenium on a specialized media. Other treatment that could be considered is biotreatment or chemical reduction followed by coagulation using an iron base coagulant. If the selenium was in the form of selenite (Se(IV)), it could also be removed by coagulation-clarification via co-precipitation.

> If high total nitrogen concentrations persist, even after simulating or testing during one summer the effects of natural degradation in the pits at Meadowbank, more active treatment solutions could be implemented, such as:

- Mechanical aerations could be installed in either the South Cell TSF Reclaim Pond, or in Portage pit.
- The reclaim water in the South Cell TSF can be treated "in-situ" by either stripping or biological treatment process.
- Alternative treatment technology like snow making could be considered.

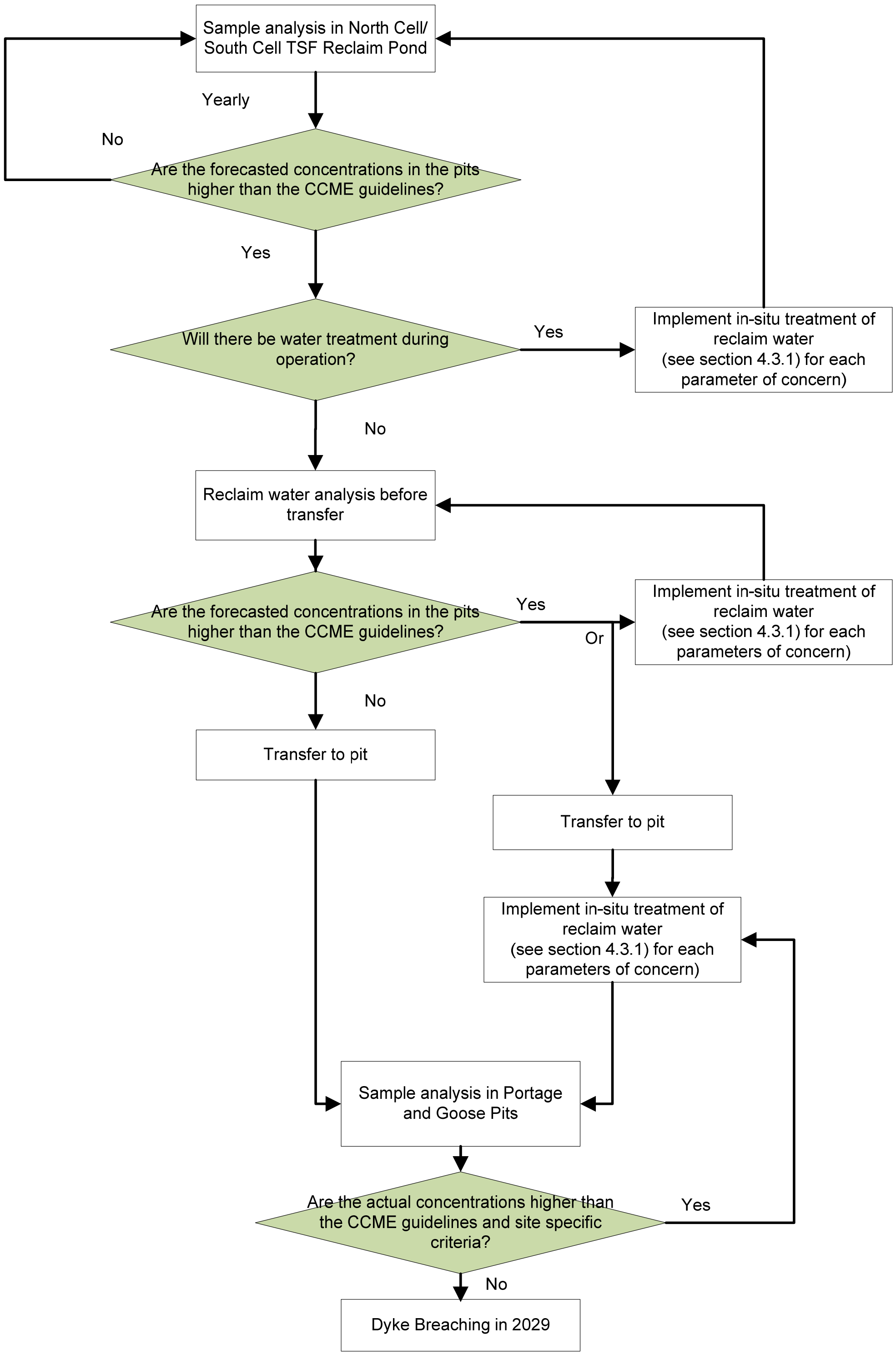
- pH adjustment of the treated water, near neutral pH, in order to ensure that most of the ammonia present is as ammonium (NH_4+) instead of un-ionized ammonia (NH_3).

These technologies should be studied and evaluated in detail to determine if they are applicable to site and effluent conditions at Meadowbank. Laboratory and/or in-situ pilot tests should also be considered to validate the treatment method to be selected if required.

4.3.2 Water Treatment Decision Flow Process

Figure 4-17 presents a high-level decision tree flow process that could be used by Agnico to help in their decision on when to consider implementing a water treatment technology and the type of water treatment technology to implement based on the parameters of concern.

Figure 4-17: Water Treatment Decision Flow Process



5.0 Vault Water Quality Forecasting

The Vault area is located around 10 km North East of the facilities of the Portage Area of Meadowbank, including among others a mining pit, an attenuation pond, a rock storage facility and a water treatment plant.

Water is transferred from Vault Pit to the Vault Attenuation Pond, which, when required, goes through the water treatment plant in operation, designed for total suspended solids removal. The water is then currently discharged each summer to Wally Lake until 2018. If the water quality in the Vault Attenuation Pond meets the Water License criteria, it is transferred directly to Wally Lake. Vault Pit will be flooded from 2018 to 2025, and Vault Dike will be breached in 2029 if water quality criteria are met.

A review of the chemical analysis for water samples collected in the Vault area was undertaken by SLI in order to identify contaminants that were currently either above the discharge criteria or present in significant concentration. The discharge criteria applied to mining effluents discharged to the environment in this case is the Water License (Nunavut Water Board License, 2015). The CCME guidelines were also used as a guide to identify potential parameters that may become a problem, should they be discharged to the environment without appropriate treatment and dispersion in the receiving environment.

5.1 Review of Vault Water Quality Data

5.1.1 Review of Water Quality Discharged to Environment

A compilation of actual measured water quality data from the Vault Area sampled in 2016 was performed. The average and maximum for each parameter monitored for the Meadowbank Water Quality Forecast Model is presented in Table 5-1. Total metals were used in this analysis. For measured values that were below the detection limit, a value equal to half of the detection limit was considered in the analysis.

Table 5-1: Average and Maximum Concentrations Measured in the Vault Area for 2016

Parameters	Units	Vault Pit (ST-23)		Vault Attenuation Pond (ST-25)		Discharge to Wally Lake (ST-10)		Exposure Area in Wally Lake (ST-MMER-2-EEM-WLE)		CCME Guidelines	Water License Vault, Max. Avg Conc.
		Avg 2016	Max. 2016	Avg 2016	Max. 2016	Avg. 2016	Max. 2016	Avg 2016	Max. 2016		Part F of License
Alkalinity	mg $CaCO_3$/L	95	116	48	102	27	35	62	102	n/a	n/a
Hardness	mg $CaCO_3$/L	332	504	123	227	78	114	19	21	n/a	n/a
Total Aluminum (Al)	mg/L	0.214	0.547	0.195	0.94	0.127	0.356	0.016	0.024	0.1	1.5
Dissolved Aluminum (Al)	mg/L	0.012	0.037	0.003	0.003	0.007	0.023			0.1	1
Total Silver (Ag)	mg/L			0.0001	0.0004					0.00025	n/a
Total Arsenic (As)	mg/L	0.003	0.0056	0.0006	0.0023	0.0007	0.0041	0.0008	0.0020	0.005	0.1
Total Barium (Ba)	mg/L	0.032	0.0472	0.0275	0.0392	0.021	0.032			n/a	n/a
Total Cadmium (Cd)	mg/L	0.00018	0.00023	0.00003	0.00007	0.00002	0.00008	0.00001	0.00002	0.00004	0.002
Total Chromium (Cr)	mg/L	0.001	0.003	0.0006	0.0019	0.001	0.008			0.001	n/a
Total Copper (Cu)	mg/L	0.004	0.0124	0.0025	0.0076	0.003	0.006	0.001	0.001	0.002	0.1
Total Iron (Fe)	mg/L	0.650	1.3	0.6033	1.71	0.266	0.510	0.020	0.020	0.3	n/a
Total Manganese (Mn)	mg/L	0.146	0.243	0.1907	0.5612	0.059	0.103			n/a	n/a
Total Mercury (Hg)	mg/L	0.000016	0.000050	0.001686	0.01	0.00003	0.00041	0.000005	0.000005	0.000026	0.004

Parameters	Units	Vault Pit (ST-23)		Vault Attenuation Pond (ST-25)		Discharge to Wally Lake (ST-10)		Exposure Area in Wally Lake (ST-MMER-2-EEM-WLE)		CCME Guidelines	Water License Vault, Max. Avg Conc.
		Avg 2016	Max. 2016	Avg 2016	Max. 2016	Avg. 2016	Max. 2016	Avg 2016	Max. 2016		Part F of License
Total Molybdenum (Mo)	mg/L	0.066	0.0964	0.0113	0.0276	0.007	0.013	0.000	0.001	0.073	n/a
Total Nickel (Ni)	mg/L	0.007	0.0135	0.0056	0.0128	0.005	0.023	0.000	0.001	0.025	0.2
Total Lead (Pb)	mg/L	0.000	0.00015	0.0002	0.00015	0.001	0.006	0.0002	0.0002	0.001	0.1
Total Selenium (Se)	mg/L	0.004	0.009	0.0006	0.001	0.0005	0.0005	0.0005	0.0005	0.001	n/a
Total Zinc	mg/L	0.00075	0.001	0.0045	0.011	0.002	0.005	0.001	0.001	0.03	0.2
Ammonia (unionized NH_3)	mg N/L	0.1125	0.14	0.0142	0.03	0.006	0.010	0.005	0.005	0.016	n/a
Total Ammonia Nitrogen (NH_3-NH_4)	mg N/L	5.04	6.94	1.2	2.51	0.74	1.62	0.03	0.07	1.83	20
Chloride	mg/L	29.3	44.8	9.7	12.9	6.0	8.5			120	500
Fluoride (F)	mg/L	0.19	0.2	0.14	0.24					0.12	n/a
Nitrate (NO_3)	mg N/L	19.9	41.6	2.8	6.7	3.2	6.3	0.2	0.2	2.94	50
Total Cyanide (CNt)	mg/L	0.078	0.137	0.012	0.034	0.006	0.039	0.002	0.003	0.005	n/a
Sulphate (SO4)	mg SO_4/L	144	161	65	149	45	71			n/a	n/a
Total dissolved solids	mg/L	529	723	216	377	134	182			n/a	1400

The yellow cells represent the concentrations that are higher than CCME guidelines for Protection of Aquatic Life, which are used for comparison purpose only. The water discharge to Wally Lake is governed by the Water License requirements only, including MMER. Any parameters measured at the discharge to Wally Lake (ST-10) that have concentrations that are above the Water License discharge criteria would be highlighted in red, which is not the case based on the samples taken in 2016.

Based on this evaluation, the concentration of the parameters discharged to Wally Lake are below the Water License requirements. Furthermore, the concentrations of metals, chlorides and sulfates in the water sampled in the Vault Pit and the Vault Attenuation Pond are relatively low compared to the Water License requirements. Finally, all samples measured in the exposure area of Wally Lake have concentrations below the CCME guidelines.

Only ammonia and nitrate concentrations, specifically in the Vault Pit, are relatively elevated and are discussed further in section 5.2.4.

5.1.2 Ammonia Loading to Environment

In 2016, the ammonia loading discharged to the environment is approximately 765 kg of NH_3. This value was computed using the water balance and the average ammonia concentration of the samples collected in July, August, September and October (i.e. period when water was discharged to Wally Lake).

5.2 Vault Water Quality Forecast

5.2.1 Model Description

A mass balance model was developed to assess the water quality forecast trends in the Vault Area for ammonia and nitrate. The starting date for the model was set for June 2014. The end date of the model was set when the dikes at Vault will be breached in 2029.

5.2.2 Assumptions

The assumptions used in the development of the mass balance model for the Vault Area of Meadowbank were the following:

i. The Vault Attenuation Pond is a combination of Pond A, B, C and D. The model does not take into consideration the transfers between Pond A, B, C and D, only transfers inside and outside the Vault Attenuation Pond.

ii. The model considers water transfers to the Vault Attenuation Pond from Vault Pit, Phase Pit, Phase Lake and runoff from its catchment area.

iii. The model does not take into consideration the variations of volume due to ice (no free volume, as well as ice ratio and water/ice entrapment).

iv. The water quality from Vault Pit is assumed to be constant over time for ammonia and nitrate.

v. The water mass balance is performed around the Vault Attenuation Pond. The volume of water transferred out of the Vault Attenuation Pond to the water treatment plant or Wally Lake is assumed to be completely discharged to the lake.

vi. It is assumed that the primary source of ammonia and nitrate loading is from Vault Pit. All other inflow contaminant concentrations (Phaser Pit, Phaser Lake, runoffs, etc) are assumed to have a negligible impact on ammonia and nitrate loadings.

vii. For simplification of the model, ponds and pits are assumed to be completely mixed systems.

viii. For simplification of the model, the parameters are assumed to be inert: they do not degrade or react with other elements in the system.

ix. For this analysis, it is assumed that the water treatment plant between the Attenuation Pond and Wally Lake does not reduce the concentration of ammonia and nitrate.

5.2.3 Input to Model

The mass balance model is based on the assumptions above and on the following water quality sampled at:

- Vault Pit (ST-23);
- Vault Attenuation Pond (ST-25);
- Final Effluent to Wally Lake (ST-10).

The initial concentration of parameters in the Vault Attenuation Pond is assumed to be the average of 2014-2015 measurements (i.e. ammonia = 2.2 mg N/L; nitrate = 4.7 mg N/L).

For the Vault Pit, the average of 2014-2015 measurements was used for the forecasted years 2014 and 2015 (i.e. ammonia = 18 mg N/L; nitrate = 46 mg N/L). As of 2016, the forecast model uses the average 2016 measurements (i.e. ammonia = 5 mg N/L; nitrate = 20 mg N/L). This was done to take into account the lower average concentrations measured for ammonia and nitrate in 2016 compared to the measurements taken in 2015.

Measurements taken at the final effluent to Wally Lake was used to compare the forecasted results.

5.2.4 Forecasting Results

5.2.4.1 Ammonia

Ammonia concentrations sampled in Vault Pit are elevated because of the use of ammonium-nitrate explosives during the mining process. Figure 5-1 presents the concentrations monitored in Vault Pit, Vault Attenuation Pond and at the final effluent to Wally Lake.

Two monitored values in Vault Pit exceeded the Water License limit in 2014 and 2015; all values measured in 2016 were below the limit. All of the sampled concentrations in the Vault Attenuation Pond (ATP) and the final effluent towards Wally Lake were below the Water License discharge requirements.

When forecasting the concentration of the effluent discharged to Wally Lake until closure, the forecasted concentration of ammonia reached a peak of about 3.7 mg-N/L in 2015 and then decreased to a concentration below 1 mg-N/L before closure. The forecasted peak is lower than the value forecasted in last year's model (i.e. 7 mg-N/L in 2018) because of the lower ammonia load considered in this year's model.

Agnico is required to meet the criteria for discharge to Wally Lake as stated in the Type A Water License which is set at 20 mg N/L. No exceedance occurred and is foreseen with the current Vault water quality forecasting model. Figure 5-2 shows the forecasted concentration, the monthly loadings and the cumulative loadings of ammonia in the treated effluent discharged to Wally Lake.

5.2.4.2 Nitrate

Nitrate concentrations sampled in the Vault Pit are also found to be elevated because of the use of ammonium-nitrate explosives for the pit development. Figure 5-3 presents the concentrations monitored in Vault Pit, Vault Attenuation Pond and at the final effluent towards Wally Lake.

Measured nitrate concentrations in the Vault Pit were below the Water License limit of 50 mg N/L. The monitored values in Vault Attenuation Pond and in the final effluent are also well below the Water License requirements.

The forecasted trend of nitrate concentration in the effluent discharged to Wally Lake until closure is similar to ammonia. There is a rise of nitrate to about 8.6 mg-N/L in 2015 and then decreased to a concentration below 1 mg-N/L before closure. The peak forecasted is lower than the value forecasted in last year's model (i.e. 18 mg-N/L in 2018) because of the lower nitrate load considered in this year's model.

Since the Water License discharge limit for nitrate is 50 mg N/L, no exceedance is foreseen. Figure 5-4 shows the forecasted concentration, the forecasted monthly loadings and the cumulative loadings of nitrate in the treated effluent discharged to Wally Lake.

5.2.4.3 Final Remarks

In conclusion, the forecasted concentrations for nitrate and ammonia in the treated effluent discharged to Wally Lake from the Vault area are expected to remain below the discharge requirements as defined in the Type A Water License. The primary source of ammonia and nitrate in the water comes from the use of ammonium-nitrate based explosive in the development of the Vault Pit.

Figure 5-1: Measured Ammonia Concentration in Vault Area

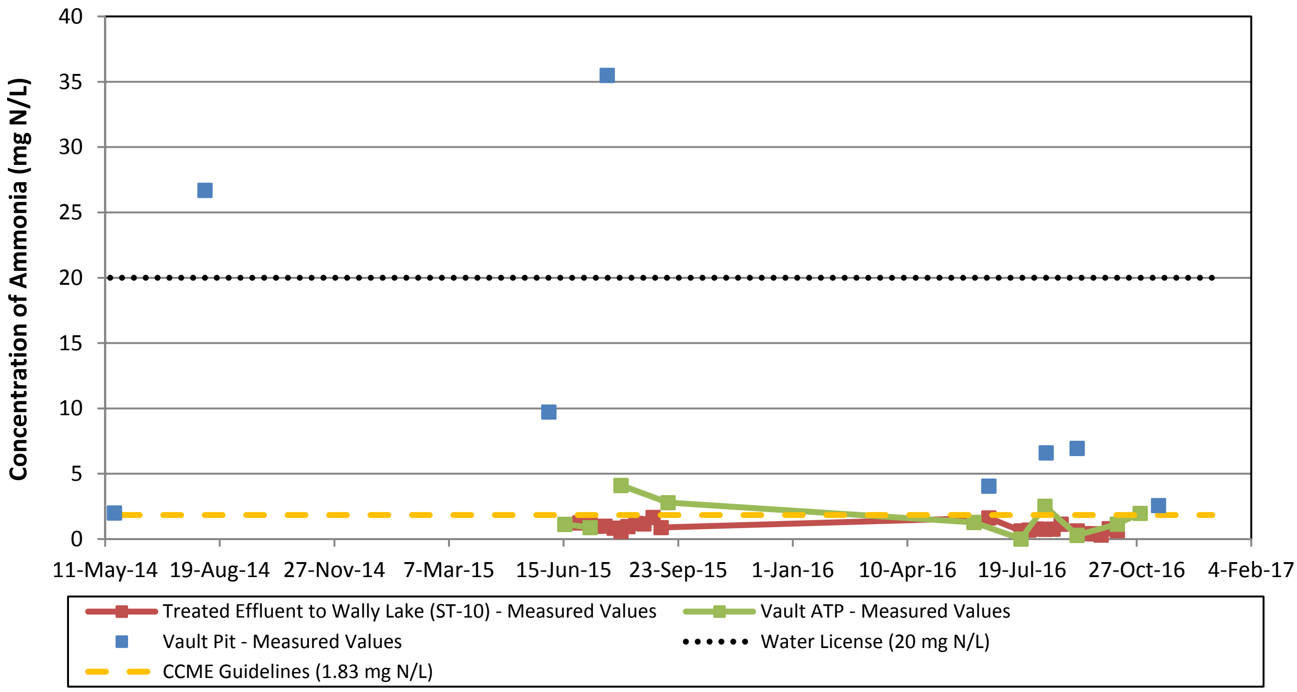


Figure 5-2: Forecasted Ammonia Concentration in Vault Area

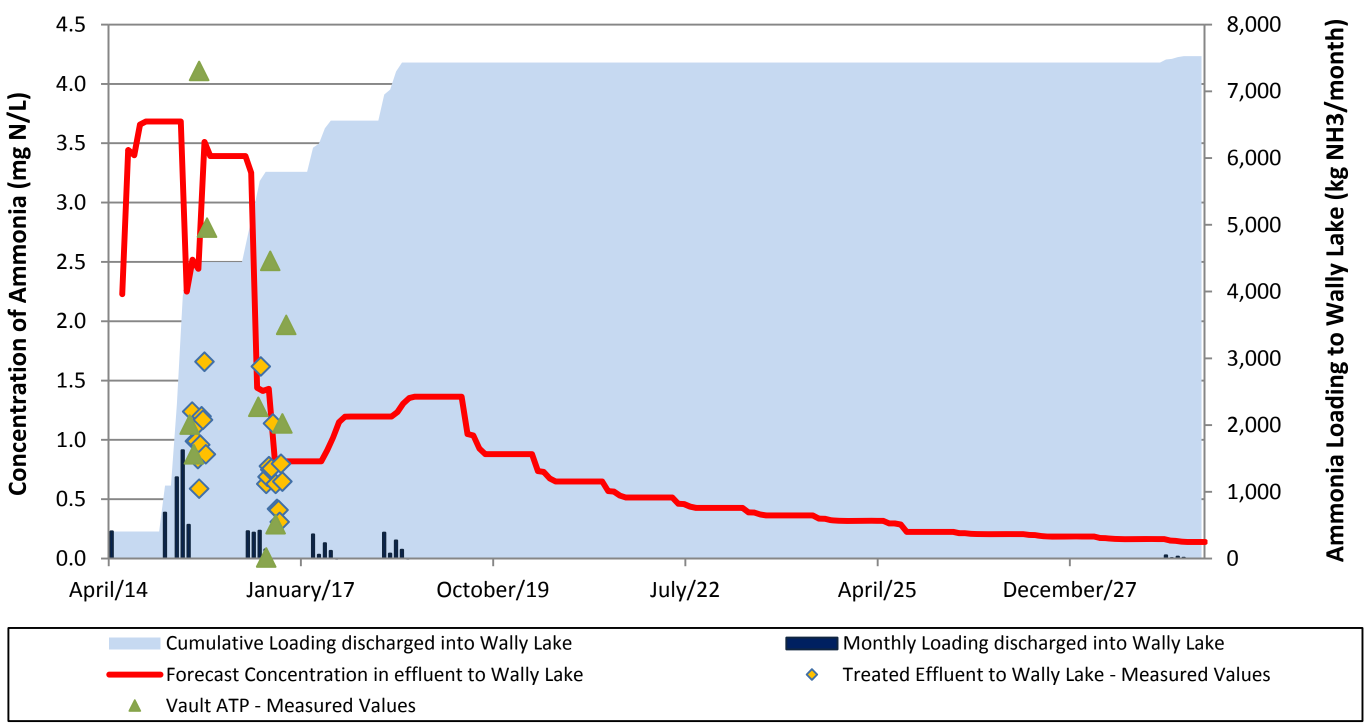


Figure 5-3: Measured Nitrate Concentration in Vault Area

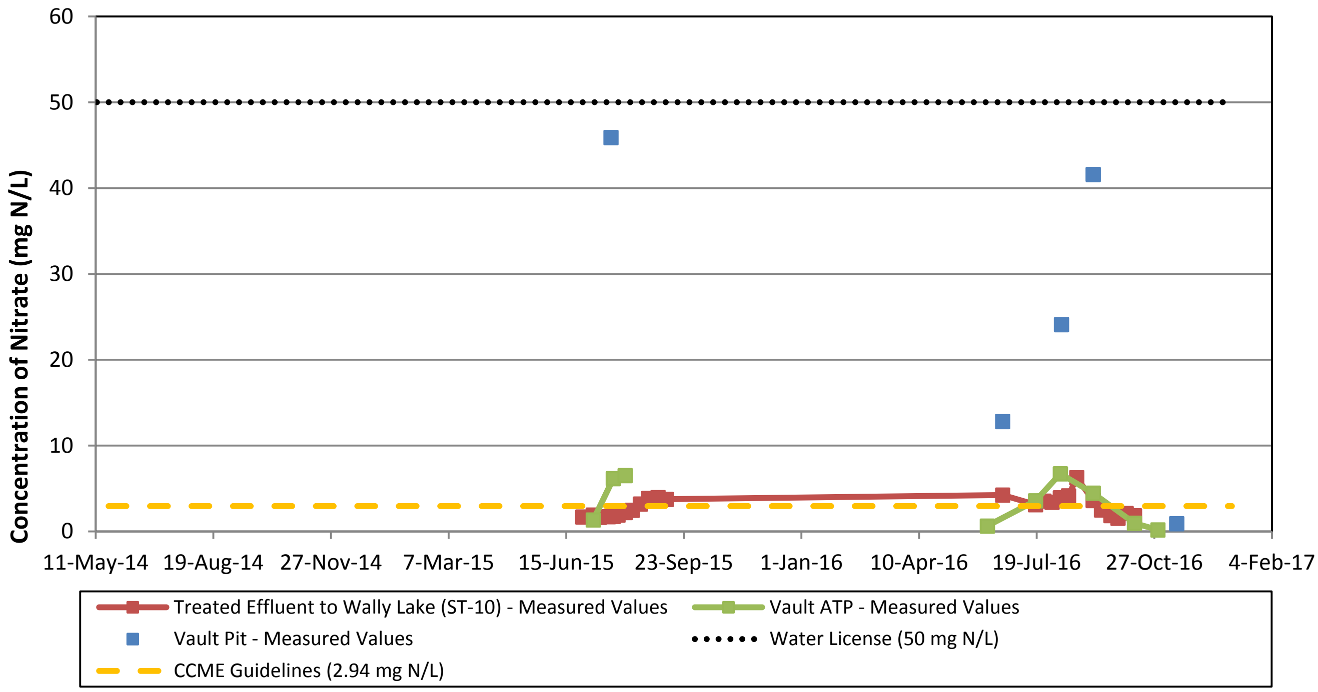
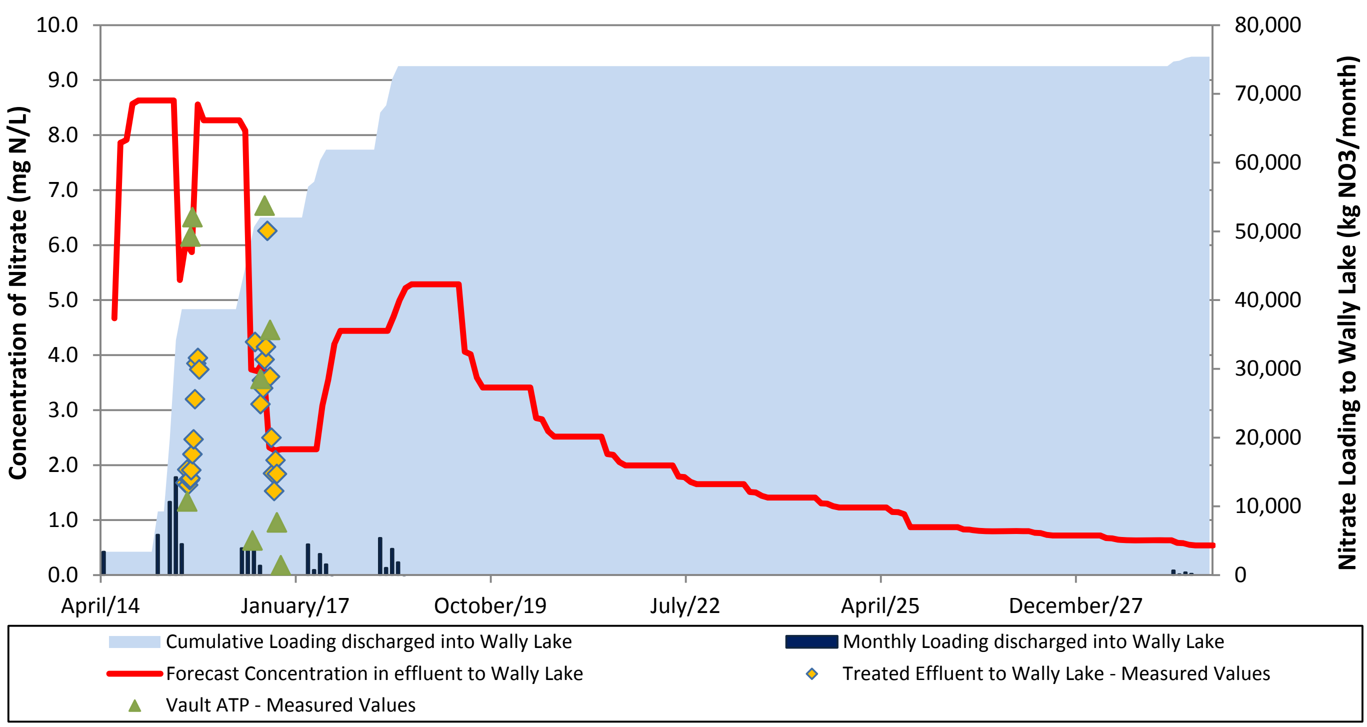


Figure 5-4: Forecasted Nitrate Concentration in Vault Area



6.0 Conclusion

Based on the WB 2016 developed by Agnico, the objective of this Technical Note was to forecast the long term concentration of different contaminants in the North and South Cells TSF Reclaim Pond and in the Portage and Goose Pits from 2014 until closure in 2028. The water quality mass balance model was updated to forecast these long-term concentrations.

6.1 Limitations

It is important to understand the limitations of the mass balance model and of this Technical Note. The limitations are presented in section 3.3 and are briefly summarized below:

- In order to simplify the model, the mass balance model assumes the following:
  - Pond and pits are completely mixed systems;
  - No change in the water quality of the Mill Effluent;
  - A monthly time-step.
- The mass balance model is based on a set of water quality analysis results provided by Agnico:
  - Water quality data provided for ST-21 is taken from samples collected at the surface of the North and South Cell TSF Reclaim Pond;
  - Water quality data available for the Mill Effluent;
  - Water quality data of various inflows and outflows of the North and South Cell TSF Reclaim Ponds.

6.2 Results Summary and Treatment

Based on the results of the water quality forecast mass balance presented in section 4.2, treatment may be required for the following parameters:

- Total Aluminum (new)
- Total Arsenic (new)
- Chromium (new)
- Copper
- Total iron (new)
- Selenium
- Fluoride (new)
- Total Nitrogen Equivalent

In last year's forecast, silver was also identified as a parameter of concern. However, this year's model considers a lower silver loading from the mill effluent based on the measurements taken of the Mill Effluent in 2016. Consequently, the forecasted concentration obtained in Portage Pit at closure is lower than the CCME limit.

For all of the new parameters identified above, the higher forecasted concentrations at closure in the pits can be attributed to the estimated additional loads to Portage Pit and Goose Pit from seepages and surface runoff that are considered in this year's water quality forecast model.

Furthermore, this year's water quality forecast model consider both total and dissolved metals and thus takes into account the suspended particles that could be present in the Reclaim Water when it is transferred to Portage Pit. If every effort is made to transfer only Reclaim Water with low TSS to Portage Pit, then based on the water quality forecast model using dissolved concentrations, treatment may be required for the following parameters:

- Chromium (new)
- Copper
- Selenium
- Fluoride (new)
- Total Nitrogen Equivalent

When evaluating the forecasted equilibrium concentrations using the PHREEQC modelling tool, all of the metals precipitate out of solution to values below the CCME guidelines. Only selenium and fluoride have forecasted equilibrium concentrations that are slightly higher than the CCME guidelines.

Treatment could be undertaken at the Reclaim Pond or in the Portage Pit if the trends shown in the model reveal to be true in the field. A potential treatment option for the removal of the metals in Reclaim Water prior to discharge in Portage Pit is caustic or lime precipitation, while aeration is recommended for total nitrogen reduction via ammonia volatilization. Coagulation with as aluminum sulfate could be used to adsorb the fluoride ion onto the aluminum hydroxide precipitate. Coagulation with ferric sulfate could be used to co-precipitate the arsenic as a ferric arsenate precipitate.

Selenium forecasted concentration remains close to the CCME guideline. This parameter still requires close monitoring. Speciation analysis of the selenium in the South Cell TSF Reclaim Pond (ST-21) indicates it is mostly in the selenate form (Se(VI)) instead of selenite form (Se(IV)). Selenite (Se(IV)) can be easily removed by coagulation. However, selenate (Se(VI)) cannot be removed easily by chemical precipitation. Other forms of treatment would need to be considered, such as adsorbtion onto a specialized media, biotreatment, or chemical reduction followed by coagulation with a ferric based coagulant.

For the Vault area, ammonia and nitrate are the parameters of concern, but no actual or forecasted concentration exceeds the Type A Water License discharge requirements for this area.

It is important to note that the water quality in the pits will be subject to CCME guidelines or site specific criteria once the water level in the Goose and Portage Pits are equal to the water level in Third Portage Lake. The dikes will only be breached once the water quality in the pits meets these criteria.

6.3 Recommendations

The water quality forecast mass balance developed for this study is intended as an updated model (from SNC 2012 model) for the mass balance in the Portage Area. Therefore, in order to improve the accuracy of the model so that it can better forecast the concentration of certain parameters in the Reclaim Pond or Portage and Goose Pits, the following studies, tests and monitoring are recommended.

1. Continue the current monthly monitoring program of all inflows and outflows of the North and South Cells TSF Reclaim Pond for cyanide, a complete total and dissolved metal scan, ammonia, nitrate, fluoride, chloride, sulfates, total dissolved solids (TDS) and total suspended solids.
2. Continue the current monitoring program of the water in the South Cell TSF Reclaim Pond for cyanide, total and dissolved metal scan, ammonia, nitrate, fluoride, chloride, sulfates, total dissolved solids (TDS) and total suspended solids. It is understood that this recommendation is required as per the water license.

3. Regular monitoring of pit water quality (Portage and Goose) should also be undertaken, when the site can be safely accessed, and analyzed for cyanide, total and dissolved metals, ammonia, nitrate, chloride, fluoride, sulfates, total dissolved solids (TDS) and total suspended solids. This information will be useful in developing and calibrating a water quality forecast model of the pit water quality based on loadings from surface runoff and possible underground water seepage.
4. If possible quantify the seepage flows or volumes entering the Portage and Goose Pits. The study should also attempt to evaluate the seepage rate into the pits as a function of the hydraulic difference between the water level in the pit and in Third Portage Lake.
5. Once transfer of South Cell Reclaim Water begins to the Portage Pit, regular (at least monthly) monitoring of all outflows of the TSF Reclaim Pond for all parameters should be undertaken, including TSS to ensure low level during transfer.
6. In order to validate the assumption of a well mixed system in Portage and Goose Pits, it is recommended to sample and analyze the water at different depths before, during and after the pits are filled with water from South Cell TSF and/or Third Portage Lake, when or if it is safe to do so. Furthermore, it may be useful to evaluate the assumption of a well mixed versus stratified pit water quality prior to mixing Portage and Goose Pits.
7. Once Portage and Goose Pits are hydraulically connected, it is recommended to sample the water at different points in the pit area in order to evaluate the mixing efficiency over the entire area. The samples should be taken at different depths over the entire area of the flooded pits before and after the filling season.
8. Continue to sample and analyze as per the Water License requirement the Vault Pit and Vault Attenuation Pond and include ammonia and nitrate in the list of parameters to analyze for.
9. Perform a bench scale water treatment test to evaluate the contaminant removal efficiency using treatment approaches such as lime neutralization, coagulation/flocculation with aluminum sulphate or ferric sulphate, and coagulation/flocculation with proprietary coagulants designed for metal removal.

7.0 References

- Agnico (2015). Meadowbank Gold Project – 2015 Annual Report, Appendix G7: 2015 Groundwater Monitoring Program Report.
- Agnico (2016). Water Balance of January 2017 based on Life of Mine BUV00_2016 production plan.
- Botz, M. and Mudder, T. (2000). Modeling of Natural Cyanide Attenuation in Tailings Impoundments. Mineral and Metallurgical Processing, Vol. 17, No. 4, pp. 228-233. November 2000.
- CCME. Water Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines Summary Table. <http://st-ts.ccme.ca/?chems=all&chapters=1>. Accessed on February 2016.
- Nunavut Water Board License (2015). Water License No: 2AM-MEA1525. Agnico-Eagle Mines Ltd. July 2015.
- SLI (2012). Water Management Plan 2012. Agnico-Eagle Mines. Document No. 610756-0000-40ER-0001, Rev. 02. March, 2013.
- SLI (2013). Meadowbank Gold Project, Water Quality Forecasting for the Portage Area 2012-2025. Document No. 610756-0000-40ER-0002, Rev. 01. March, 2013.
- SLI (2014). Meadowbank Gold Project, Water Quality Forecasting Update for 2013-2025. Document No. 617429-0000-40ER-0001, Rev. 02. March, 2014.
- SLI (2015). Meadowbank Water Quality Forecasting Update for the 2014 Water Management Plan. Document No. 625618-0000-40ER-0001, Rev. 00. February, 2015.
- SLI (2016). Meadowbank Water Quality Forecasting Update for the 2015 Water Management Plan. Document No. 635062-0000-40ER-0001, Rev. 00. March, 2016.

Appendix A

Water Quality Data

1. Attenuation Pond (ST-18) / South Cell TSF Reclaim Pond (ST-21)
2. North Cell TSF Reclaim Pond (ST-21)
3. Central Dike Downstream Pond (ST-S-5)
4. Portage Pit, Pit A (ST-17)
5. Portage Pit, Pit E (ST-19)
6. Goose Pit Sump and Goose Pit Lake (ST-20)
7. Final Effluent Discharge to Wally Lake (ST-10)
8. Vault Pit Sump (ST-23)
9. Vault Attenuation Pond (ST-25(a))
10. Wally Lake Exposure Area (ST-MMER-2-EEM-WLE)
11. Mill Effluent Quarterly Samples

ATTENUATION POND / SOUTH CELL TSF RECLAIM POND (ST-18 AND SOUTH CELL ST-21)

#1

Date	*pH	*Turbidity	Alkalinity	Ammonia (as NH3)	Ammonia-nitrogen (NH3-NH4)	Arsenic	Chloride	Copper	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel
Units		NTU	mg CaCO3/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4-Jun-13	6.75	17.32	80	0.18		0.003		0.0063											
4-Jul-13	7.4	12.83	97	0.235	6.15	0.0029	60.1	0.03385	0.009	<0,0005	0.04535	<0,00002	0.0178	0.005	<0,0003	1.8265	0.0001	0.0154	0.04185
8-Aug-13	7.2	13.25	108	0.35	9.8	0.2403		0.0189											
2-Sep-13	7.88	24.8	116	0.12	12.4	0.0133	91.3	0.0169	0.021	0.0064	0.061	0.00008	0.0045	0.01	<0,0003	2.44	<0,0001	0.0306	0.0822
3-Oct-13	7.57	30.7	121	0.11		0.0163		0.0099											
3-Jun-14	6.86	38.9	113	0.12	8.5	0.0041		0.0076											
1-Jul-14	7.78	26.3	96	0.2	8.4	0.0061	84.4	0.0064	0.006	0.0041	0.0447	0.00007	0.0041	0.01	0.0003	2.43	0.0001	0.0237	0.0346
5-Aug-14	7.83	8.11	103		9.7		112		0.006	0.0068	0.0462	0.0001	0.0052	0.01	0.0003	2.858	0.0001	0.0269	0.041
7-Sep-14			114	0.18		0.0111		0.0054											
13-Oct-14			106	0.19	11.8	0.0084		0.0065											
6-Jan-15			117		31.3		406		0.037	0.0203	0.0827	0.00026	2.561	0.05	0.00015	0.02	0.00038	0.1849	0.1146
10-Feb-15			116		53.7		439		0.036	0.022	0.1157	0.00068	0.6986	0.2	0.00015	0.003	0.00061	0.2755	0.0571
4-Mar-15			126		54.6		543		0.024	0.0379	0.1208	0.00079	2.045	0.03	0.00015	0.0254	0.00077	0.3331	0.1832
7-Apr-15			113		59.7		638		0.029	0.0126	0.1296	0.00094	2.165	0.9	0.00015	0.014	0.00058	0.3948	0.0258
5-May-15			80		57		770		0.232	<0.0005	0.1062	0.00066	5.541	2.4	0.00015	0.0084	0.00057	0.4086	0.0304
1-Jun-15			76		57.3		637		0.022	0.0005	0.107	0.00086	1.857	0.05	0.00015	0.057	0.00037	0.3877	0.0287
6-Jul-15			107		45.8		633		0.006	0.0005	0.0772	0.00002	0.6646	0.05	0.00015	0.1811	0.00031	0.3019	0.0853
3-Aug-15			157		16.1		378		0.006	0.0005	0.0581	0.00078	0.1869	0.02	0.00015	0.6803	0.00015	0.25	0.0834
1-Sep-15																			
8-Sep-15			150		31.2		436		0.006	0.0015	0.0485	0.00061	0.0618	0.01	0.00015	1.018	0.00009	0.244	0.0578
13-Sep-15							411								0.00015				
28-Sep-15							427												
6-Oct-15			135		5.79		1329		0.003	0.0025	0.0585	0.00043	0.6453	0.02	0.0003	1.254	0.00007	0.3034	0.0962
13-Oct-15			137		5.09		445		0.003	0.0081	0.0453	0.00063	0.485	0.02	0.0003	1.129	0.00005	0.2468	0.0668
20-Oct-15							399								0.0003				
26-Oct-15							429								0.0015				
2-Nov-15			137		35.4		445		0.01	0.0088	0.0535	0.00081	2.403	0.03	0.0003	0.9792	0.00024	0.3123	0.1404
10-Nov-15							431								0.0003				
19-Nov-15							471								0.0003				
23-Nov-15							505								0.0003				
1-Dec-15			144		35.4		562		0.014	0.00025	0.076	0.0008	0.0155	0.36	0.0003	0.1727	0.00028	0.3233	0.018
5-Jan-16	8.5	4.75	141	2.61	41.3	0.0162	548	0.610	0.055	0.012	0.091	0.00138	0.2914	0.14	0.00015	0.0802	0.00007	0.3571	0.0231
1-Feb-16	8.2	16.4	126	4.83	44.1	0.0149	630	0.508	0.018	0.0164	0.110	0.0011	0.0412	0.77	0.00015	0.0575	0.00025	0.4267	0.0165
8-Mar-16	7.4	13.65	132	2.6	50.0	0.0138	599	1.882	0.024	0.0112	0.137	0.00001	0.0719	1.22	0.00015	0.0743	0.00021	0.4821	0.013
5-Apr-16	8.6	10.88	129	2.94	49.7	0.028	608	1.501	0.02	0.0218	0.105	0.00107	0.0526	0.7	0.00015	0.1378	0.0003	0.4613	0.0133
3-May-16	8.78	13.2	117	2.79	51.4	0.0338	614	0.082	0.04	0.0363	0.110	0.00095	0.0131	1.31	0.00015	0.1118	0.00077	0.5981	0.0113
16-Jun-16	8.5	15.1	93	0.01	38.6	0.0005	348	0.223	0.022	0.0096	0.078	0.00044	0.1646	0.02	0.0003	0.0005	0.00001	0.0005	0.0005
18-Jul-16	7.14	19.5	126	1	32.7	0.0236	344	0.086	0.047	0.0192	0.084	0.00182	0.0787	0.06	0.00015	0.4181	0.00047	0.4507	0.0539
2-Aug-16	8.07	2.56	133	0.93	31.3	0.014	372	0.069	0.015	0.0097	0.088	0.00154	0.0751	0.05	0.00015	0.3433	0.0004	0.4812	0.0502
6-Sep-16	8.51	18.13	132	1.36	41.6	0.0177	364	0.109	0.053	0.00025	0.089	0.00112	0.0887	0.03	0.00015	0.2782	0.000005	0.496	0.03
3-Oct-16	7.93	6.98	122	0.99	38.9	0.00025	332	0.263	0.078	0.00025	0.069	0.00118	0.2160	0.04	0.00015	0.322	0.00036	0.431	0.0498
8-Nov-16	8.13	7.81	120	1.73	43.4	0.0083	407	0.023	0.056	0.0089	0.087	0.00235	0.0108	0.35	0.00015	0.1591	0.00055	0.4696	0.0471
5-Dec-16	7.76	4.51	127	1.71	44.8	0.004	417	0.206	0.059	0.0046	0.094	0.00191	0.0191	0.66	0.00015	0.2706	0.00044	0.5502	0.0326
END OF DATABASE																			

Indicate values = 1/2 of detection limit

ATTENUATION POND / SOUTH CELL TSF RECLAIM POND (ST-18 AND SOUTH CELL ST-21)

Date	Dissolved Selenium	Dissolved Silver	Dissolved Thallium	Dissolved Zinc	Fluoride	Hardness	Lead	Nickel	Nitrate	Nitrite	Sulphate	Total dissolved solids (TDS)	Zinc	Conductivity	Total cyanide	TSS	aluminum (Al)	silver (Ag)	boron (B)
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg CaCO3/L	mg/L	mg/L	mgN/L	mgN/L	mg/L	mg/L	mg/L						
4-Jun-13							<0,0003	0.0371				379	0.001	496	0.117				
4-Jul-13	0.001	<0,0002	<0,005	<0,001	0.395	320	0.00245	0.0593	5.1	0.185	277.5	633.5	0.008	924	0.1725				
8-Aug-13							0.0089	0.0056				779	0.007	1224	0.236				
2-Sep-13	0.002	<0,0001	<0,005	0.004	0.49	396	0.0003	0.0822	3.3	0.6	451	806	0.009	1420	0.193				
3-Oct-13							<0,0003	0.0718				814	<0,001	1472	0.039				
3-Jun-14							0.0003	0.0427				754	0.002	1830	0.247				
1-Jul-14	0.001	0.0001	0.005	0.001	0.57	318	0.0003	0.0398	1.2	0.27	471	2628	0.04	1021	0.34				
5-Aug-14	0.004	0.0001	0.005	0.001	0.56	406			1.3	0.21	612	1155		1497	0.462				
7-Sep-14							0.0003	0.0659				1283	0.006		0.346				
13-Oct-14							0.0017	0.0727				1363	0.012		0.336				
6-Jan-15	0.049		0.0025	0.001	2.5	893.5444			7.45		1200	1924			16.29				
10-Feb-15	0.084		0.0025	0.0005	0.26	1099			9.08		1456	2190			14.71				
4-Mar-15	0.104		0.0025	0.002	0.42	1224			11		1537	2628			13.08				
7-Apr-15	0.102		0.0025	0.004	0.01	1325			10.8		1670	2946			0.762				
5-May-15	0.079		0.0025	0.0005	2.4	1395			10.7		1604	3411			22.93				
1-Jun-15	0.075		0.0025	0.003	0.03	1329			10.4		1557	2801			6.13				
6-Jul-15	0.046		0.0025	0.0005	0.03	1315			10.5		1235	2270			0.638				
3-Aug-15	0.049		0.0025	0.005	0.04	1029			8.51		1316	2328			0.047				
1-Sep-15															0.0025				
8-Sep-15	0.039		0.0025	0.0005	0.01	1176			7.29		1473	2230			0.078				
13-Sep-15															0.024				
28-Sep-15															0.34				
6-Oct-15	0.045		0.0025	0.0005	0.44	1222			7.77		1650	2184			0.307				
13-Oct-15	0.036		0.0025	0.0005	0.47	1100			7.53		1656	2210			0.272				
20-Oct-15									7.88		1500				0.676				
26-Oct-15									8.56		1811				1.37				
2-Nov-15	0.048		0.0025	0.001	0.4	1263			9.09		1651	2433			1.45				
10-Nov-15									8.17		1866				0.56				
19-Nov-15											1852				1.28				
23-Nov-15									9.77						2.37				
1-Dec-15	0.072	0.0003	0.0025	0.0005	0.13	1461			10.7		1998	2926			3.58				
5-Jan-16	0.088	0.00005	0.0025	0.007	0.34	1303	0.00015	0.1396	10.7	0.22	2274	2992	0.007		10.6	16	0.033	0.0002	
1-Feb-16	0.097	0.001	0.001	0.001	0.27	1567	0.00015	0.0659	6.34	0.23	2052	3136	0.002		9.51	35	0.142	0.0007	
8-Mar-16	0.113	0.0003	0.001	0.0005	0.36	1497	0.00015	0.0553	12.5	0.24	2060	3386	0.001		10.79	39	0.247	0.0003	
5-Apr-16	0.125	0.0037	0.001	0.001	0.4	1561	0.0015	0.0408	10.7	0.24	2142	3030	0.004		6.82	23	0.147	0.0041	
3-May-16	0.103	0.0009	0.001	0.001	2.79	1237	0.00015	0.021	10.5	0.22	2161	3611	0.007		5.77	26	0.249	0.0007	
16-Jun-16	0.001	0.0006	0.002	0.001	0.35	916	0.0003	0.0005	5.79	0.1	1511	2017	0.001		0.977	52	0.006	0.0017	
18-Jul-16	0.067	0.0016	0.0004	0.0005	0.45	1073	0.00015	0.0531	5.55	0.14	1683	2452	0.001		0.08	18	0.263	0.0019	
2-Aug-16	0.066	0.0006	0.0004	0.0005	0.39	1273	0.0037	0.0491	5.04	0.12	1730	2430	0.005		0.094	5	0.039	0.0005	
6-Sep-16	0.057	0.00005	0.0004	0.001	0.41	1210	0.00015	0.0312	5.28	0.22	1926	2914	0.001		0.072	5	0.11	0.00005	
3-Oct-16	0.052	0.0002	0.0004	0.0005	0.39	1301	0.00015	0.0572	4.32	0.18	1768	2580	0.0005		0.161	8	0.21	0.0001	
8-Nov-16	0.067	0.0001	0.0004	0.005	0.42	1272	0.0006	0.0588	4.91	0.18	1945	2542	0.006		0.586	13	0.192	0.00005	
5-Dec-16	0.06	0.00005	0.0004	0.002	0.43	962	0.00015	0.0566	4.89	0.21	2018	2968	0.006		1.66	8	0.096	0.00005	
END OF DATABASE																			

Indicate values = 1/2 of detection limit

ATTENUATION POND / SOUTH CELL TSF RECLAIM POND (ST-18 AND SOUTH CELL ST-21)

Date	barium (Ba)	beryllium (Be)	cadmium (Cd)	chromium (Cr)	iron (Fe)	lithium (Li)	manganese (Mn)	mercury (Hg)	molybdenum (Mo)	selenium (Se)	antimony (Sb)	tin (Sn)	strontium (Sr)	titanium (Ti)	thallium (Tl)	uranium (U)	vanadium (V)	Dissolved boron (B)	Dissolved beryllium (Be)
Units																			
4-Jun-13																			
4-Jul-13																			
8-Aug-13																			
2-Sep-13																			
3-Oct-13																			
3-Jun-14																			
1-Jul-14																			
5-Aug-14																			
7-Sep-14																			
13-Oct-14																			
6-Jan-15																			
10-Feb-15																			
4-Mar-15																			
7-Apr-15																			
5-May-15																			
1-Jun-15																			
6-Jul-15																			
3-Aug-15																			
1-Sep-15																			
8-Sep-15																			
13-Sep-15																			
28-Sep-15																			
6-Oct-15																			
13-Oct-15																			
20-Oct-15																			
26-Oct-15																			
2-Nov-15																			
10-Nov-15																			
19-Nov-15																			
23-Nov-15																			
1-Dec-15																			
5-Jan-16	0.0908		0.00138	0.0025	0.44		0.080	0.00036	0.337	0.088					0.0025				
1-Feb-16	0.1305		0.00102	0.0023	0.89		0.081	0.00027	0.400	0.097					0.001				
8-Mar-16	0.1359		0.00001	0.0003	2.67		0.114	0.00021	0.482	0.118					0.001				
5-Apr-16	0.1237		0.00127	0.0021	2.64		0.195	0.0003	0.464	0.118					0.001				
3-May-16	0.1207		0.0008	0.0027	1.46		0.137	0.00056	0.504	0.096					0.001				
16-Jun-16	0.0005		0.00002	0.0006	0.6		0.001	0.00001	0.001	0.001					0.002				
18-Jul-16	0.0846		0.00195	0.0003	0.79		0.418	0.00044	0.454	0.062					0.0004				
2-Aug-16	0.087		0.00141	0.0003	0.16		0.355	0.00042	0.478	0.065					0.0004				
6-Sep-16	0.0963		0.00103	0.0011	0.17		0.317	0.00017	0.518	0.055					0.0004				
3-Oct-16	0.0741		0.00154	0.0003	0.44		0.368	0.00032	0.465	0.052					0.0004				
8-Nov-16	0.0901		0.00267	0.0015	0.89		0.159	0.00065	0.450	0.064					0.0004				
5-Dec-16	0.0852		0.00196	0.0003	1.01		0.271	0.00049	0.537	0.06					0.0004				
END OF DATABASE																			

Indicate values = 1/2 of detection limit

ATTENUATION POND / SOUTH CELL TSF RECLAIM POND (ST-18 AND SOUTH CELL ST-21)

Date	Dissolved chromium (Cr)	Dissolved lithium (Li)	Dissolved antimony (Sb)	Dissolved tin (Sn)	Dissolved strontium (Sr)	Dissolved titanium (Ti)	Dissolved uranium (U)	Dissolved vanadium (V)	Cyanide WAD	CN Free	Cyanate	Thyocyanate	Selenium 4 (Se)	Selenium 6 (Se)
Units										mg/L	mg/L	mg/L	mg/L	mg/L
4-Jun-13														
4-Jul-13														
8-Aug-13														
2-Sep-13														
3-Oct-13														
3-Jun-14														
1-Jul-14														
5-Aug-14														
7-Sep-14														
13-Oct-14														
6-Jan-15														
10-Feb-15														
4-Mar-15														
7-Apr-15														
5-May-15														
1-Jun-15														
6-Jul-15														
3-Aug-15														
1-Sep-15														
8-Sep-15														
13-Sep-15														
28-Sep-15														
6-Oct-15														
13-Oct-15														
20-Oct-15														
26-Oct-15														
2-Nov-15														
10-Nov-15														
19-Nov-15														
23-Nov-15														
1-Dec-15														
5-Jan-16									0.477					
1-Feb-16									0.405	0.009				
8-Mar-16									0.392	0.008				
5-Apr-16									0.372	0.022				
3-May-16									5.41	0.008				
16-Jun-16									0.056	0.045				
18-Jul-16									0.033	0.018				
2-Aug-16									0.045		0.005	212	0.005	0.061
6-Sep-16									0.041	0.023	35		0.006	0.047
3-Oct-16									0.109	0.087	36	193	0.003	0.049
8-Nov-16									0.093	0.069	214	211	0.002	0.05
5-Dec-16									0.212	0.019	51	240	0.001	0.045
END OF DATABASE														

Indicate values = 1/2 of detection limit

Tailings Reclaim Pond (NORTH CELL ST-21)

#2

DATE	ANNÉE	pH	Alkalinity	Turbidity	Hardness	Ammonia nitrogen (NH3)	Nitrate (NO3)	Nitrite (NO2)	Nitrite - Nitrate	Chloride	Fluoride	Sulphate	Chlrotide + sulphate	Total Dissolved Solids	Cyanide (total)	CN-WAD	Dissolved Aluminum	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel	Dissolved Selenium	Dissolved Silver	Dissolved Thallium	Dissolved Zinc	Aluminum	Antimony
		Units	mg CaCO3/L	NTU	mg CaCO3/L	mg N/L	mg N/L	mg N/L	mg N/L	mg/L	mg/L	mg/L		mg/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Max. Monthly		6.0 - 9.0		15		16	20			1000					0.5		1	1															1.5	
Max. Instant.		6.0 - 9.0		15		32	40			2000					1		1	1															1.5	
2-Jan-13	2013															20.4																		
5-Jan-13	2013															20.3																		
8-Jan-13	2013	9.04	115	1.01	1607	5.2	12.9	0.27		1463	21.9	2960		4943	17.30	19.3		0.05	0.019	0.107	<0,005	17.17	1.60	<0,005	<0,005	0.0002	0.492	0.056	0.023	<0,005	<0,01	0.005		
11-Jan-13	2013															19.1																		
14-Jan-13	2013															12.8																		
19-Jan-13	2013															19.7																		
22-Jan-13	2013															17.9																		
30-Jan-13	2013															20.0																		
4-Feb-13	2013															18.7																		
6-Feb-13	2013	9.42	134	36.70	2116	0	17.9	0.29		1582	0.33	3125		568	12.11			0.34	0.012	0.101	<0,005	18.55	1.10	<0,005	0.071	0.0003	0.481	0.032	0.026	0.0110	<0,01	0.569		
10-Feb-13	2013															18.0																		
17-Feb-13	2013															21.4																		
23-Feb-13	2013															22.0																		
28-Feb-13	2013															20.4																		
4-Mar-13	2013															22.0																		
5-Mar-13	2013	9.14	142	21.90	1795	0	17.7	0.16		1572	0.23	2876		5354	25.19			0.02	0.010	0.144	<0,005	15.21	0.30	<0,005	0.009	<0,0001	0.469	0.041	0.037	0.0100	<0,01	<0,005		
10-Mar-13	2013															15.2																		
19-Mar-13	2013															8.4																		
25-Mar-13	2013															7.9																		
31-Mar-13	2013															10.0																		
2-Apr-13	2013	8.90	113	43.30	1525	0	14.4	0.34		1092	0.38	2248		4242	36.25			0.08	0.011	0.096	<0,005	5.56	0.67	<0,005	<0,005	0.0002	0.332	0.026	0.019	<0,005	<0,01	0.015		
6-Apr-13	2013															9.6																		
12-Apr-13	2013															32.8																		
16-Apr-13	2013															17.0																		
21-Apr-13	2013															18.7																		
27-Apr-13	2013															16.5																		
7-May-13	2013	9.00	105	8.80	1550	3.6	20.5	0.33		1287	0.33	2205		4476	18.95			0.06	0.015	0.088	0.001	9.51	0.67	<0,0003	<0,0005	0.0002	0.418	0.697	0.029	0.008	<0,005	0.009		
8-May-13	2013															17.1																		
12-May-13	2013															19.7																		
15-May-13	2013															16.8																		
19-May-13	2013															19.7																		
25-May-13	2013															16.9																		
31-May-13	2013															18																		
4-Jun-13	2013	8.85	77	17.37	891	46.2	13.7	0.06		683	0.07	1276		2954	16.77	19.1		0.14	0.008	0.057	0.001	0.29	<0,01	<0,0003	0.0713	<0,0001	0.247	0.088	0.008	0.004	<0,005	0.001		
8-Jun-13	2013															6.01																		
12-Jun-13	2013															5.21																		
16-Jun-13	2013															3.64																		
20-Jun-13	2013															2.0																		
27-Jun-13	2013															0.0967																		
4-Jul-13	2013	8.28	127	9.25	641	17.7	12.0	0.31		283	0.26	1053		1992	0.09			0.15	0.014	0.051	0.000	0.39	<0,01	<0,0021	0.4214	<0,0001	0.170	0.096	0.010	<0,0002	<0,005	0.004		0.00135
5-Jul-13	2013															0.156																		
12-Jul-13	2013															0.0829																		
19-Jul-13	2013															0.247																		
25-Jul-13	2013															0.142																		
1-Aug-13	2013															0.237																		
11-Aug-13	2013															0.0829																		
13-Aug-13	2013	7.72	154	5.65	751	33.5	11.3	0.90		232	1.1	1169			0.05			0.14	0.016	0.061	0.001	0.42	0.01	0.0012	0.5621	0.0001	0.222	0.300	0.010	0.006	<0,005	0.004		
14-Aug-13	2013															0.0765																		
19-Aug-13	2013															0.133																		
26-Aug-13	2013															0.242																		
2-Sep-13	2013	8.00	143	20.10	759	32.3	13.5	1.10		917	0.16	1457		2020	0.99			0.20	0.025	0.067	0.001	1.78	0.38	0.0045	0.4087	0.0001	0.309	0.602	0.009	0.014	<0,005	0.015		
6-Sep-13	2013															0.355																		
13-Sep-13	2013															0.501																		
23-Sep-13	2013															0.499																		
3-Oct-13	2013	7.87	135	9.30	935	28.9	13.8	1.00		547	0.47	1954		1796	0.14	1.77		0.12	0.027	0.065	0.001	0.50	0.01	<0,0003	0.2476	0.0001	0.398	0.583	0.011	0.011	<0,005	<0,001		
9-Oct-13	2013															1.99																		
16-Oct-13	2013															2.16																		
22-Oct-13	2013															2.09																		
1-Nov-13	2013															5.69																		
4-Nov-13	2013	7.92	123	9.21	878	38.8	16.2	0.85		691	0.45	1971		2233	2.55			0.04	0.023	0.073	0.001	6.28	0.01	<0,0003	0.2819	0.0005	0.507		0.024	0.046	<0,005	<0,001		
9-Nov-13	2013															4.74																		
14-Nov-13	2013															3.34																		
29-Nov-13	2013															4.85																		
2-Dec-13	2013	6.69	133	1.15	1122	43.7	18.7	0.94		888	0.41	1979		1866	3.99			0.10	0.016	0.081	0.001	2.34	0.01	<0,0003	0.1495	0.0002	0.496	0.386	0.047	<0,0001	<0,005	0.002		0.0029
6-Dec-13	2013															4.78																		
14-Dec-13	2013															4.33																		
20-Dec-13	2013															9.27																		
8-Jan-14	2014	7.39	135	4.6	1329	36.8	25.5	0.97		1035	0.18	2115		1329	8.33			0.072	0.021	0.0838	0.00134	9.053	0.03	0.0016	0.0595	0.0002	0.5826	0.2525	0.072	0.0001		0.001		
4-Feb-14	2014	7.45	120	4.86	1428	53.6	32	0.97		1289	0.02	2496		2660	9.17			0.15	0.031	0.0914	0.00173	10.9	0.08	0.0003	0.0141	0.0004	0.7348	0.0754	0.113	0.0107		0.001		
11-Mar-14	2014	8.12	95	0.98	1286	58.8	29.8	0.8		1860	6.8	2542		2740	14.49			0.006	0.024	0.1096	0.00417	2.189	0.69	0.0003	0.0035	0.0004	0.6747	0.0871	0.188	0.0036		0.002		
8-Apr-14	2014	9.25	110	3.3	1721	58.8	27.7	0.58		2153	0.32	2275		4633	23.1			0.079	0.0229	0.1219	0.0004	0.2578	0.09	0.0003	0.0005	0.0003	0.1866	0.0578	0.273	0.0041		0.001		
6-May-14	2014	8.19	73	10.57	949	59.5	24.2	0.24		1549	2.2	2015		3878	11.69			0.139	0.0162	0.0826	0.00267	0.7796	0.29	0.0003	0.003	0.0005	0.3037	0.0756	0.247	0.0016		0.007		
3-Jun-14	2014	7.05	67	13.88	674	51.5	14.3	0.16		727	0.41	1251		2142	6.21			0.046	0.0085	0.0512	0.00065	8.398	0.02	0.0003	0.0447	0.0002	0.2232	0.2941	0.122	0.0042		0.001		
1-Jul-14	2014	8.18	90	3.94	1265	61.1	26.7	0.19		1235	2	2289		8573	0.913			0.099	0.007	0.0691	0.00084	0.7023	0.09	0.0003	0.0615	0.0003	0.359	0.6107	0.17	0.0001		0.001	0.163	0.0036
5-Aug-14	2014	7.8	89	3.78	1246	48.7	33.5	0.24		1847	0.48	2683		3909	1.33			0.134	0.0143	0.0791	0.0013	0.8784	0.12	0.0003	0.0212	0.0006	0.5202	0.2237	0.239	0.0001		0.001		
7-Sep-14	2014	7.32	84	8.09	1390	46.3	21.7	0.19		2236	3.7	2400		3636	3.36			0.072	0.0075	0.0893	0.00114	2.139	0.25	0.0003	0.0269	0.0004	0.5631	0.5444	0.209	0.0222		0.001		
7-Oct-14	2014		93	0.95	1387	55.10	35.6	0.19		2372	4.8	2359		4746	17.79			0.034	0.018	0.1068	0.00266	8.68	0.26	0.0003	0.0285	0.0006	0.65	1.399	0.217	0.0333		0.001		
4-Nov-14	2014	7.91	120	2.41	1693	67.30	39.6	0.20		2902	1.5	3033		1694	20.54			0.109	0.0254	0.1048	0.00303	1.261	0.65	0.0003	0.0261	0.0009	0.721	1.518	0.222	0.1837		0.011		
1-Dec-14	2014	7.58	127	1.21	659	88.20	3.7	0.30		256	0.02	951		1461	6.02			0.040	0.0122	0.0439	0.00026	1.267	0.60	0.0003	1.355	<0.0001	0.0641	0.2428	0.016	0.0032		0.001		
15-Jan-15	2015		197		1961	61.4	53.2			3907	0.58	3724		3304	68.67			0.176	0.0372	0.1626	0.00302	14.71	0.17	0.00015	0.0236	0.00151	0.9494	1.787	0.28	0.00005	0.0025	0.0005		
4-Mar-15	2015		296		1803	52.9	64.5			3838	7.4	4261		7846	78.98			0.003	0.0643	0.1226	0.00354	13.6	0.27	0.001	0.0217	0.00102	1.14	2.494	0.402	0.00005	0.0025	0.006		
7-Apr-15	2015		24		123	4.99	2.85			159	0.09	274		559	3.54			0.003	0.0011	0.0085	0.00026	1.008	0.96	0.00015	0.0032	0.00002	0.0668	0.1586	0.018	0.0056	0.0025	0.0005		
11-May-15	2015		374		1447	108	67.3			4751	7.5	4103		9773	60.47			0.003	0.0424	0.0507	0.00289	35.8	0.51	0.00015	0.0075	0.00359	1.308	4.271	0.399	0.0069	0.0025	0.009		
1-Jun-15	2015		43		385	13.6	9.93			267	0.03	770		1474	1.45			0.003	0.00025	0.0233	0.00024	2.258	0.03	0.0008	0.035	0.035	0.1116	0.2058	0.042	0.0098	0.0025	0.0005		
6-Jul-15	2015		62		559	17.6	12.1			432	2.37	843		1720	0.009			0.003	0.00025	0.0289	0.00001	1.06	0.005	0.00015	0.0529	0.00011	0.1765	0.3169	0.054	0.005	0.0025	0.0005		
3-Aug-15	2015		97		1005	35.9	19			608	0.32	1692		2863	0.079			0.003	0.00025	0.0809	0.00001	0.5371	0.005	0.00015	0.0229	0.00036	0.38	0.0883	0.068	0.0068	0.0025	0.0005		
8-Sep-15	2015		99		1880	46.1	20.6			868	0.55	2140		3232	0.396			0.033	0.00025	0.0874	0.00141	0.7407	0.02	0.00015	0.029	0.00053	0.5175	0.0758	0.057	0.00005	0.0025	0.0005		
7-Jun-16	2016	7.71	31	14.55	328	8.05	4.82	0.05		94.9	0.02	416		800	0.112			0.006	0.0005	0.0113	0.00008	0.2621	0.01	0.0003	0.0388	0.00003	0.0598	0.0399	0.017	0.0001	0.002	0.001	0.006	
26-Jul-16	2016	7.52	54	3.1	564	12.9	5.22	0.56		144	0.31	765		1166	0.03	0.015		0.003	0.00025	0.0269	0.00037	0.0237	0.01	0.00015	0.1858	0.0004	0.1085	0.0281	0.026	0.00005	0.0004	0.0005	0.043	
2-Aug-16	2016	7.87	55	5.15	514	7.03	3.46	0.61		112	0.25	854		1244	0.038	0.02		0.003	0.0068	0.0273	0.00023	0.0301	0.01	0.00015	0.186	0.00005	0.1209	0.0303	0.029	0.00005	0.0004	0.0005	0.003	
6-Sep-16	2016	8.28	56	4.98	597	19.3	1.9	0.46		138	0.27	1145		1558	0.033	0.016		0.011	0.00025	0.0311	0.0003	0.0139	0.03	0.00015	0.2037	0.00005	0.134	0.0144	0.03	0.00005	0.0004	0.016	0.034	
3-Oct-16	2016	8.01	61	18.7	699	16.9	1.81	0.27		127	0.28	937		1457	0.031	0.014		0.003	0.00025	0.0217	0.00021	0.0122	0.01	0.00015	0.2394	0.000005	0.112	0.021	0.023	0.00005	0.0004	0.003	0.193	
END OF DATABASE																																		

Indicate values = 1/2 of detection limit

Tailings Reclaim Pond (NORTH CELL ST-21)

	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Max. Monthly	0.3			0.002			0.1		0.1	0.1			0.0004											0.4	15					
Max. Instant.	0.6			0.004			0.2		0.2	0.2			0.0008											0.8	30					
DATE	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Lead	Lithium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc	TSS	CN Free	Cyanate	Thyocyanate	Selenium 4 (Se)	Selenium 6 (Se)
2-Jan-13																														
5-Jan-13																														
8-Jan-13																														
11-Jan-13																														
14-Jan-13																														
19-Jan-13																														
22-Jan-13																														
30-Jan-13																														
4-Feb-13																														
6-Feb-13																														
10-Feb-13																														
17-Feb-13																														
23-Feb-13																														
28-Feb-13																														
4-Mar-13																														
5-Mar-13																														
10-Mar-13																														
19-Mar-13																														
25-Mar-13																														
31-Mar-13																														
2-Apr-13																														
6-Apr-13																														
12-Apr-13																														
16-Apr-13																														
21-Apr-13																														
27-Apr-13																														
7-May-13																														
8-May-13																														
12-May-13																														
15-May-13																														
19-May-13																														
25-May-13																														
31-May-13																														
4-Jun-13																														
8-Jun-13																														
12-Jun-13																														
16-Jun-13																														
20-Jun-13																														
27-Jun-13																														
4-Jul-13	0.0197	0.058	<0,0005	0.000415	0.00065		0.63635	0.57		0.004	<0,005	0.5	<0,00001	0.1985	0.1168	0.012		0.804	0.275	<0,001	<0,005	0.009	<0,0005	0.0045						
5-Jul-13																														
12-Jul-13																														
19-Jul-13																														
25-Jul-13																														
1-Aug-13																														
11-Aug-13																														
13-Aug-13																														
14-Aug-13																														
19-Aug-13																														
26-Aug-13																														
2-Sep-13																														
6-Sep-13																														
13-Sep-13																														
23-Sep-13																														
3-Oct-13																														
9-Oct-13																														
16-Oct-13																														
22-Oct-13																														
1-Nov-13																														
4-Nov-13																														
9-Nov-13																														
14-Nov-13																														
29-Nov-13																														
2-Dec-13	0.0175	0.0826	<0,0005	0.001	0.0013		5.931	0.15		<0,0003	<0,005	0.1521	0.00029	0.4997	0.4075	0.047		1.23	<0,005	<0,001	0.345	0.019	<0,0005	0.002						
6-Dec-13																														
14-Dec-13																														
20-Dec-13																														
8-Jan-14							9.135			0.0003																				
4-Feb-14							10.9			0.0011																				
11-Mar-14							5.466			0.0009																				
8-Apr-14							0.37			0.0003																				
6-May-14							0.9237																							
3-Jun-14																														
1-Jul-14	0.0107	0.0774	0.0005	0.00101	0.0006		3.538	0.42		0.0003	0.005	0.0674	0.00035	0.3672	0.6694	0.177		0.743	0.005	0.002	0.71	0.01	0.0005	0.01						
5-Aug-14							0.015			0.0003																				
7-Sep-14							0.5292																							
7-Oct-14																														
4-Nov-14																														
1-Dec-14																														
15-Jan-15																														
4-Mar-15																														
7-Apr-15																														
11-May-15																														
1-Jun-15																														
6-Jul-15																														
3-Aug-15																														
8-Sep-15																														
7-Jun-16	0.0005	0.001		0.00002	0.0006		0.3547	0.88		0.0003		0.001	0.00001	0.001	0.001	0.001			0.002					0.001	17					
26-Jul-16	0.00025	0.028		0.00043	0.0003		0.0326	0.3		0.0021		0.198	0.00053	0.116	0.031	0.027	0.00005		0.0004					0.0005	2	0.751	3.2	124	0.0005	0.019
2-Aug-16	0.0091	0.026		0.00022	0.0006		0.047	0.22		0.0032		0.169	0.00005	0.110	0.029	0.028	0.00005		0.0004					0.001	6		0.005	80	0.0005	0.026
6-Sep-16	0.0204	0.031		0.00038	0.002		0.0144	0.2		0.0011		0.204	0.000005	0.135	0.015	0.027	0.00005		0.0004					0.015	3	0.013	2.2	77	0.0005	0.024
3-Oct-16	0.00025	0.021		0.00022	0.0003		0.0161	0.98		0.0053		0.271	0.000005	0.114	0.023	0.024	0.00005		0.0004					0.005	17	0.013	2.0	67	0.0005	0.023
END OF DATABASE																														

Indicate values = 1/2 of detection limit

CENTRAL DIKE DOWNSTREAM POND (ST-S-5)

Parameter	conductivity	pH	Temperature	Turb	Salinity	CN WAD	Alkalinity	Al	Ag	As	Ammonia nitrogen	Ba	Cd
Date	µs/cm		˚C	NTU	ppm	ppm	mg CaCO3/L	mg/L	mg/L	mg/L	mg N/L	mg/L	mg/L
05/01/2016	3.19	7.48		9.25		0.864	157	0.011	< 0.0001	0.0368	25.3	0.0274	0.00079
01/02/2016	3.40			22.81			160	0.046	< 0.0001	0.0434	25.9	0.0347	0.00057
08/03/2016	2.49	7.05	24.5	10.96		0.389	160	< 0.006	< 0.0001	0.0457	26.9	0.036	< 0.00002
05/04/2016	4.54	7.65	15.8	13.23		0.374	161	0.01	0.0015	0.0452	30	0.0353	0.0007
03/05/2016	4.87	7.94	10.3	11.6			156	< 0.006	< 0.0001	0.045	29	0.0413	0.00059
05/05/2016	4.83	8.25	10.3	11.1		0.074							
06/05/2016	4.7	7.37	11.5	9.05									
07/05/2016	4.61	7.47	8.9	12.18									
07/06/2016	4.27	7.89	12.5	7.24			148	0.039	< 0.0001	0.0407	27.6	0.0409	0.00063
18/07/2016	4.69	7.96	10.6	15.77			133	0.011	< 0.0001	0.048	25.9	0.0295	0.00135
03/08/2016	3450	7.76	8.1	4.1		0.052	137	< 0.006	< 0.0001	0.0383	22.1	0.0284	0.00099
06/09/2016	4.11	7.91	11.6	2.33		0.042	137	0.046	< 0.0001	0.0072	28.8	0.0324	0.00054
03/10/2016	3891	7.27	8.2	11.8		0.039	133	0.015	< 0.0001	0.0426	27.5	0.0273	0.00065
08/11/2016	3570	7.84	8	7.67		0.033	132	0.008	< 0.0001	0.0427	29.3	0.0268	0.00168
05/12/2016	2620	8.3	7.9	12.5			129	0.047	< 0.0001	0.1082	29.5	0.0274	0.00161
19/12/2016	2.45	7.58	8	3.7									

CENTRAL DIKE DOWNSTREAM POND (ST-S-5)

Parameter	Chloride	Cr	Cu	Hardness	Fe	Fluoride	Mn	Hg	Mo	Ammonia (NH3)	Ni	Nitrate (NO3)
Date	mg/L	mg/L	mg/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg N/L	mg/L	mg N/L
05/01/2016	500	0.0022	0.0566	1108	1.32	0.49	2.435	0.00008	0.1882	0.32	0.0991	0.63
01/02/2016	491	< 0.0006	0.2502	1123	1.52	0.43	2.078	0.00024	0.2584	0.48	0.1515	2.06
08/03/2016	532	< 0.0006	0.1463	1309	1.58	0.52	2.38	0.00004	0.2846	0.44	0.079	1.88
05/04/2016	520	0.0011	0.0785	1316	1.85	0.53	2.187	0.00006	0.2767	0.53	0.0478	1.62
03/05/2016	511	0.0046	0.0236	1358	1.34	1.47	2.316	0.00014	0.3273	0.49	0.0287	0.75
05/05/2016												
06/05/2016												
07/05/2016												
07/06/2016	533	0.0059	0.0171	1368	1.68	0.07	2.072	0.00004	0.3268	0.43	0.0237	0.05
18/07/2016	392	< 0.0006	0.0054	1074	1.85	0.49	2.002	0.0001	0.3131	0.32	0.0299	0.01
03/08/2016	391	< 0.0006	0.0091	1104	1.64	0.49	2.065	< 0.0001	0.3257	0.39	0.0254	0.04
06/09/2016	370	0.0007	0.0061	1106	2.75	0.47	2.339	< 0.00001	0.3347	0.32	0.0105	0.02
03/10/2016	359	< 0.0006	0.031	1217	2.2	0.49	2.159	< 0.00001	0.2982	0.34	0.0187	0.1
08/11/2016	357	0.001	0.0112	1140	2.01	0.48	2.414	0.0001	0.3144	0.32	0.0273	< 0.01
05/12/2016	458	< 0.0006	0.0077	887	5.07	0.48	1.975	0.0001	0.3586	0.27	0.0217	< 0.01
19/12/2016												

CENTRAL DIKE DOWNSTREAM POND (ST-S-5)

Parameter	Nitrite (NO2)	Pb	Se	Sulphate (SO2-4)	TDS	TSS	Tl	Total Cyanide CNt	CN WAD	CN Free	Zn	Dissolved Al	Dissolved Ag	Dissolved As
Date	**mg N/L**	**mg/L**	**mg/L**	**mg SO4/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
05/01/2016	0.05	< 0.0003	0.048	1845	2558	4	< 0.005	0.531	0.445	0.08	0.009	< 0.006	< 0.0001	0.0223
01/02/2016	0.06	< 0.0003	0.039	1786	2772	7	< 0.002	0.821	0.712	0.096	0.003	< 0.006	< 0.0001	0.0296
08/03/2016	0.1	< 0.0003	0.058	1836	2854	8	< 0.002	0.573	0.423	0.012	< 0.001		< 0.0001	0.0225
05/04/2016	0.12	< 0.0003	0.056	1939	2547	4	< 0.002	0.476	0.374	0.008	0.007	< 0.006	0.0013	0.0267
03/05/2016	0.08	< 0.0003	0.043	2028	3081	3	< 0.002	0.248	0.229		0.003	< 0.006	< 0.0001	0.0328
05/05/2016														
06/05/2016										0.074				
07/05/2016														
07/06/2016	0.03	< 0.0003	0.035	2079	2287	1	< 0.002	0.282	0.081	0.082	0.009	< 0.006	< 0.0001	0.0136
18/07/2016	0.05	< 0.0003	0.034	1565	2349	3	< 0.0008	0.134	0.058	0.029	< 0.001	< 0.006	< 0.0001	0.0204
03/08/2016	0.05	< 0.0003	0.028		2296	6	< 0.0008	0.103	0.052		0.004	< 0.006	< 0.0001	0.0145
06/09/2016	0.05	< 0.0003	0.017	1664	2716	4	< 0.0008	0.097	0.042	0.445	0.001	< 0.006	< 0.0001	0.0072
03/10/2016	0.05	< 0.0003	0.012	1657	2493	1	< 0.0008	0.146	0.039	0.021	0.002	< 0.006	< 0.0001	0.0271
08/11/2016	0.04	0.0066	0.02	1689	2351	7	< 0.0008	0.129	0.033	0.022	0.016	< 0.006	< 0.0001	0.019
05/12/2016	0.07	< 0.0003	0.02	1777	2685	22	< 0.0008	0.134	0.051	0.027	0.019	< 0.006	< 0.0001	0.0237
19/12/2016														

CENTRAL DIKE DOWNSTREAM POND (ST-S-5)

Parameter	Dissolved Cd	Dissolved Cr	Dissolved Cu	Dissolved Fe	Dissolved Mn	Dissolved Hg	Dissolved Mo	Dissolved Ni	Dissolved Pb	Dissolved Se	Dissolved Tl	Dissolved Zn
Date	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
05/01/2016	0.00079	0.0021	0.052	0.1	2.664	< 0.00001	0.187	0.1077	< 0.0003	0.052	< 0.005	0.003
01/02/2016	0.00054	0.0062	0.2288	0.13	2.252	0.00013	0.2525	0.1246	< 0.0003	0.051	< 0.002	0.002
08/03/2016	< 0.00002	< 0.0006	0.1435	0.07	2.303	< 0.00001	0.2719	0.0759	< 0.0003	0.056	< 0.002	< 0.001
05/04/2016	0.00062	< 0.0006	0.072	0.06	2.153	0.00006	0.282	0.0506	< 0.0003	0.063	< 0.002	< 0.001
03/05/2016	0.00055	0.0029	0.0184	0.04	2.239	0.00014	0.326	0.0313	< 0.0003	0.044	< 0.002	< 0.001
05/05/2016												
06/05/2016												
07/05/2016												
07/06/2016	0.00037	0.0027	0.0134	0.05	2.121	0.00005	0.3367	0.022	< 0.0003	0.037	< 0.002	0.003
18/07/2016	0.00135	< 0.0006	0.0045	0.05	2.006	0.0001	0.3167	0.0298	< 0.0003	0.036	< 0.0008	< 0.001
03/08/2016	0.00084	< 0.0006	0.0055	0.06	1.953	< 0.0001	0.299	0.228	< 0.0003	0.026	< 0.0008	0.001
06/09/2016	0.00054	< 0.0006	0.0061	0.04	2.339	< 0.00001	0.3153	0.0099	< 0.0003	0.022	< 0.0008	0.002
03/10/2016	0.00065	< 0.0006	0.0047	0.04	2.032	< 0.00001	0.2998	0.0187	< 0.0003	0.014	< 0.0008	0.001
08/11/2016	0.00151	< 0.0006	0.0103	1.38	2.308	0.0001	0.2984	0.0244	0.0052	0.018	< 0.0008	0.011
05/12/2016	0.00123	< 0.0006	0.0044	0.04	1.785	< 0.0001	0.3479	0.0145	< 0.0003	0.022	< 0.0008	< 0.001
19/12/2016												

Portage Pit (ST-17 - PIT A)

		V				V	V	V	V								
Date	pH	Alkalinity	Turbidity	Carbonate Alkalinity	Ammonia	Ammonia-Nitrogen (NH3-NH4)	Arsenic	Chloride	Copper	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese
Units	Units	mg $CaCO_3$/L	NTU	mg $CaCO_3$/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	*6.5 to 9.0*	*--*	*--*	*--*	*0.016*	*1.83*	*0.0050*	*120*	*0.0020*	*0.1000*	*0.0050*	*--*	*0.00004*	*0.0020*	*0.30*	*0.0010*	*--*
28/05/2015	8.52	60	9.92		0.010	1.17	0.522	5	0.0014	0.003	0.032	0.005	0.00001	0.0003	0.0050	0.0002	0.043
01/06/2015	8.47	55	14.24		0.020	1.24	0.051		0.0022								
23/07/2015	6.99	76	1.43		0.060	4.27	0.004	15	0.0012	0.003	0.009	0.014	0.00001	0.001	0.010	0.000	0.098
04/08/2015	6.51	75	0.48		0.050	2.26	0.048		0.0003								
08/09/2015	8.44	86	2.13		0.070	3.35	0.024		0.0006								
05/10/2015	8.26	86	1.02		0.080	3.80	0.035	24	0.0006								
02/11/2015	7.9	100	1.07		0.100	4.22	0.055	26	0.0003								
07/06/2016	8.08	45	49.2		0.050	2.02	0.000	11	0.0008								
20/06/2016	8.13	79	23.8		0.090	3.94	0.013	19	0.0120								
18/07/2016	8.03	79	18.31		0.090	3.69	0.010	19	0.0010								
03/08/2016	7.91	80	10.46		0.090	3.42	0.019	19	0.0011	0.003	0.017	0.013	0.000	0.001	0.005	0.00015	0.105
06/09/2016		84			0.070	2.99	0.015	20	0.0008	0.003	0.00025	0.018	0.000	0.001	0.005	0.00015	0.128
03/10/2016	7.34	86	4.54		0.050	2.55	0.008	20	0.0007	0.014	0.008	0.016	0.000	0.001	0.005	0.00015	0.142
08/11/2016	7.93	227	212		0.200	7.46	0.060	58	0.0118	0.011	0.031	0.037	0.001	0.003	0.010	0.00015	0.174
30/11/2016	7.97		5.87														

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Portage Pit (ST-17 - PIT A)

								V	V	v	v	v		V	V	V	
Date	**Dissolved Mercury**	**Dissolved Molybdenum**	**Dissolved Nickel**	**Dissolved Selenium**	**Dissolved Silver**	**Dissolved Thallium**	**Dissolved Zinc**	**Fluoride**	**Hardness**	**Lead**	**Nickel**	**Nitrate**	**Nitrite**	**Sulphate**	**TDS**	**Zinc**	**Calcium**
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg CaCO3/L**	**mg/L**	**mg/L**	**mgN/L**	**mgN/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***0.000026***	***0.073***	***0.025***	***0.001***	***0.00025***	***0.0008***	***0.030***	***0.12***	***--***	***0.0010***	***0.0250***	***2.94***	***0.060***	***--***	***--***	***0.03***	***--***
28/05/2015	0.000005	0.036	0.014	0.001	0.00005	0.0025	0.0005	0.06	82	0.0002	0.019	3.190	0.120	45	171	0.006	
01/06/2015										0.0057	0.021				192	0.004	
23/07/2015	0.000005	0.001	0.001	0.001	0.00005	0.005	0.001	0.37	227	0.0002	0.033	11.900	0.350	165	464	0.001	
04/08/2015										0.0002	0.023				426	0.001	
08/09/2015										0.0002	0.031				461	0.001	
05/10/2015								0.37	306	0.0002	0.043	16.800	0.150	250	532	0.001	
02/11/2015								0.42	340	0.0002	0.045	15.700	0.050	258	548	0.002	
07/06/2016								0.23	127	0.0002	0.011	5.570	0.110	117	245	0.001	
20/06/2016								0.33	264	0.0002	0.020	13.100	0.150	197	473	0.001	
18/07/2016								0.36	222	0.0002	0.018	12.400	0.050	193	436	0.001	
03/08/2016	0.000005	0.121	0.024	0.001	0.00005	0.0004	0.001	0.36	259	0.0002	0.028	12.800	0.050	205	473	0.001	
06/09/2016	0.000005	0.130	0.026	0.001	0.00005	0.0004	0.001	0.36	250	0.0038	0.027	13.600	0.040	235	510	0.001	
03/10/2016	0.000005	0.113	0.033	0.002	0.00005	0.0004	0.001	0.37	329	0.0002	0.037	14.100	0.030	244	528	0.001	
08/11/2016	0.000060	0.163	0.047	0.004	0.00005	0.0004	0.006	0.99	690	0.0082	0.127	17.200	0.090	432	964	0.028	
30/11/2016																	

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Portage Pit (ST-17 - PIT A)

											v				v	v	
Date	Conductivity	DOC	Magnesium	Ortho-phosphate	Potassium	Reactive Silica	Sodium	TKN (Kjeldahl)	TOC	Total Alkalinity	Total Cyanide	C_{10}-C_{50}	Total Phosphorus	TSS	Aluminium	Silver	Boron
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L	mg $CaCO_3$/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	--	--	--	--	--	--	--	--	--	--	*0.005*	--	*0.0040*	--	*0.10*	*0.00025*	*1.50*
28/05/2015											0.005						
01/06/2015																	
23/07/2015																	
04/08/2015																	
08/09/2015																	
05/10/2015											0.006			4	0.034	0.00005	
02/11/2015											0.010			3	0.050	0.00005	
07/06/2016											0.016			41	0.794	0.00005	
20/06/2016											0.013			23	0.625	0.00005	
18/07/2016														5	0.148	0.00005	
03/08/2016											0.011			69	0.332	0.00005	
06/09/2016											0.018			0.5	0.034	0.00005	
03/10/2016											0.004			5	0.064	0.00005	
08/11/2016											0.056			228	6.530	0.00005	
30/11/2016											0.012						

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Portage Pit (ST-17 - PIT A)

	v			v	v		v	v	v	v							
Date	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Iron**	**Lithium**	**Manganese**	**Mercury**	**Molybdenum**	**Selenium**	**Antimony**	**Tin**	**Strontium**	**Titanium**	**Thallium**	**Uranium**	**Vanadium**
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***--***	***--***	***0.000040***	***0.0010***	***0.30***	***--***	***--***	***0.000026***	***0.073***	***0.001***	***--***	***--***	***--***	***--***	***0.0008***	***0.015***	***--***
28/05/2015																	
01/06/2015																	
23/07/2015																	
04/08/2015																	
08/09/2015																	
05/10/2015	0.017		0.00001	0.0003	0.050		0.109	0.000005	0.195	0.001					0.0025		
02/11/2015	0.016		0.00045	0.0029	0.040		0.118	0.000190	0.162	0.002					0.0025		
07/06/2016	0.009		0.00012	0.0003	1.710		0.076	0.000005	0.038	0.0005					0.0010		
20/06/2016	0.014		0.00039	0.0059	1.600		0.117	0.000005	0.130	0.0005					0.0010		
18/07/2016	0.013		0.00035	0.0021	0.320		0.093	0.000005	0.112	0.0005					0.0004		
03/08/2016	0.015		0.00031	0.0053	0.920		0.131	0.000050	0.128	0.00005					0.0004		
06/09/2016	0.018		0.00024	0.0007	0.040		0.135	0.000005	0.137	0.001					0.0004		
03/10/2016	0.015		0.00018	0.0003	0.150		0.148	0.000005	0.113	0.001					0.0004		
08/11/2016	0.056		0.00090	0.2155	22.500		0.837	0.000050	0.162	0.004					0.0004		
30/11/2016																	

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Portage Pit (ST-17 - PIT A)

Date	Dissolved Boron	Dissolved Beryllium	Dissolved Chromium	Dissolved Lithium	Dissolved Antimony	Dissolved Tin	Dissolved Strontium	Dissolved Titanium	Dissolved Uranium	Dissolved Vanadium	CN-WAD	CN Free
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	*1.50*	*--*	*0.0010*	*--*	*--*	*--*	*--*	*--*	*0.0150*	*--*	*--*	*--*
28/05/2015												0.005
01/06/2015												
23/07/2015												
04/08/2015												
08/09/2015												
05/10/2015												
02/11/2015												
07/06/2016											0.005	0.007
20/06/2016											0.010	0.011
18/07/2016											0.010	
03/08/2016											0.006	
06/09/2016											0.003	0.003
03/10/2016											0.004	0.006
08/11/2016											0.006	0.005
30/11/2016											0.005	

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Portage Pit (ST-19 - Pit E)

Date	pH	V Alkalinity	Turbidity	Carbonate Alkalinity	V Ammonia	Ammonia-Nitrogen (NH3-NH4)	V Arsenic	V Chloride	V Copper	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese
Units	**Units**	**mg $CaCO_3$/L**	**NTU**	**mg $CaCO_3$/L**	**mg N/L**	**mg N/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***6.5 to 9.0***	***--***	***--***	***--***	***0.016***	***1.83***	***0.0050***	***120***	***0.0020***	***0.1000***	***0.0050***	***--***	***0.00004***	***0.0020***	***0.30***	***0.0010***	***--***
2013-01-16	7.61	112	61.6		0.41	7.1	0.0179		0.0059								
2013-02-06	7.68	95	21.5		0.29	12.6	0.0367		0.0143								
2013-03-06	7.22	111	25.3		0.99	10.7	0.0107		0.0044								
2013-04-03	7.02	55	2.1		0.025	0.19	0.0011		0.0073								
2013-05-07	7.17	73	5.48		0.025	0.35	0.0191		0.0026								
2013-07-08	8.16	53	5.74		0.025	0.71	0.0245		0.0012								
2013-08-14	7.54	50	5.76		0.025	0.25	0.0493		0.0015								
2013-09-09	7	52	1.42		0.005	0.13	0.0083		0.00025								
2013-10-07	8	49	1.75		0.005	0.11	0.0139		0.00025								
2014-11-21		90			0.3	13.4		34.4		0.026	0.0203	0.0291	0.00093	0.002	0.005	0.00015	0.1502
2015-07-13	6.81	72	2.25		0.09	3.85	0.0172	16.7	0.00025	0.003	0.0182	0.0124	0.00001	0.00025	0.005	0.00015	0.0788
2015-08-11	5.9	70	8.73		0.04	2.24	0.0138	14.1	0.00025	0.003	0.0138	0.0098	0.00001	0.00025	0.005	0.00015	0.1054
2015-09-14	7.28	49	2.81		0.01	2.17	0.00025		0.00025								
2016-06-13	7.95	65	38.5		0.04	4.06	0.00025	33.1	0.0022								
2016-07-17		84			0.19	7.19	0.0053	29.3	0.0015								
2016-08-03	7.45	42	14.86		0.02	4.67	0.00025	29.1	0.0019	0.003	0.00025	0.0173	0.00024	0.001	0.02	0.00015	0.5854

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Portage Pit (ST-19 - Pit E)

								V	V	v	v	v			V	V	
Date	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel	Dissolved Selenium	Dissolved Silver	Dissolved Thallium	Dissolved Zinc	Fluoride	Hardness	Lead	Nickel	Nitrate	Nitrite	Sulphate	TDS	Zinc	Calcium
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg CaCO3/L**	**mg/L**	**mg/L**	**mg N/L**	**mgN/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***0.000026***	***0.073***	***0.025***	***0.001***	***0.00025***	***0.0008***	***0.030***	***0.12***	***--***	***0.0010***	***0.0250***	***2.94***	***0.060***	***--***	***--***	***0.03***	***--***
2013-01-16										0.00015	0.0043				252	0.0005	
2013-02-06										0.00015	0.0032				238	0.116	
2013-03-06										0.0097	0.0045				253	0.008	
2013-04-03										0.00015	0.004				57	0.001	
2013-05-07										0.00015	0.0024				116	0.011	
2013-07-08										0.0006	0.0063				103	0.0005	
2013-08-14										0.0006	0.0094				2	0.0005	
2013-09-09										0.00015	0.0011				54	0.004	
2013-10-07										0.00015	0.00025				64	0.001	
2014-11-21	0.000050	0.3088	0.0539	0.005	0.00005	0.0025	0.005	0.29	432			42.3	0.36	339	806		
2015-07-13	0.000020	0.1074	0.0243	0.002	0.00005	0.0025	0.0005	0.24	198	0.00015	0.025	11.8	0.3	154	401	0.0005	
2015-08-11	0.000005	0.0181	0.0402	0.001	0.00005	0.0025	0.0005	0.29	193	0.00015	0.0402	9.13	0.09	117	324	0.0005	
2015-09-14										0.00015	0.1968				768	0.201	
2016-06-13								0.38	130	0.00015	0.0072	9.79	0.15	77.4	333	0.004	
2016-07-17								0.69	267	0.00015	0.0179	1.28	0.02	229	607	0.0005	
2016-08-03	0.000050	0.0867	0.0072	0.002	0.00005	0.0004	0.004	0.45	422	0.00015	0.0945	1.96	0.28	429	747	0.007	

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Portage Pit (ST-19 - Pit E)

											v				v	v	
Date	**Conductivity**	**DOC**	**Magnesium**	**Ortho-phosphate**	**Potassium**	**Reactive Silica**	**Sodium**	**TKN (Kjeldahl)**	**TOC**	**Total Alkalinity**	**Total Cyanide**	**C_{10}-C_{50}**	**Total Phosphorus**	**TSS**	**Aluminium**	**Silver**	**Boron**
Units		**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L as N**	**mg/L**	**mg CaCO$_3$/L**	**mg/L**		**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	--	--	--	--	--	--	--	--	--	--	***0.005***	--	***0.0040***	--	***0.10***	***0.00025***	***1.50***
2013-01-16																	
2013-02-06																	
2013-03-06																	
2013-04-03																	
2013-05-07																	
2013-07-08																	
2013-08-14																	
2013-09-09																	
2013-10-07																	
2014-11-21																	
2015-07-13																	
2015-08-11																	
2015-09-14																	
2016-06-13											0.031			14	0.296	0.00005	
2016-07-17											0.065			4	0.084	0.00005	
2016-08-03											0.022			14	0.136	0.00005	

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Portage Pit (ST-19 - Pit E)

	v			v	v		v	v	v	v							
Date	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Iron**	**Lithium**	**Manganese**	**Mercury**	**Molybdenum**	**Selenium**	**Antimony**	**Tin**	**Strontium**	**Titanium**	**Thallium**	**Uranium**	**Vanadium**
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***--***	***--***	***0.000040***	***0.0010***	***0.30***	***--***	***--***	***0.000026***	***0.073***	***0.001***	***--***	***--***	***--***	***--***	***0.0008***	***0.015***	***--***
2013-01-16																	
2013-02-06																	
2013-03-06																	
2013-04-03																	
2013-05-07																	
2013-07-08																	
2013-08-14																	
2013-09-09																	
2013-10-07																	
2014-11-21																	
2015-07-13																	
2015-08-11																	
2015-09-14																	
2016-06-13	0.008		0.00001	0.0064	0.82		0.0474	0.00012	0.0121	0.0005					0.0010		
2016-07-17	0.0078		0.00041	0.0003	0.24		0.0744	0.00007	0.0906	0.002					0.0004		
2016-08-03	0.0173		0.0003	0.0013	3.55		0.6503	0.00005	0.0966	0.003					0.0004		

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Portage Pit (ST-19 - Pit E)

Date	Dissolved Boron	Dissolved Beryllium	Dissolved Chromium	Dissolved Lithium	Dissolved Antimony	Dissolved Tin	Dissolved Strontium	Dissolved Titanium	Dissolved Uranium	Dissolved Vanadium	CN-WAD	CN Free
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	*1.50*	--	*0.0010*	--	--	--	--	--	*0.0150*	--	--	--
2013-01-16												
2013-02-06												
2013-03-06												
2013-04-03												
2013-05-07												
2013-07-08												
2013-08-14												
2013-09-09												
2013-10-07												
2014-11-21												
2015-07-13												
2015-08-11												
2015-09-14												
2016-06-13												
2016-07-17												0.043
2016-08-03											0.007	

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Goose Pit (ST-20, Sump)

Date	pH	Alkalinity	Turbidity	Carbonate Alkalinity	Ammonia	Ammonia-Nitrogen (NH3-NH4)	Arsenic	Chloride	Copper	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese
Units	**Units**	**mg $CaCO_3$/L**	**NTU**	**mg $CaCO_3$/L**	**mg N/L**	**mg N/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***6.5 to 9.0***	***--***	***--***	***--***	***0.016***	***1.83***	***0.0050***	***120***	***0.0020***	***0.1000***	***0.0050***	***--***	***0.00004***	***0.0020***	***0.30***	***0.0010***	***--***
2013-01-16	7.74	141	29.7		0.700	13.7	0.0058		0.0005								
2013-02-06	6.94	130	26.9		0.100	3.9	0.0184		0.0092								
2013-03-06	7.49	125	45.7		0.140	1.5	0.0146		0.00025								
2013-05-07	7.49	108	33.8		0.160	4	0.0183		0.0048								
2013-06-11	7.53	100	109.5		0.320	9.5	0.0035		0.015								
2013-07-08	8.88	110	73.7		0.400	6.6	0.0054		0.0077								
2013-08-13	7.47	140	84.1		0.600	11.5	0.0078		0.00025								
2013-09-09	7.57	176	42.1		0.230	13.9	0.0044		0.0041								
2013-10-07	8	138	28		0.010	6.5	0.0105		0.00025								
2014-03-11	8.38	93	2.82		0.010	0.017	0.017		0.0005								
2014-06-03	6.82	90	30.86		0.050	2.4	0.0061		0.0022								
2014-07-01	8.21	94	79.2		0.220	5.6	0.0045	73.6	0.0005	0.016	0.0013	0.0163	0.00001	0.00025	0.005	0.00015	0.0115
2014-08-10	8.22	83	7.4		0.030	0.4	0.0075		0.0022								
2014-09-08	8.24	88	16.42		0.010	0.61	0.0059	31.3	0.002	0.046	0.0059	0.0387	0.00001	0.0013	0.005	0.00015	0.1072
2015-07-07	7.23	71	106.5		0.005	0.41	0.00025	13.8	0.0037	0.003	0.00025	0.0104	0.00001	0.00025	0.005	0.00015	0.1258
2015-08-04	6.88	50	4.84		0.010	0.99	0.00025		0.00025								
2015-09-09		52			0.020	1.72	0.00025	34.8	0.0023	0.003	0.00025	0.0198	0.00002	0.001	0.005	0.00015	0.2043
2015-10-05	7.99	53	12.06		0.020	1.4	0.0039	17.9	0.0026	0.003	0.00025	0.0216	0.00001	0.0026	0.005	0.0003	0.2026
2016-06-07	7.75	23	70.8		0.005	0.28	0.00025	3.8	0.0025	0.003	0.00025	0.0012	0.00001	0.0005	0.005	0.00015	0.0839
2016-07-18	8.15	52	7.04		0.005	0.03	0.001	15.1	0.0047	0.003	0.00025	0.0214	0.00002	0.0009	0.005	0.00015	0.0635
2016-08-08	7.28	53	9.81		0.005	0.06	0.00025	15.7	0.0027	0.003	0.00025	0.0185	0.00001	0.0019	0.005	0.00015	0.0266
2016-10-11	7.74	60	7.42		0.005	0.03	0.00025	18.8	0.0021	0.003	0.00025	0.0235	0.00001	0.00025	0.005	0.00015	0.0178

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Goose Pit (ST-20, Lake)

Date	pH	Alkalinity	Turbidity	Carbonate Alkalinity	Ammonia	Ammonia-Nitrogen (NH3-NH4)	Arsenic	Chloride	Copper	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese
Units	**Units**	**mg $CaCO_3$/L**	**NTU**	**mg $CaCO_3$/L**	**mg N/L**		**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***6.5 to 9.0***	***--***	***--***	***--***	***0.016***	***1.83***	***0.0050***	***120***	***0.0020***	***0.1000***	***0.0050***	***--***	***0.00004***	***0.0020***	***0.30***	***0.0010***	***--***
2015-08-09		75		1		0.57	0.0061	13.7	0.0007	0.003	0.00025	0.0163	0.00001	0.00025	0.01	0.00015	0.0058
2016-07-24	7.81	80	77	1	0.08	4.4	0.00025	25.9	0.0034	0.003	0.00025	0.0453	0.00006	0.0007	0.005	0.0011	0.1336
2016-08-09	8.1	80	17.05	1	0.08	3.98	0.00025	24.9	0.0018	0.003	0.00025	0.0534	0.00003	0.0007	0.005	0.00015	0.15
2016-09-14	7.23	82	8	1	0.08	3.17	0.00025	22.7	0.0016	0.003	0.00025	0.0397	0.00001	0.0005	0.005	0.00015	0.1046
2016-10-10	7.9	83	10.8	1	0.09	3.04	0.00025	24.8	0.0016	0.003	0.00025	0.0422	0.00001	0.00025	0.005	0.00015	0.1105

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Goose Pit (ST-20, Sump)

Date	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel	Dissolved Selenium	Dissolved Silver	Dissolved Thallium	Dissolved Zinc	Fluoride	Hardness	Lead	Nickel	Nitrate	Nitrite	Sulphate	TDS	Zinc	Calcium
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg CaCO3/L**	**mg/L**	**mg/L**	**mgN/L**	**mgN/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***0.000026***	***0.073***	***0.025***	***0.001***	***0.00025***	***0.0008***	***0.030***	***0.12***	***--***	***0.0010***	***0.0250***	***2.94***	***0.060***	***--***	***--***	***0.03***	***--***
2013-01-16										0.0003	0.0085				329	0.0005	
2013-02-06										0.00015	0.0048				223	0.058	
2013-03-06										0.0057	0.0032				199	0.004	
2013-05-07										0.0032	0.0135				202	0.0005	
2013-06-11										0.00015	0.432				280	0.0005	
2013-07-08										0.00065	0.041				422	0.0055	
2013-08-13										0.0033	0.0556					0.008	
2013-09-09										0.00015	0.0898				496	0.01	
2013-10-07										0.00015	0.0692				366	0.003	
2014-03-11										0.0006	0.0018				175	0.001	
2014-06-03										0.00015	0.0137				288	0.001	
2014-07-01	0.0001	0.0191	0.0043	0.001	0.0001	0.0025	0.0005	0.91	111	0.00015	0.0109	16.4	0.39	50.9	1544	0.0005	
2014-08-10										0.0009	0.036				319	0.003	
2014-09-08	0.00005	0.0166	0.0253	0.001	0.0001	0.0025	0.0005	0.96	151	0.0003	0.0277	5.3	0.13	70.6	322	0.009	
2015-07-07	0.00002	0.0062	0.0145	0.0005	0.00005	0.0025	0.0005	0.29	72	0.00015	0.0263	1.67	0.04	21.3	144	0.0005	
2015-08-04										0.001	0.0209				25	0.0005	
2015-09-09	0.000005	0.0116	0.0319	0.002	0.00005	0.0025	0.0005	0.48	171	0.00015	0.0423	3.33	0.28	98.6	270	0.0005	
2015-10-05	0.000005	0.012	0.0515	0.002	0.00005	0.0025	0.0005	0.42	159	0.00015	0.0629	3.89	0.25	117	282	0.0005	
2016-06-07	0.00001	0.0022	0.0045	0.0005	0.00005	0.001	0.0005	0.12	50	0.00015	0.0113	0.9	0.02	25	83	0.007	
2016-07-18	0.000005	0.0085	0.0405	0.001	0.00005	0.0004	0.0005	0.41	145	0.00015	0.0424	4.43	0.03	97.8	277	0.0005	
2016-08-08	0.000005	0.0073	0.0332	0.001	0.00005	0.0004	0.0005	0.4	134	0.00015	0.039	5	0.02	100	281	0.0005	
2016-10-11	0.000005	0.0077	0.0626	0.0005	0.00005	0.0004	0.0005	0.44	179	0.00015	0.0673	4.54	0.02	114	312	0.003	

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Goose Pit (ST-20, Lake)

Date	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel	Dissolved Selenium	Dissolved Silver	Dissolved Thallium	Dissolved Zinc	Fluoride	Hardness	Lead	Nickel	Nitrate	Nitrite	Sulphate	TDS	Zinc	Calcium
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg CaCO3/L**	**mg/L**	**mg/L**	**mgN/L**	**mgN/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***0.000026***	***0.073***	***0.025***	***0.001***	***0.00025***	***0.0008***	***0.030***	***0.12***	***--***	***0.0010***	***0.0250***	***2.94***	***0.060***	***--***	***--***	***0.03***	***--***
2015-08-09	0.00006	0.0148	0.0097	0.001		0.0025	0.0005	0.55	104	0.00015	0.0097	4.11	0.08	45.8		0.002	23.6
2016-07-24	0.00036	0.0219	0.0085	0.0005		0.0004	0.001		190	0.0015	0.0121	2.57	0.58	151	388	0.008	48
2016-08-09	0.00006	0.0237	0.0096	0.0005		0.0004	0.0005		154	0.00015	0.0111	3.01	0.36	142	394	0.001	41.2
2016-09-14	0.00001	0.0236	0.0129	0.0005		0.0004	0.0005		165	0.00015	0.0139	2.61	0.05	144	378	0.001	42.7
2016-10-10	0.000005	0.0214	0.0098	0.0005		0.0004	0.0005		183	0.00015	0.0113	3.5	0.05	147	399	0.002	47.8

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Goose Pit (ST-20, Sump)

Date	Conductivity	DOC	Magnesium	Ortho-phosphate	Potassium	Reactive Silica	Sodium	TKN (Kjeldahl)	TOC	Total Alkalinity	Total Cyanide	C_{10}-C_{50}	Total Phosphorus	TSS	Aluminium	Silver	Boron
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L	mg CaCO$_3$/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	--	--	--	--	--	--	--	--	--	--	*0.005*	--	*0.0040*	--	*0.10*	*0.00025*	*1.50*
2013-01-16																	
2013-02-06																	
2013-03-06																	
2013-05-07																	
2013-06-11																	
2013-07-08																	
2013-08-13																	
2013-09-09																	
2013-10-07																	
2014-03-11	310																
2014-06-03	463																
2014-07-01	517																
2014-08-10	473																
2014-09-08	477																
2015-07-07																	
2015-08-04																	
2015-09-09																	
2015-10-05											0.008			7	0.305	0.00005	
2016-06-07											0.0025			36	1.26	0.00005	
2016-07-18											0.0025			10	0.114	0.00005	
2016-08-08											0.0025			6	0.084	0.00005	
2016-10-11											0.001			21	0.091	0.00005	

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Goose Pit (ST-20, Lake)

Date	Conductivity	DOC	Magnesium	Ortho-phosphate	Potassium	Reactive Silica	Sodium	TKN (Kjeldahl)	TOC	Total Alkalinity	Total Cyanide	C_{10}-C_{50}	Total Phosphorus	TSS	Aluminium	Silver	Boron
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L	mg CaCO$_3$/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	--	--	--	--	--	--	--	--	--	--	*0.005*	--	*0.0040*	--	*0.10*	*0.00025*	*1.50*
2015-08-09	217	0.3	11.1	0.005	5.81	2.75	18.5	0.49	2.1		0.0025	0.05	0.01	0.5	0.011		0.11
2016-07-24	551	0.1	17.2	0.11	9.7	5	36.6	3.87	1.6		0.01		0.03	29	1.11		0.11
2016-08-09	624	0.1	12.6	0.03	8.51	5.3	34.6	3.75	0.7		0.0025		0.03	6	0.24		0.005
2016-09-14	776	0.1	14.4	0.01	10.9	5.2	38.4	3.18	1.8		0.0005		0.02	8	0.085		0.005
2016-10-10	607	0.1	15.5	0.02	10.8	5.6	38.6	2.97	1.3		0.003		0.01	6	0.164		0.1

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Goose Pit (ST-20, Sump)

Date	Barium	Beryllium	Cadmium	Chromium	Iron	Lithium	Manganese	Mercury	Molybdenum	Selenium	Antimony	Tin	Strontium	Titanium	Thallium	Uranium	Vanadium
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	--	--	*0.000040*	*0.0010*	*0.30*	--	--	*0.000026*	*0.073*	*0.001*	--	--	--	--	*0.0008*	*0.015*	--
2013-01-16																	
2013-02-06																	
2013-03-06																	
2013-05-07																	
2013-06-11																	
2013-07-08																	
2013-08-13																	
2013-09-09																	
2013-10-07																	
2014-03-11																	
2014-06-03																	
2014-07-01																	
2014-08-10																	
2014-09-08																	
2015-07-07																	
2015-08-04																	
2015-09-09																	
2015-10-05	0.0276		0.00001	0.0003	0.69		0.2682	0.000005	0.0138	0.001					0.0025		
2016-06-07	0.0121		0.00001	0.0101	2.17		0.1095	0.000005	0.0026	0.0005					0.001		
2016-07-18	0.0241		0.00008	0.0003	0.16		0.0894	0.000005	0.0081	0.001					0.0004		
2016-08-08	0.021		0.00001	0.0003	0.18		0.0502	0.000005	0.008	0.001					0.0004		
2016-10-11	0.0249		0.00007	0.0018	0.15		0.0241	0.000005	0.0083	0.0005					0.0004		

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Goose Pit (ST-20, Lake)

Date	Barium	Beryllium	Cadmium	Chromium	Iron	Lithium	Manganese	Mercury	Molybdenum	Selenium	Antimony	Tin	Strontium	Titanium	Thallium	Uranium	Vanadium
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME Guidelines	--	--	*0.000040*	*0.0010*	*0.30*	--	--	*0.000026*	*0.073*	*0.001*	--	--	--	--	*0.0008*	*0.015*	--
2015-08-09	0.0166	0.00025	0.00001	0.0025	0.07	0.0025	0.0175	0.00005	0.0145	0.0005	0.0018	0.0005	0.177	0.01	0.0025	0.003	0.00025
2016-07-24	0.054	0.00025	0.00005	0.0049	2.33	0.0025	0.1763	0.00051	0.0225	0.001	0.0015	0.0005	0.286	0.1	0.0004	0.008	0.00025
2016-08-09	0.0534	0.00025	0.00001	0.0072	0.63	0.0025	0.1666	0.00007	0.0276	0.001	0.0015	0.0005	0.28	0.05	0.0004	0.009	0.00025
2016-09-14	0.0425	0.00025	0.00001	0.0003	0.16	0.0025	0.1177	0.00004	0.024	0.001	0.0012	0.0005	0.28	0.03	0.0004	0.008	0.00025
2016-10-10	0.0429	0.00025	0.00001	0.0013	0.27	0.0025	0.1208	0.000005	0.0217	0.0005	0.0016	0.0005	0.251	0.04	0.0004	0.01	0.00025

Indicate values = 1/2 of detection limit
Indicate values greater than CCME guidelines

Goose Pit (ST-20, Sump)

Date	Dissolved Boron	Dissolved Beryllium	Dissolved Chromium	Dissolved Lithium	Dissolved Antimony	Dissolved Tin	Dissolved Strontium	Dissolved Titanium	Dissolved Uranium	Dissolved Vanadium	CN-WAD	CN-Free	Cyanate	Thiocyanate
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***1.50***	--	***0.0010***	--	--	--	--	--	***0.0150***	--	--	--	--	--
2013-01-16														
2013-02-06														
2013-03-06														
2013-05-07														
2013-06-11														
2013-07-08														
2013-08-13														
2013-09-09														
2013-10-07														
2014-03-11														
2014-06-03														
2014-07-01								0.005						
2014-08-10														
2014-09-08								0.005						
2015-07-07														
2015-08-04														
2015-09-09														
2015-10-05														
2016-06-07											0.0025	0.0025		
2016-07-18											0.0025	0.0025		
2016-08-08											0.0025	0.0025		
2016-10-11											0.0005	0.0025		

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

Goose Pit (ST-20, Lake)

Date	Dissolved Boron	Dissolved Beryllium	Dissolved Chromium	Dissolved Lithium	Dissolved Antimony	Dissolved Tin	Dissolved Strontium	Dissolved Titanium	Dissolved Uranium	Dissolved Vanadium	CN-WAD	CN-Free	Cyanate	Thiocyanate
Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
CCME Guidelines	***1.50***	--	***0.0010***	--	--	--	--	--	***0.0150***	--	--	--	--	--
2015-08-09	0.12	0.00025	0.0003	0.0025	0.002	0.0005	0.193	0.01	0.003	0.00025				
2016-07-24	0.09	0.00025	0.0029	0.0025	0.0015	0.0005	0.299	0.03	0.008	0.00025		0.006	6.16	0.43
2016-08-09	0.005	0.00025	0.0023	0.0025	0.0016	0.0005	0.285	0.04	0.009	0.00025		0.0025	4.47	0.025
2016-09-14	0.005	0.00025	0.0003	0.0025	0.0013	0.0005	0.249	0.02	0.008	0.00025		0.0025	0.01	0.025
2016-10-10	0.09	0.00025	0.0021	0.0025	0.0016	0.0005	0.293	0.03	0.008	0.00025		0.0025	1.1	0.025

Indicate values = 1/2 of detection limit

Indicate values greater than CCME guidelines

#7

Calendar reference	ST-10 (a) / ST-10 (b)
Sample ID	ST-10
Old calendar reference	
Sampling location	Vault Attenuation Pond (water released at diffuser) (Final Effluent)

Date	Parameters	pH	Conductivity	Turbidity	Alkalinity Total	Alkalinity bicarbonate	Alkalinity carbonate	Ammonia (NH3)	Ammonia-nitrogen (NH3-NH4)	Calcium (Ca)	Chloride (Cl)	Cyanide Total	CN Free	Dissolved organic carbon (DOC)	Hardness	Magnesium (Mg)	Nitrate	Nitrite	Ortho-phosphate	Phosphorous total	Potassium (K)	Reactive silica	Sodium (Na)	Sulphate (SO2-4)	TDS	TKN (Kjeldahl nitrogen)	TOC
	Unit		µS/cm	NTO	mg CaCO3/L	mg/L	mg/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg CaCO3/L	mg/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Max concentration Grab	6.0 -9.0		15					40		1000						100			3					1400		
	Max concentration Average	6.0 -9.0		15					20		500						50			1.5					1400		
28/06/2013		8.57										0.003															
02/07/2013		7.84										0.003															
09/07/2013		6.57										0.0060															
16/07/2013		7.80										0.003															
23/07/2013		7.81										0.0050															
30/07/2013		7.16										0.003															
17/08/2013		7.34										0.003															
20/08/2013		7.16										0.003															
23/08/2013		7.63										0.0070															
27/08/2013		7.02										0.0050															
03/09/2013		7.51										0.003															
10/09/2013		6.95										0.003															
17/09/2013		6.93										0.0050															
24/09/2013		7.02										0.003															
02/10/2013		7.38										0.003															
09/10/2013		7.42										0.003															
15/10/2013		6.94										0.0050															
22/10/2013		7.68										0.003															
24/06/2014		7.51										0.0025															
30/06/2014	sample before discharge											0.0025															
28/07/2014		7.42										0.0025															
31/07/2014												0.0025															
02/08/2014												0.0025															
06/08/2014		7.17										0.0025															
12/08/2014		7.86										0.0025															
28/08/2014	sample before discharge											0.0025															
29/06/2015	sample before discharge				52				1.24	17.6	4.2	0.0025		8	62	4.52	1.68	0.02	0.02	0.005	1.86	1.72	1.92	31	114	1.13	7.6
08/07/2015		7.10	564	13.7	52	52	1		1.1	15.9	4.3	0.0025		3.4	56	4.03	1.92	0.02	0.01	0.02	1.95	1.08	1.81	23.7	108	1.07	3.5
10/07/2015		6.98	172	1.35																							
13/07/2015		6.58	170.9	2.72	28	28	1		0.99	15.4	4.7	0.0025		2.7	53	3.76	1.64	0.02	0.005	0.02	1.71	1.07	1.67	27.2	99	0.99	2.4
21/07/2015		6.98	151	1.01	36	36	1	0.005	0.99	15.2	9.9	0.0025		3.5	54	3.94	1.73	0.02	0.005	0.03	1.78	0.96	1.71	28.5	103	0.62	3.4
24/07/2015																											
25/07/2015		7.39	149		27			0.005		16.7	4.3				59	4.3	1.76	0.02			1.74			37.9	99		
29/07/2015		7.66	176.2	1.2	28	28	1		0.84	14.4	3.9	0.0025		3.3	54	4.58	1.91	0.03	0.005	0.01	1.69	0.53	2.14	48.7	1	0.91	3.6
31/07/2015		7.23	178.3	1.3																							
04/08/2015		7.08	180	1.81	29	29	1		0.59	19	3.9	0.0025		3.4	68	5.19	2.2	0.04	0.005	0.005	1.85	0.69	2.23	27.4	103	1.3	3.9
07/08/2015		6.31	193.1	3.03																							
10/08/2015		7.96	210	2.46	31	31	1		0.96	17.5	4.5	0.0025		3.2	62	4.54	2.47	0.06	0.005	0.01	1.81	0.46	2.01	29.9	109	1.62	3.9
11/08/2015		6.98	173.4	8.2																							
15/08/2015				4.39																							
17/08/2015		6.92	192.7	2.73	32	32	1		1.2	18.9	5.5	0.0025		3	68	5.21	3.2	0.06	0.005	0.06	2.2	0.7	1.98	33.3	117	1.58	4.2
20/08/2015		8.3	209	2.63																							
21/08/2015																											
24/08/2015		7.73	178.2	2.23	34	34	1		1.17	22.6	5.9	0.0025		3.3	84	6.92	3.85	0.06	0.005	0.005	2.67	3.17	1.99	36	126	1.2	4
28/08/2015		7.48	199.4	5.26																							
01/09/2015		7.37	207	6.54	35	35	1		1.66	18.2	6.7	0.0025		3.9	64	4.65	3.95	0.07	0.02	0.005	2.72	0.27	2.38	33.1	135	2.24	3.9
04/09/2015		7.52	210	6.81																							
08/09/2015		7.67	205	2.25	39	39	1		0.88	21.3	5.7	0.0025		4	78	5.62	3.74	0.04	0.005	0.005	2.29	0.27	2.66	36	132	1.15	4.4
20/06/2016	sample before discharge	6.91	198.6	13.73	25	25	1		1.62	19.3	5.6	0.0025		4.1	68	4.98	4.24	0.05	0.005	0.09	2.43	2.4	2.27	37.7	128	1.75	4.6
14/07/2016		7.06	163.9	2.3																							
15/07/2016		7.93	170	4.1																							
16/07/2016		7.64	172	2.05																							
17/07/2016		7.3	166.5	1.97																							
18/07/2016		7.63	170	1.59	23	23	1	0.005	0.63	18.8	5	0.0025		3.5	67	4.91	3.11	0.05	0.005	0.03	2.06	1.5	2	41.2	119	0.94	3.5
19/07/2016				1.05																							
20/07/2016																											
23/07/2016				0.6																							
25/07/2016		7.5	173.8	2.17	23	23	1	0.005	0.69	19.8	4.9	0.0025		2.4	68	4.7	3.54	0.04	0.005	0.005	1.91	1.4	2.06	42.5	120	0.9	2.6
26/07/2016				0.92																							
29/07/2016				2.5																							
01/08/2016		7.85	178.2	4.09	23	23	1	0.005	0.78	22.3	5.9	0.0025		2.7	77	5.2	3.4	0.04	0.005	0.005	2.4	1.5	2.01	45.4	133	0.86	3.5
05/08/2016																											
08/08/2016		7.35	199.8	5.05	24	24	1	0.01	0.75	21.5	5.8	0.0025		2.8	73	4.89	3.92	0.05	0.01	0.03	2.56	1.6	4.25	49.8	148	1.1	2.8
12/08/2016				4.23									0.0025														
15/08/2016		7.46	194.2	5.83	23	23	1	0.005	0.76	23	6.5	0.0025	0.0025	2.4	80	5.53	4.15	0.05	0.005	0.01	2.25	1.4	2.47	53	155	0.98	2.8
19/08/2016																											
22/08/2016		7.36	261	8.79	28	28	1	0.01	1.14	31.7	8.5	0.011	0.0025	2.8	114	8.51	6.26	0.06	0.01	0.005	3.17	1.4	3.26	71	182	1.39	3
26/08/2016																											
28/08/2016																											
01/09/2016		7.55	244	2.77																							
02/09/2016																											
05/09/2016		7.49	256	3.14	27	27	1	0.005	0.63	24.9	6.8	0.039	0.0025	2.3	87	6.25	3.61	0.05	0.01	0.01	2.75	0.9	2.59	49	150	0.82	2.9
09/09/2016																											
12/09/2016		6.99	180	3.41	27	27	1	0.005	0.42	20.5	5	0.001	0.0025	2.5	72	5.17	2.5	0.03	0.005	0.02	2.28	0.9	2.35	40.6	122	0.57	3.2
16/09/2016													0.0025														
20/09/2016		6.71	201	12.2	28	18	1	0.005	0.41	21.2	6.6	0.001	0.0025	2.6	72	4.78	1.85	0.01	0.05	0.01	1.87	1	1.69	35.9	109	0.05	0.2
23/09/2016		6.8	150	8.8																							
26/09/2016		6.68	179	8.3	30	30	1	0.005	0.31	21.7	5.3	0.001	0.0025	2.7	78	5.79	1.53	0.02	0.005	0.01	1.31	1	2.52	35.9	115	0.64	5.3
30/09/2016				11.12																							
03/10/2016		7.71	385	9.95	33	33	33	0.005	0.8	24.8	5.9	0.008		2.8	89	6.63	2.09	0.04	0.005	0.02	2.3	1.1	2.82	43	127	1.07	3.6
07/10/2016				4.81																							
10/10/2016		7.34	232	7.84	35	35	1	0.005	0.65	17.8	5.8	0.005	0.007	2.4	66	5.35	1.84	0.03	0.01	0.005	2.47	1.4	2.28	43.9	129	1.1	4.3

Indicate values = 1/2 of detection limit
Indicate values = 1/2 of detection limit

Calendar reference	ST-10 (a) / ST-10 (b)
Sample ID	ST-10
Old calendar reference	
Sampling location	Vault Attenuation Pond (water released at diffuser) (Final Effluent)

Date	Parameters	Total petroleum hydrocarbons (C10-C50)*	TSS	aluminum (Al)	arsenic (As)	boron (B)	barium (Ba)	beryllium (Be)	cadmium (Cd)	copper (Cu)	chromium (Cr)	iron (Fe)	lithium (Li)	manganese (Mn)	mercury (Hg)	molybdenum (Mo)	nickel (Ni)	lead (Pb)	selenium (Se)	antimony (Sb)	tin (Sn)	strontium (Sr)	titanium (Ti)	thallium (Tl)	uranium (U)	vanadium (V)	zinc (Zn)	Dissolved aluminum (Al)
	Unit	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Max concentration Grab		30	3	0.2				0.004	0.2					0.008		0.4	0.2									0.4	2
	Max concentration Average		15	1.5	0.1				0.002	0.1					0.004		0.2	0.1									0.2	1
28/06/2013			4.00		0.0003					0.0003							0.0003	0.0002									0.001	
02/07/2013			3.00		0.0003					0.0003							0.0003	0.0002									0.001	
09/07/2013			3.00		0.0003					0.0003							0.0003	0.0002									0.001	
16/07/2013			2.00		0.0003					0.0005							0.0003	0.0002									0.0020	
23/07/2013			0.50		0.0003					0.0003							0.0003	0.0002									0.001	
30/07/2013			2.00		0.0003					0.0003							0.0003	0.0002									0.001	
17/08/2013			0.50		0.0003					0.0007							0.0003	0.0324									0.0040	
20/08/2013			0.50		0.0003					0.0009							0.0003	0.0002									0.001	
23/08/2013			0.50		0.0003					0.0005							0.0003	0.0002									0.0050	
27/08/2013			0.50		0.0003					0.0013							0.0003	0.0002									0.001	
03/09/2013			1.00		0.0003					0.0006							0.0003	0.0002									0.001	
10/09/2013			1.00		0.0003					0.0011							0.0003	0.0002									0.001	
17/09/2013			2.00		0.0003					0.0003							0.0039	0.0002									0.0150	
24/09/2013			5.00		0.0003					0.0003							0.0003	0.0002									0.001	
02/10/2013			0.50		0.0012					0.0022							0.0006	0.0002									0.0050	
09/10/2013			6.00		0.0003					0.0003							0.0003	0.0002									0.0010	
15/10/2013			6.00		0.0003					0.0009							0.0007	0.0002									0.001	
22/10/2013			12.00		0.0029					0.0013							0.0008	0.0006									0.0010	
24/06/2014			11.00		0.0021					0.0003							0.0014	0.0002									0.0010	
30/06/2014	sample before discharge		3		0.0003					0.0012							0.00025	0.0002									0.0005	
28/07/2014			5.00		0.0003					0.0020							0.0011	0.0187									0.0010	
31/07/2014			3.6		0.0006					0.0022							0.0012	0.0002									0.0005	
02/08/2014			3																									
06/08/2014			57.00		0.0011					0.0087							0.0039	0.0011									0.0060	
12/08/2014			4.00		0.0035					0.0037							0.0015	0.0002									0.0005	
28/08/2014	sample before discharge		8		0.0025					0.003							0.0035	0.0002									0.005	
29/06/2015	sample before discharge	0.005	1	0.003	0.00025	0.005	0.0206	0.00025	0.00001	0.0017		0.49	0.0025	0.0624	0.000005	0.0036	0.0042	0.00015	0.0005	0.00005	0.0005	0.079	0.01	0.0025	0.001	0.00025	0.0005	0.01
08/07/2015		0.2	6	0.089	0.00025	0.005	0.0198	0.00025	0.00001	0.003	0.0003	0.2	0.0025	0.054	0.000005	0.0039	0.0044	0.00015	0.0005	0.0003	0.0005	0.08	0.01	0.0025	0.001	0.00025	0.0005	0.003
10/07/2015			1.1																									
13/07/2015		0.005	2	0.62	0.00025	0.005	0.0186	0.00025	0.00001	0.0013	0.0003	0.14	0.0025	0.0444	0.000005	0.0042	0.0033	0.00015	0.0005	0.0003	0.0005	0.084	0.01	0.0025	0.001	0.00025	0.0005	0.003
21/07/2015		0.05	6	0.034	0.00025	0.005	0.0162	0.00025	0.00001	0.0023	0.0006	0.08	0.0025	0.0367	0.000005	0.0031	0.0033	0.00015	0.0005	0.0003	0.0005	0.083	0.01	0.0025	0.0005	0.00025	0.001	0.003
24/07/2015			1.2																									
25/07/2015			3	0.015	0.00025	0.005	0.0158	0.00025	0.00001	0.0023	0.0018	0.1	0.0025	0.0332	0.000005	0.0038	0.0034	0.00015	0.0005	0.00005	0.0005	0.076	0.01	0.0025	0.001	0.00025	0.0005	
29/07/2015		0.1	1	0.011	0.00025	0.005	0.0161	0.00025	0.00001	0.0016	0.0003	0.04	0.016	0.0253	0.000005	0.0045	0.0032	0.00015	0.0005	0.0004	0.0005	0.076	0.01	0.0025	0.001	0.00025	0.0005	0.003
31/07/2015			3.2																									
04/08/2015		0.1	3.5	0.038	0.00025	0.005	0.0177	0.00025	0.00001	0.00025	0.0014	0.1	0.0025	0.023	0.000005	0.0053	0.0038	0.00015	0.0005	0.00005	0.0005	0.067	0.01	0.0025	0.001	0.00025	0.0005	0.003
07/08/2015			0.8																									
10/08/2015		0.2	1	0.003	0.004	0.005	0.0165	0.00025	0.00001	0.0033	0.002	0.08	0.0025	0.0165	0.000005	0.0057	0.003	0.00015	0.0005	0.0005	0.0005	0.067	0.01	0.0025	0.001	0.00025	0.004	0.003
11/08/2015			9.6																									
15/08/2015			2.7																									
17/08/2015		0.01	3	0.075	0.00025	0.005	0.0193	0.00025	0.00003	0.0015	0.0003	0.14	0.0025	0.0204	0.000005	0.0072	0.0034	0.0135	0.001	0.0008	0.0005	0.103	0.02	0.0025	0.001	0.00025	0.001	0.003
20/08/2015																												
21/08/2015			0.8																									
24/08/2015		0.1	1	0.023	0.0088	0.005	0.0177	0.00025	0.00004	0.0028	0.0627	0.13	0.0025	0.0257	0.000005	0.0085	0.0032	0.0031	0.0005	0.0009	0.0005	0.1	0.02	0.0025	0.002	0.0211	0.0005	0.003
28/08/2015			8																									
01/09/2015		0.05	10	0.102	0.00025	0.005	0.0213	0.00025	0.00001	0.0028	0.0003	0.19	0.0025	0.022	0.000005	0.0101	0.0029	0.0095	0.0005	0.0012	0.0005	0.123	0.02	0.0025	0.002	0.00025	0.0005	0.003
04/09/2015			4.2																									
08/09/2015		0.05	1	0.06	0.00025	0.01	0.0234	0.00025	0.00001	0.0025	0.0003	0.13	0.0025	0.0217	0.000005	0.0075	0.0019	0.00015	0.0005	0.0008	0.0005	0.12	0.01	0.0025	0.001	0.00025	0.0005	0.003
20/06/2016	sample before discharge	0.05	11	0.356	0.0009	0.005	0.0319	0.00025	0.00001	0.0025	0.0003	0.03	0.0025	0.1025	0.000005	0.0083	0.0044	0.00015	0.0005	0.00005	0.0005	0.101	0.02	0.001	0.001	0.00025	0.005	0.023
14/07/2016			4.5																									
15/07/2016			2.9																									
16/07/2016			1.7																									
17/07/2016			0.4																									
18/07/2016		0.05	2	0.032	0.00025	0.005	0.0216	0.00025	0.00004	0.0025	0.0077	0.14	0.0025	0.0553	0.000005	0.0056	0.0046	0.00015	0.0005	0.0006	0.0005	0.098	0.01	0.0004	0.001	0.00025	0.0005	0.003
19/07/2016			4.4																									
20/07/2016																												
23/07/2016			0.4																									
25/07/2016		0.05	6	0.003	0.00025	0.005	0.0086	0.00025	0.00001	0.002	0.0047	0.16	0.0025	0.0366	0.000005	0.0055	0.0035	0.00015	0.0005	0.0006	0.0005	0.144	0.01	0.0004	0.001	0.00025	0.0005	0.003
26/07/2016			0.4																									
29/07/2016			0.4																									
01/08/2016		0.05	3	0.112	0.00025	0.005	0.0201	0.00025	0.00001	0.0022	0.0003	0.19	0.0025	0.0338	0.00041	0.0056	0.0034	0.00015	0.0005	0.0005	0.0005	0.119	0.01	0.0004	0.001	0.00025	0.0005	0.016
05/08/2016			8																									
08/08/2016		0.05	6	0.077	0.001	0.005	0.0224	0.00025	0.00001	0.0057	0.0003	0.25	0.0025	0.0613	0.000005	0.0076	0.0055	0.00015	0.0005	0.0007	0.0005	0.132	0.02	0.0004	0.001	0.00025	0.0005	0.003
12/08/2016			1.4																									
15/08/2016		0.05	1	0.095	0.00025	0.005	0.0278	0.00025	0.00001	0.0029	0.0003	0.29	0.0025	0.0775	0.000005	0.0093	0.0048	0.00015	0.0005	0.0005	0.0005	0.133	0.01	0.0004	0.001	0.00025	0.002	0.009
19/08/2016			7.2																									
22/08/2016		0.05	5	0.152	0.0041	0.005	0.0323	0.00025	0.00008	0.003	0.0003	0.51	0.0025	0.0937	0.000005	0.0129	0.0039	0.00015	0.0005	0.0014	0.0005	0.162	0.02	0.0004	0.002	0.00025	0.001	0.003
26/08/2016			4																									
28/08/2016			5.6																									
01/09/2016			4																									
02/09/2016			3.8																									
05/09/2016		0.05	4	0.028	0.00025	0.005	0.0251	0.00025	0.00001	0.0018	0.0003	0.2	0.0025	0.0525	0.000005	0.0093	0.00025	0.00015	0.0005	0.0008	0.0005	0.143	0.02	0.0004	0.002	0.00025	0.0005	0.003
09/09/2016			2.8																									
12/09/2016		0.05	3	0.082	0.00025	0.005	0.0159	0.00025	0.00001	0.0022	0.0003	0.19	0.0025	0.043	0.000005	0.0069	0.0226	0.0058	0.0005	0.0006	0.0005	0.107	0.02	0.0004	0.001	0.00025	0.0005	0.003
16/09/2016			1.6																									
20/09/2016		0.1	14	0.006	0.00025	0.005	0.0215	0.00025	0.00001	0.0023	0.0017	0.34	0.0025	0.0039	0.000005	0.0047	0.0037	0.00015	0.0005	0.0004	0.0005	0.11	0.01	0.0004	0.001	0.00025	0.004	0.003
23/09/2016			5.2																									
26/09/2016		0.05	11	0.23	0.00025	0.005	0.016	0.00025	0.00001	0.002	0.0003	0.37	0.0025	0.0673	0.000005	0.0065	0.0039	0.00015	0.0005	0.0043	0.0005	0.142	0.02	0.0004	0.002	0.00025	0.002	0.003
30/09/2016			7.1																									
03/10/2016		0.4	10	0.234	0.00025	0.005	0.0139	0.00025	0.00001	0.0026	0.0003	0.47	0.0025	0.068	0.000005	0.007	0.0045	0.0008	0.0005	0.00005	0.0005	0.119	0.02	0.0004	0.002	0.00025	0.002	0.011
07/10/2016			6.4																									
10/10/2016		0.05	2	0.248	0.00025	0.005	0.0142	0.00025	0.00001	0.0029	0.0003	0.32	0.0025	0.0686	0.000005	0.0065	0.0041	0.00015	0.0005	0.0019	0.0005	0.086	0.01	0.0004	0.002	0.0045	0.003	0.003

Indicate values = 1/2 of detection limit
Indicate values = 1/2 of detection limit

Calendar reference	ST-10 (a) / ST-10 (b)
Sample ID	ST-10
Old calendar reference	
Sampling location	Vault Attenuation Pond (water released at diffuser) (Final Effluent)

Date	Parameters	Dissolved arsenic (As)	Dissolved boron (B)	Dissolved barium (Ba)	Dissolved beryllium (Be)	Dissolved cadmium (Cd)	Dissolved copper (Cu)	Dissolved chromium (Cr)	Dissolved iron (Fe)	Dissolved lithium (Li)	Dissolved manganese (Mn)	Dissolved mercury (Hg)	Dissolved molybdenum (Mo)	Dissolved nickel (Ni)	Dissolved lead (Pb)	Dissolved selenium (Se)	Dissolved antimony (Sb)	Dissolved tin (Sn)	Dissolved strontium (Sr)	Dissolved titanium (Ti)	Dissolved thallium (Tl)	Dissolved uranium (U)	Dissolved vanadium (V)	Dissolved zinc (Zn)	Daphnia Magna	CL50 48 hours	Rainbow trout	CL50 48 hours
	Unit	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	toxic unit	v/v	toxic unit	v/v
	Max concentration Grab																											
	Max concentration Average																											
28/06/2013																												
02/07/2013																												
09/07/2013																												
16/07/2013																												
23/07/2013																												
30/07/2013																												
17/08/2013																												
20/08/2013																												
23/08/2013																												
27/08/2013																												
03/09/2013																												
10/09/2013																												
17/09/2013																												
24/09/2013																												
02/10/2013																												
09/10/2013																												
15/10/2013																												
22/10/2013																												
24/06/2014																												
30/06/2014	sample before discharge	0.00025					0.001							0.00025	0.00015									0.0005				
28/07/2014																												
31/07/2014		0.00025					0.002							0.0013	0.00015									0.0005				
02/08/2014																												
06/08/2014		0.0005					0.0016																					
12/08/2014		0.0014					0.0033							0.0012	0.00015									0.0005				
28/08/2014	sample before discharge	0.0008					0.0024							0.0015	0.00015									0.0005				
29/06/2015	sample before discharge	0.00025	0.005	0.0182	0.00025	0.00001	0.0017	0.0003	0.03	0.0025	0.0562	0.000005	0.0037	0.0037	0.00015	0.0005	0.00005	0.0005	0.08	0.01	0.0025	0.001	0.00025	0.0005	<1	>100	<1	>100
08/07/2015		0.00025	0.005	0.0199	0.00025	0.00001	0.0021	0.0003	0.02	0.0025	0.0484	0.000005	0.0041	0.0039	0.00015	0.0005	0.00005	0.0005	0.08	0.01	0.0025	0.001	0.00025	0.0005				
10/07/2015																												
13/07/2015		0.00025	0.005	0.0163	0.00025	0.00001	0.0005	0.0003	0.005	0.0025	0.0355	0.00003	0.0038	0.0029	0.00015	0.0005	0.0003	0.0005	0.081	0.01	0.0025	0.0005	0.00025	0.0005				
21/07/2015		0.00025	0.005	0.0136	0.00025	0.00001	0.0015	0.0008	0.005	0.0025	0.025	0.000005	0.0031	0.0025	0.00015	0.0005	0.00005	0.0005	0.081	0.01	0.0025	0.0005	0.00025	0.0005	<1	>100	<1	>100
24/07/2015																												
25/07/2015																												
29/07/2015		0.00025	0.005	0.0118	0.00025	0.00001	0.0012	0.0003	0.005	0.0025	0.016	0.000005	0.0047	0.0028	0.00015	0.0005	0.0004	0.0005	0.072	0.005	0.0025	0.001	0.00025	0.0005				
31/07/2015																												
04/08/2015		0.00025	0.005	0.0179	0.00025	0.00002	0.0021	0.0023	0.01	0.0025	0.0157	0.000005	0.0048	0.0036	0.0005	0.0005	0.00005	0.0005	0.067	0.01	0.0025	0.001	0.00025	0.0005				
07/08/2015																												
10/08/2015		0.00025	0.005	0.016	0.00025	0.00003	0.0024	0.0003	0.01	0.0025	0.0117	0.000005	0.0063	0.003	0.00015	0.0005	0.0006	0.0005	0.073	0.01	0.0025	0.001	0.00025	0.0005	<1	>100	<1	>100
11/08/2015																												
15/08/2015																												
17/08/2015		0.00025	0.005	0.0188	0.00025	0.00006	0.0012	0.0006	0.005	0.0025	0.0167	0.00001	0.0077	0.0031	0.0135	0.0005	0.0009	0.0005	0.096	0.01	0.0025	0.001	0.00025	0.0005				
20/08/2015																												
21/08/2015																												
24/08/2015		0.00025	0.005	0.019	0.00025	0.00001	0.0019	0.0003	0.01	0.0025	0.0204	0.000005	0.0085	0.0027	0.00015	0.0005	0.001	0.0005	0.103	0.01	0.0025	0.001	0.00025	0.0005				
28/08/2015																												
01/09/2015		0.00025	0.005	0.0201	0.00025	0.00001	0.001	0.0003	0.005	0.0025	0.0168	0.00001	0.0104	0.0026	0.0034	0.0005	0.0009	0.0005	0.122	0.01	0.0025	0.001	0.00025	0.0005				
04/09/2015																												
08/09/2015		0.00025	0.005	0.023	0.00025	0.00001	0.002	0.0003	0.005	0.0025	0.0165	0.000005	0.0075	0.0018	0.00015	0.0005	0.0008	0.0005	0.121	0.01	0.0025	0.001	0.00025	0.0005	<1	>100	<1	>100
20/06/2016	sample before discharge	0.0009	0.005	0.0314	0.00025	0.00001	0.0025	0.0003	0.03	0.0025	0.0992	0.000005	0.0083	0.0035	0.00015	0.001	0.00005	0.0005	0.107	0.01	0.001	0.001	0.00025	0.0005	<1	>100	<1	>100
14/07/2016																												
15/07/2016																												
16/07/2016																												
17/07/2016																												
18/07/2016		0.00025	0.005	0.0212	0.00025	0.00003	0.0017	0.0023	0.02	0.0025	0.0332	0.000005	0.0062	0.0039	0.00015	0.0005	0.0005	0.0005	0.099	0.01	0.0004	0.001	0.00025	0.0005				
19/07/2016																												
20/07/2016																									<1	>100	<1	>100
23/07/2016																												
25/07/2016		0.00025	0.005	0.0071	0.00025	0.00001	0.0011	0.0003	0.12	0.0025	0.0337	0.000005	0.0055	0.0033	0.00015	0.0005	0.0005	0.0005	0.11	0.02	0.0004	0.001	0.00025	0.0005				
26/07/2016																												
29/07/2016																												
01/08/2016		0.00025	0.005	0.0189	0.00025	0.00001	0.0013	0.0003	0.02	0.0025	0.0275	0.00019	0.0055	0.0028	0.00015	0.0005	0.0005	0.0005	0.11	0.01	0.0004	0.001	0.00025	0.0005				
05/08/2016																												
08/08/2016		0.00025	0.005	0.0221	0.00025	0.00001	0.0014	0.0003	0.01	0.0025	0.0531	0.000005	0.0075	0.003	0.00015	0.0005	0.0007	0.0005	0.129	0.01	0.0004	0.001	0.00025	0.0005				
12/08/2016																												
15/08/2016		0.00025	0.005	0.0301	0.00025	0.00001	0.0023	0.0003	0.01	0.0025	0.0775	0.00001	0.0082	0.0046	0.00015	0.0005	0.0003	0.0005	0.131	0.01	0.0004	0.001	0.00025	0.002				
19/08/2016																												
22/08/2016		0.00025	0.005	0.0323	0.00025	0.00003	0.0019	0.0003	0.01	0.0025	0.0796	0.000005	0.0123	0.003	0.00015	0.001	0.0014	0.0005	0.156	0.01	0.0004	0.002	0.00025	0.0005	<1	>100	<1	>100
26/08/2016																												
28/08/2016																												
01/09/2016																												
02/09/2016																												
05/09/2016		0.00025	0.005	0.0234	0.00025	0.00001	0.0011	0.0003	0.005	0.0025	0.0525	0.000005	0.009	0.00025	0.00015	0.0005	0.0008	0.0005	0.141	0.01	0.0004	0.001	0.00025	0.0005				
09/09/2016																												
12/09/2016		0.00025	0.005	0.0155	0.00025	0.00001	0.0014	0.0003	0.005	0.0025	0.0292	0.00003	0.0068	0.00025	0.00015	0.0005	0.0006	0.0005	0.107	0.01	0.0004	0.001	0.00025	0.0005				
16/09/2016																												
20/09/2016		0.00025	0.005	0.0141	0.00025	0.00001	0.0011	0.0014	0.005	0.0025	0.0341	0.000005	0.0047	0.003	0.00015	0.0005	0.0003	0.0005	0.096	0.005	0.0004	0.0005	0.00025	0.0005				
23/09/2016																												
26/09/2016		0.00025	0.005	0.0121	0.00025	0.00001	0.0015	0.0003	0.005	0.0025	0.0418	0.000005	0.005	0.0028	0.00015	0.0005	0.0003	0.0005	0.104	0.01	0.0004	0.001	0.00025	0.0005	<1	>100	<1	>100
30/09/2016																												
03/10/2016		0.00025	0.005	0.014	0.00025	0.00001	0.0025	0.0003	0.005	0.0025	0.0571	0.000005	0.0076	0.0038	0.00015	0.0005	0.00005	0.0005	0.122	0.005	0.0004	0.002	0.00025	0.001				
07/10/2016																												
10/10/2016		0.00025	0.005	0.015	0.00025	0.00001	0.0014	0.0003	0.01	0.0025	0.0635	0.000005	0.0067	0.0034	0.00015	0.002	0.0009	0.0005	0.061	0.01	0.0004	0.002	0.00025	0.002	<1	>100	<1	>100

Indicate values = 1/2 of detection limit

Indicate values = 1/2 of detection limit

Sample ID	ST-23
Old calendar reference	
Sampling location	Vault Pit Sump

Date	YEAR	pH	Turbidity	Conductivity	Alkalinity	Ammonia-nitrogen	Ammonia NH3	TDS (dissolved solids)	TSS	Chloride	Fluoride	Hardness	Nitrate (NO3)	Nitrite (NO2)
			NTU		mg CaCO3/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg CaCO3/L	mg N/L	mg N/L
27/10/2013	2013	7.64	3.24											
19/05/2014	2014	6.53	19.9		50	2	0.03	175						
06/08/2014	2014	7.73	18		127	26.7	0.33	736		30.9	0.26	378	46.4	1.5
02/06/2015	2015	6.93	523		85	9.73	0.14	337						
23/07/2015	2015	7.28	44		167	35.5	0.5	799		33.2	0.25	340	45.9	2.05
20/06/2016	2016	8.28	22.8	645	88	4.06	0.13	425	24	44.8		250	12.8	0.24
09/08/2016	2016	7.3	9.83	805	84	6.6	0.13	522	6	8.6	0.18	315	24.1	0.31
05/09/2016	2016	7.82	9.96	1022	91	6.94	0.14	723	6	19.5	0.19	504	41.6	0.48
15/11/2016	2016	7.64	5.7	675	116	2.57	0.05	446	16	44.4	0.2	260	0.91	0.05

Indicate values = 1/2 of detection limit

Sample ID	ST-23
Old calendar reference	
Sampling location	Vault Pit Sump

Date	YEAR	Sulphate (SO2-4)	Total Al	Total As	Total Ba	Total Cd	Total Cu	Total Cr	Total Fe	Total Mn	Total Hg	Total Mo	Total Ni
		mg SO4/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
27/10/2013	2013												
19/05/2014	2014			0.0023			0.002						0.0035
06/08/2014	2014	148		0.0395			0.0229						0.049
02/06/2015	2015			0.00025			0.0102						0.021
23/07/2015	2015	124		0.00025			0.0054						0.0244
20/06/2016	2016	97.9	0.547	0.0056	0.0201	0.00023	0.0012	0.0008	1.3	0.0489	0.000005	0.0838	0.0041
09/08/2016	2016	161	0.038	0.00025	0.042	0.00022	0.0124	0.003	0.38	0.1769	0.00005	0.0635	0.0093
05/09/2016	2016	159	0.088	0.00025	0.0472	0.0002	0.0012	0.0003	0.35	0.1145	0.000005	0.0964	0.00025
15/11/2016	2016	158	0.181	0.0042	0.018	0.00008	0.00025	0.0007	0.57	0.243	0.000005	0.0222	0.0135

Indicate values = 1/2 of detection limit

Sample ID	ST-23
Old calendar reference	
Sampling location	Vault Pit Sump

Date	YEAR	Total Pb	Total Se	Total Tl	Total Zn	Dissolved Al	Dissolved As	Dissolved Ba	Dissolved Cd	Dissolved Cu	Dissolved Fe	Dissolved Mn	Dissolved Hg
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
27/10/2013	2013												
19/05/2014	2014	0.0003			0.002								
06/08/2014	2014	0.0378			0.026	0.003	0.0127	0.0588	0.0003	0.0116	0.22	0.1328	0.0001
02/06/2015	2015	0.046			0.028								
23/07/2015	2015	0.00015			0.0005	0.003	0.00025	0.0703	0.00001	0.001	0.59	0.0863	0.000005
20/06/2016	2016	0.00015	0.003	0.001	0.0005	0.037	0.0058	0.0198	0.00015	0.001	0.01	0.0373	0.000005
09/08/2016	2016	0.00015	0.003	0.0004	0.0005	0.003	0.00025	0.0394	0.00022	0.0075	0.07	0.1704	0.00005
05/09/2016	2016	0.00015	0.009	0.0004	0.001	0.003	0.00025	0.0452	0.00007	0.0006	0.03	0.1145	0.000005
15/11/2016	2016	0.00015	0.001	0.0004	0.001	0.003	0.0027	0.0178	0.00008	0.00025	0.03	0.237	0.00001

Indicate values = 1/2 of detection limit

Sample ID	ST-23
Old calendar reference	
Sampling location	Vault Pit Sump

Date	YEAR	Dissolved Mo	Dissolved Ni	Dissolved Pb	Dissolved Se	Dissolved Tl	Dissolved Zn	Dissolved Ag	CN Total	CN Free
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
27/10/2013	2013									
19/05/2014	2014									
06/08/2014	2014	0.1089	0.0254	0.00015	0.007	0.0025	0.002	0.00005		
02/06/2015	2015									
23/07/2015	2015	0.1111	0.0218	0.00015	0.004	0.0025	0.0005	0.00005		
20/06/2016	2016	0.0874	0.0031	0.00015	0.003	0.001	0.0005		0.044	
09/08/2016	2016	0.0641	0.0093	0.00015	0.003	0.0004	0.001	0.00005	0.137	
05/09/2016	2016	0.0911	0.00025	0.00015	0.009	0.0004	0.0005	0.0003	0.083	0.019
15/11/2016	2016	0.0208	0.0135	0.00015	0.0005	0.0004	0.001	0.00005	0.046	0.014

Indicate values = 1/2 of detection limit

Calendar reference	ST-25 (a)
Sample ID	ST-25 (a)
Old calendar reference	
Sampling location	Vault Attenuation Pond

#9

Date	Parametre	pH	Conductivity	Turbidity	Alkalinity	Total Ammonia (NH3)	Ammonia nitrogen (NH3-NH4)	Total Cyanide (CNt)	Dissolved Solids (TDS)	TSS	Nitrite	Nitrate	Chloride	Fluoride	Sulphate	Hardness
	Units		us/cm	NTU	mg CaCo3/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
08/07/2014		7.34	105.9	1.44	33	0.005			80							
06/08/2014		7.34	191.9	10.34	41	0.02			144							
09/09/2014					52	0.03			229							
16/06/2015		6.47	110.6	8.93	23	0.005	1.13	0.007	73							
08/07/2015		6.9	139.9	3.73	52	0.005	0.88	0.0025	90		0.02	1.34	4.3	0.06	13.6	48
25/07/2015		7.68	233		41	0.04			155		0.21	6.16	8.3	0.11		80
04/08/2015		6.93	278	10.01	47	0.06	4.11	0.014	168		0.19	6.51	7.8	0.09	0.6	82
14/09/2015		7.44	315	21.3	45	0.04	2.79	0.0025	198							
07/06/2016		7.48	111.8	46.9	25	0.005	1.28	0.0025	74	36	0.05	0.63	4.7	0.06	20.7	39
18/07/2016		7.36	102.3	28.9	41	0.01	0.01	0.0025	171	0.5	0.09	3.57	10.8	0.11	53.1	91
08/08/2016		7.45	182	4.17	39	0.03	2.51	0.027	252	4	0.18	6.72	12	0.13	96.5	134
05/09/2016		7.8	241	1.65	32	0.005	0.29	0.034	172	2	0.03	4.46	7.3	0.11	55.8	108
10/10/2016		7.19	443	2.71	48	0.005	1.14	0.0005	247	0.5	0.03	0.96	10.7	0.17	16.9	141
30/10/2016		7.7	596	3.27	102	0.03	1.97	0.003	377	3	0.04	0.18	12.9	0.24	149	227

Indicate values = 1/2 of detection limit

Calendar reference	ST-25 (a)
Sample ID	ST-25 (a)
Old calendar reference	
Sampling location	Vault Attenuation Pond

Date	Parametre	Arsenic (As)	Aluminium (Al)	Barium (Ba)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)
	Units				mg/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
08/07/2014																
06/08/2014																
09/09/2014																
16/06/2015		0.00025					0.0014		0.00015				0.0031			
08/07/2015		0.00025	0.023	0.0106	0.00001	0.0003	0.0017	0.11	0.00015	0.0283	0.000005	0.0045	0.0027	0.0005		0.0025
25/07/2015		0.00025	0.031	0.0175	0.00001	0.0016	0.0026	0.22	0.00015	0.03	0.000005	0.0179	0.0041	0.0005		0.0025
04/08/2015		0.00025					0.0034		0.0018				0.004			
14/09/2015		0.00025					0.0079		0.00015				0.0042			
07/06/2016		0.00025	0.94	0.0213	0.00003	0.0003	0.0026	1.71	0.00015	0.0935	0.000005	0.0044	0.0035	0.0005	0.00005	0.001
18/07/2016		0.00025	0.07	0.022	0.00003	0.0003	0.002	0.33	0.00015	0.037	0.01	0.011	0.003	0.0005	0.00005	0.0004
08/08/2016		0.00025	0.101	0.0297	0.00004	0.0003	0.0076	0.44	0.00015	0.1155	0.00005	0.0276	0.0093	0.0005	0.00005	0.0004
05/09/2016		0.00025	0.003	0.024	0.00001	0.0003	0.0017	0.12	0.00015	0.0283	0.000005	0.0106	0.00025	0.0005	0.0004	0.0004
10/10/2016		0.0023	0.051	0.0392	0.00001	0.0003	0.0008	0.86	0.00015	0.3089	0.000005	0.0036	0.0045	0.001	0.00005	0.0004
30/10/2016		0.00025	0.003	0.0286	0.00007	0.0019	0.00025	0.16	0.00015	0.5612	0.00005	0.0103	0.0128	0.0005	0.00005	0.0004

Indicate values = 1/2 of detection limit

Calendar reference	**ST-25 (a)**
Sample ID	**ST-25 (a)**
Old calendar reference	
Sampling location	**Vault Attenuation Pond**

Date	Parametre	Zinc (Zn)	diss. Aluminum (Al)	Diss. Silver (Ag)	diss. Arsenic (As)	diss. Barium (Ba)	diss. Cadmium (Cd)	diss. Copper (Cu)	diss. Iron (Fe)	diss. Manganese (Mn)	diss. Mercury (Hg)	diss. Molybdenum (Mo)	diss. Nickel (Ni)	diss. Lead (Pb)	diss. Selenium (Se)	diss. Thallium (Tl)
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
08/07/2014																
06/08/2014																
09/09/2014																
16/06/2015		0.0005														
08/07/2015		0.0005	0.023	0.00005	0.00025	0.0104	0.00001	0.0017	0.01	0.0198	0.000005	0.0046	0.0026	0.00015	0.0005	0.0025
25/07/2015		0.0005														
04/08/2015		0.0005	0.006		0.00025	0.0215	0.00008	0.0028	0.01	0.0306	0.000005	0.0199	0.0041	0.0018	0.0005	0.0025
14/09/2015		0.007														
07/06/2016		0.003														
18/07/2016		0.011														
08/08/2016		0.005														
05/09/2016		0.0005														
10/10/2016		0.007														
30/10/2016		0.0005	0.003	0.00005	0.00025	0.0258	0.00009	0.00025	0.01	0.5129	0.00005	0.0098	0.0119	0.00015	0.0005	0.0004

Indicate values = 1/2 of detection limit

Calendar reference	ST-25 (a)
Sample ID	ST-25 (a)
Old calendar reference	
Sampling location	Vault Attenuation Pond

Date	Parametre	diss. Zinc (Zn)	Antimony (Sb)	Beryllium (Be)	Boron (B)	Tin (Sn)	Lithium (Li)	Strontium (Sr)	Titanium (Ti)	Uranium (U)	Vanadium (V)
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
08/07/2014											
06/08/2014											
09/09/2014											
16/06/2015											
08/07/2015		0.0005	0.0004	0.00025	0.005	0.0005	0.0025	0.066	0.01	0.001	0.00025
25/07/2015			0.0018	0.00025	0.005	0.0005	0.0025	0.119	0.01	0.005	0.00025
04/08/2015		0.053									
14/09/2015											
07/06/2016											
18/07/2016											
08/08/2016											
05/09/2016											
10/10/2016											
30/10/2016		0.0005	0.0008	0.00025	0.02	0.0005	0.021	0.583	0.06	0.005	0.00025

Indicate values = 1/2 of detection limit

Calendar reference	**EEM-2 (c)**
Sample ID	**ST-MMER-2-EEM-WLE**
Old calendar reference	
Sampling location	**Wally Lake Exposure area**

#10

Date	Parameter	Conductivity	Dissolved oxygene	pH	Temperature		Alkalinity		Aluminum		Arsenic		Ammonia nitrogen (NH3-NH4)		Cadmium		Copper		Cyanide		Hardness		Iron		TSS	
	Unit	µs/cm			°C		mg CaCO3/L		mg/L		mg/L		mg N/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
19/07/2016		34		7.58	13.25		14		0.015	<	0.00025		0.01	<	0.00001		0.0007	<	0.0025		15		0.02		2	<
22/08/2016		48.7		7.62	16.1		14		0.009		0.002		0.02	<	0.00001		0.0013	<	0.0025		21		0.02		6	<
27/09/2016		102		7.42			14		0.024	<	0.00025		0.07		0.00002		0.0007	<	0.0005		21		0.02		3	<

Indicate values = 1/2 of detection limit

Calendar reference	**EEM-2 (c)**
Sample ID	**ST-MMER-2-EEM-WLE**
Old calendar reference	
Sampling location	**Wally Lake Exposure area**

Date	Parameter	Mercury (max allowance of 10µg/L)		Molybdenum		Ammonia (NH3)		Nickel		Nitrate		Lead		Radium 226		Selenium		Zinc
	Unit	mg/L		mg/L		mg N/L		mg/L		mg N/L		mg/L		mg/L		mg/L		mg/L
19/07/2016		0.000005	<	0.00025	<	0.005	<	0.00025		0.12	<	0.00015	<	0.002	<	0.0005	<	0.0005
22/08/2016		0.000005	<	0.00025	<	0.005		0.0005		0.18	<	0.00015			<	0.0005	<	0.0005
27/09/2016		0.000005		0.0006	<	0.005		0.0007		0.17	<	0.00015			<	0.0005		0.001

Indicate values = 1/2 of detection limit

MILL EFFLUENT (ADDITIONAL TESTS ON QUATERLY SAMPLES)

#11

SAMPLING DATE		January-14-16	April-10-16	July-09-16	October-11-16	Moyenne 2016
LAB CERTIFICATE		CA-15223	CA14226	CA15232	CA15363	
SAMPLE NAME		Tailings-Liquid and Solid	Tailings-Liquid and Solid	Tailings-Liquid and Solid	Tailings-Liquid and Solid	Tailings-Liquid and Solid
Alkalinity	mg $CaCO_3$/L	61	57	79	68	66
Aluminium (Al)	mg/L	0.329	0.222	0.184	0.570	0.326
Dissolved Aluminium (Al)	mg/L	0.137	0.086	0.011	0.240	0.119
Antimony (Sb)	mg/L	0.0124	0.0097	0.0297	0.0233	0.019
Dissolved Antimony (Sb)	mg/L	0.0111	0.0077	0.0323	0.0227	0.018
Silver (Ag)	mg/L	0.00119	0.000091	0.0167	0.000680	0.005
Dissolved Silver (Ag)	mg/L	0.00110	0.000168	0.0166	0.000746	0.005
Arsenic (As)	mg/L	0.0322	0.0127	0.0150	0.0435	0.026
Dissolved Arsenic (As)	mg/L	0.0320	0.0119	0.0150	0.0449	0.026
Barium (Ba)	mg/L	0.142	0.135	0.143	0.0916	0.128
Dissolved Barium (Ba)	mg/L	0.137	0.130	0.134	0.0879	0.122
Beryllium (Be)	mg/L	0.000009	0.000009	0.000007	0.000015	0.000010
Dissolved Beryllium (Be)	mg/L	0.0000035	0.0000035	0.0000035	0.0000035	0.000004
Bismuth (Bi)	mg/L					
Boron (B)	mg/L	0.167	0.143	0.193	0.157	0.165
Dissolved Boron (B)	mg/L	0.166	0.146	0.170	0.154	0.159
Cadmium (Cd)	mg/L	0.000203	0.000115	0.000493	0.000416	0.0003
Dissolved Cadmium (Cd)	mg/L	0.000222	0.000110	0.000480	0.000431	0.0003
Calcium (Ca)	mg/L					
Chloride	mg/L	800	470	440	520	558
Chrome (Cr)	mg/L	0.00052	0.00079	0.00031	0.00111	0.001
Dissolved Chromium (Cr)	mg/L	0.000015	0.00013	0.000015	0.00009	0.0001
Cobalt (Co)	mg/L					
Copper (Cu)	mg/L	0.0389	0.0576	14.1	0.0799	3.569
Dissolved Copper (Cu)	mg/L	0.00915	0.00547	12.9	0.0468	3.240
Cynanide WAD	mg/L	0.03	0.02	7.07	0.02	1.785
Total Cyanide (CNt)	mg/L	18.3	8.75	7.13	2.92	9.275
Hardness	mg $CaCO_3$/L	1550	1020	1600	1080	1313
Tin (Sn)	mg/L	0.00009	0.000005	0.00043	0.00017	0.0002
Dissolved Tin (Sn)	mg/L	0.000005	0.000005	0.00036	0.00007	0.0001
Iron (Fe)	mg/L	5.62	3.28	0.309	1.88	2.772
Dissolved Iron (Fe)	mg/L	4.87	2.98	0.017	1.19	2.264
Fluoride (F)	mg/L	0.51	0.51	0.74	0.82	0.645
Lithium (Li)	mg/L	0.00281	0.00212	0.00429	0.0025	0.003
Dissolved Lithium (Li)	mg/L	0.00253	0.00190	0.00409	0.0024	0.003
Magnesium	mg/L					
Manganese (Mn)	mg/L	0.00793	0.00730	0.0263	0.0114	0.013
Dissolved Manganese (Mn)	mg/L	0.00217	0.00446	0.0221	0.00193	0.008
Mercury (Hg)	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005
Dissolved Mercury (Hg)	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005
Molybdenum (Mo)	mg/L	0.992	0.602	1.21	1.06	0.966
Dissolved Molybdenum (Mo)	mg/L	1.02	0.563	1.15	1.04	0.943
Ammonia (NH_3) (ionized)	mg N/L					
Ammonia (NH3-NH4)	mg N/L	110	66.9	113	130	105
Nickel (Ni)	mg/L	0.0117	0.0206	0.0583	0.0053	0.024
Dissolved Nickel (Ni)	mg/L	0.0115	0.0178	0.0538	0.0018	0.021
Nitrate (NO_3)	mg N/L	18.3	11.7	12.6	10.6	13.3
Nitrite (NO2)		0.48	0.15	0.15	0.45	0.308
Lead (Pb)	mg/L	0.00213	0.00118	0.00317	0.00260	0.002
Dissolved Lead (Pb)	mg/L	0.00024	0.00013	0.00119	0.00011	0.0004
Potassium (K)	mg/L					
Selenium (Se)	mg/L	0.200	0.142	0.181	0.142	0.166
Dissolved Selenium (Se)	mg/L	0.206	0.141	0.175	0.154	0.169
Silica (Si)	mg/L					
Sodium (Na)	mg/L					
Strontium (Sr)	mg/L	2.94	1.85	1.79	1.94	2.130
Dissolved Strontium (Sr)	mg/L	2.84	1.75	1.68	1.91	2.045
Sulfate (SO_4)	mg SO_4/L	2600	2000	2300	2500	2350
Thallium (Tl)	mg/L	0.000027	0.000010	0.000045	0.000023	0.00003
Dissolved thallium (Tl)	mg/L	0.0000025	0.000006	0.000041	0.000019	0.00002
Tellurium (Te)						
Titanium (Ti)	mg/L	0.00349	0.00292	0.0116	0.00483	0.006
Dissolved titanium (Ti)	mg/L	0.00048	0.00024	0.00049	0.00065	0.000
Uranium (U)	mg/L	0.00762	0.0266	0.0158	0.000409	0.013
Dissolved Uranium (U)	mg/L	0.00731	0.0260	0.0149	0.000336	0.012
Vanadium (V)	mg/L	0.00090	0.00057	0.00085	0.00404	0.002
Dissolved Vanadium	mg/L	0.00062	0.00035	0.00057	0.00360	0.001
Zinc (Zn)	mg/L	0.007	0.001	0.002	0.001	0.003
Dissolved Zinc	mg/L	0.001	0.001	0.002	0.001	0.001
Total dissolved solids	mg/L	5550	3970	4140	4730	4597.5

Value below detection limit. Use 1/2 of detection limit

SNC·LAVALIN

455 René-Lévesque Blvd. West
Montreal, Quebec, H2Z 1Z3, Canada
(514) 393-1000
www.snclavalin.com

APPENDIX D – 2017 FRESHET ACTION PLAN

AGNICO EAGLE

MEADOWBANK GOLD MINE

FRESHET ACTION AND INCIDENT RESPONSE PLAN

MARCH 2017

EXECUTIVE SUMMARY

The purpose of this Action and Response Plan is to identify areas of concern around the Meadowbank mine site and the AWAR that need to be managed in an organized and timely manner during the annual freshet period to prevent adverse environmental and operational impacts. The Incident Response section of the Plan outlines specified actions that will be taken by Agnico to manage and mitigate areas where environmental incidents have occurred, specifically seepage on the north-east side of the Portage Waste Rock Storage area, known as sampling location ST-16 (2013) and seepage from the mill (inside) containment structures through the Assay Road southwest of the mill (Mill Seepage - 2013). The Central Dike seepage is also included in this plan. Any future incidents that have the potential to affect off site water or land will be added and would include any specific mitigation and monitoring actions.

The freshet period typically occurs during the annual snow and ice melt sometime around mid-May and extends until the end of July. During this period excess water is created and must be managed through additional pumping and management practices at vulnerable areas around the site. Mitigation techniques, timeframes and specified roles and responsibilities are outlined in this document for each area of concern.

The main areas of concern are the mining pits and pit walls, the East and West diversion ditches, Vault Road culverts, the areas around the Portage Waste Rock Storage Facility (RSF) including the northern portions of the NPAG waste rock extension, which includes two new collection ponds known as WEP1 and WEP2, Vault Waste Rock Storage Facility, Northwest corner of the North Cell TSF, Saddle Dam 1 corner, Saddle Dam 2 sump, Saddle Dam 3 sump, Saddle Dam 4-5 downstream, AWAR culverts near the site and along the road to Baker Lake, RSF – ST-16 Seepage, Assay Road (Mill) Seepage, Central Dike seepage station STS-5, and the Vault Pit area.

It is important that all dewatering and associated infrastructure be in good working order and adequate to manage the expected water flows associated with the freshet period; this includes but is not limited to pumps, ditch, culvert and sump maintenance, critical piping system installation and inspection, adequate resource allocation for preparative work and establishing a viable monitoring program for the areas of concern and incident response locations. A concise summary of the 2017 preparation works and roles and responsibilities is presented in the attached Appendix 1 (2017 Freshet Action Plan Procedures). Appendix 1 will be updated yearly to reflect changes in conditions at the Meadowbank site. Appendix 2 contains diagrams depicting the areas of concern and incident response locations. Schedules 1 and 2 describe the monitoring programs for incident responses.

DOCUMENT CONTROL

Revision				Pages Revised	Remarks
#	Prep.	Rev.	Date		
01	AEM	Internal	April 2014	All	
02	AEM	Internal	May 2015	All	Comprehensive update from 2014 Plan
03	AEM	Internal	October 2015	All	Comprehensive update from May 2015 Plan
04	AEM	Internal	March 2016	All	2016 Comprehensive review
05	AEM	Internal	March 2017	All	Comprehensive update from May 2016 Plan

Prepared By:

Pier-Eric McDonald P.Eng, Tailings & Water Engineer

Approved by:

Erika Voyer, P.Eng. M.Sc., General Supervisor Environment

TABLE OF CONTENTS

LIST OF FIGURES

List of Tables

List of Appendix

List of Schedule

1 INTRODUCTION

The purpose of this Freshet Action and Incident Response Plan is to ensure that Agnico can address and manage excess water associated with the freshet season at the Meadowbank site and to ensure Agnico has implemented specific management and mitigation measures in response to environmental incidents with potential for off site impacts to water or land.

The freshet season is loosely defined as being a period of time from approximately May 15 – July 30; in some cases this period of time can extend up to early fall when freezing re-occurs (October 15). There are many areas around the site that are vulnerable to this excess water; the goal is to identify these areas and develop a clear plan with defined roles and responsibilities (among Agnico Departments), and to manage the freshet flows.

In addition, several guiding principles are applicable to the formation of this plan. The highest priority principles are:

1) to ensure that mine contact water from runoff or seepage is managed to prevent adverse environmental impacts;
2) to ensure that the health and safety of Agnico employees is protected, especially with respect to mining operations when excess water is present; and
3) to make sure the site is in compliance with the Nunavut Water Board (NWB) License, Part D, Item 19 and Part E, Item 10.

The plan will identify the areas of concern and discuss the potential risks as well as mitigation measures necessary to address the identified issues. Appendix 1 contains the actual defined 2017 procedures, the roles and responsibilities and associated timelines. Agnico's intent is to update the Procedural Appendix on a yearly basis. For example, there may be additional mitigation measures for a defined problem area or in some cases a previously defined issue may be permanently rectified.

The main areas of concern are:

- Mining pits and pit walls;
- Vault Pit area including pit sumps;
- Area around the Portage Waste Rock Storage Facility (RSF) including the northern portions of the NPAG waste rock extension, which include the collection ponds known as WEP 1 and WEP 2;
- Vault Waste Rock Storage Facility;
- East and West diversion ditches;
- Vault Road culverts;
- Northwest corner of the North Cell TSF;
- Saddle Dam 1 corner;
- Saddle Dam 2 sump;
- Saddle Dam 3 sump;
- Saddle Dam 4-5 downstream;
- AWAR culverts near the site and along the road to Baker Lake;

- RSF – ST-16 Seepage;
- Assay Road (Mill) Seepage;
- Central Dike Seepage.

Each area identified above will be discussed in detail below. All areas of concern are considered priorities based on the guiding principles.

2 AREAS OF CONCERN

2.1 MINING PITS AND PIT WALLS

All permanent ramps, jump ramps, ditches and sumps must be cleaned of all ice and snow before May in order to contain any water resulting from the snow melt. All pumps must be checked and serviced before the month of May. In addition, a check must be completed confirming that all piping systems starting from the different pits leading to the Vault attenuation pond or the South Cell TSF are free of ice by validating pumping values (if pumping systems are active) and/or performing an air test in the pipe with a compressor.

2.1.1 Goose pit

Mining in Goose pit was completed in 2014. All pumping equipment has been removed from the pit. Runoff water that accumulates in the Goose pit will now form part of the Goose pit natural reflooding process. No further action in this area during the freshet period is required. Water and/or ice will remain as part of the pit reflooding activity.

2.1.2 Portage pit

Water management in the Portage pit has been simplified since the mining of pits B, C and D has been completed. However, infrastructure is in place to prevent runoff water from reaching Pit A and E.

- A pond and ditch system south of Pit E pushback is presented in Figure 2-1. Runoff water accumulated in ponds GP-4 and GP-5will be pumped into Goose pit. Infrastructures might be modified or added within the actual trench and sumps footprint in such a way to prevent water from ponding against the pit crest;

- A pumping station is located in pit B (not shown) and will be used to manage runoff water affecting the active mining production area in pit A. The water will be pumped to the South Cell Tailings Storage Facility (TSF); and

- A pumping station located at the bottom of pit E (not shown) will be used to manage runoff water affecting the active mining production area in pit E. The water will be pumped to the South Cell TSF.

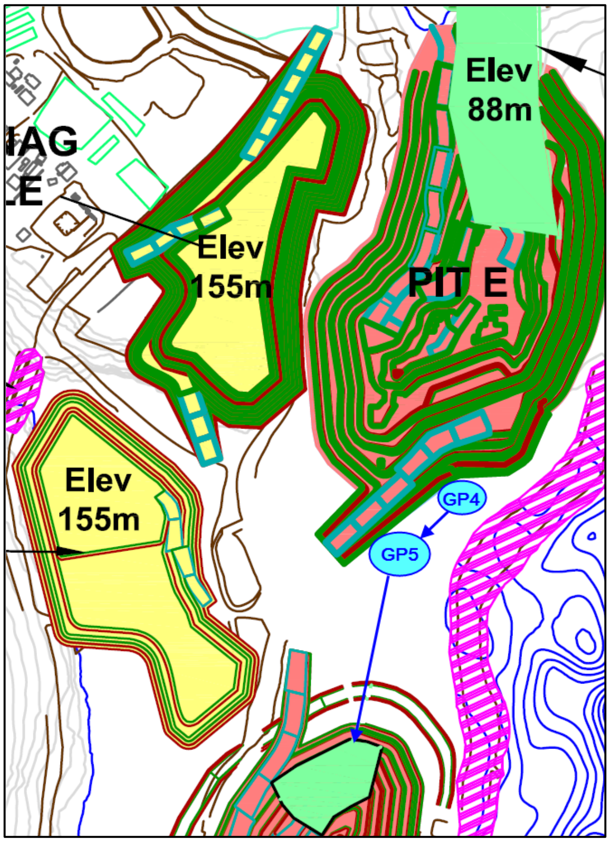


Figure 2-1: View of Portage Pit E area with the associated sumps and trenches

2.1.3 Vault & Phaser Pits

Since the summer of 2014 (dewatering completed) Vault Lake is now used as an Attenuation pond. The light blue surfaces in Figure 2-2 represent four isolated ponds that form the Attenuation pond (A, B, C & D) used to collect contact water from Vault Pit. Runoff from the pit area and the waste rock storage area that flows into the active mining areas will be pumped to the Attenuation pond.

As per the 2016 Water Management Plan, the Phaser Lake has been dewatered in 2016 to low levels to allow mining activities in spring 2017. Upcoming freshet will involve to manage residual Phaser ponds level so that freshet inflows do not interfere with mining. Residual water will be pumped to the Vault Attenuation Pond. The infrastructure used for 2016 dewatering will be used for taking such actions.

Discharge from the Vault attenuation pond to Wally Lake may require treatment at the Vault WTP if the water quality does not meet discharge criteria for Vault Attenuation Pond discharge. The Actiflo treatment plant is designed to remove TSS. Since the beginning of the Attenuation pond discharge into Wally Lake, the WTP was never used as water quality was found to be within guidelines. A diffuser was installed in Wally Lake to meet the Type A Water License requirement. The Environmental department must be notified at a minimum ten days before discharging any water to Wally Lake to comply with notification and sampling requirements. All piping and the discharge diffuser must be inspected in April in order to have all installations in place to proceed with pumping and/or treatment activities during freshet. The WTP will also be available should removal of TSS be required. To date all discharge has been compliant with the NWB Water License and MMER criteria.

Furthermore, in 2016 Agnico built a permanent sump in Vault pond D to avoid overflows into the pit past 134.3masl elevation. It will act as a low point to redirect all the freshet water in Vault ponds B and C via pumping. Its storage capacity is considered to be null as the pond should be maintained dry throughout the summer season. Please refer to Appendix 1 for a complete review of the freshet action to be put in place each year.

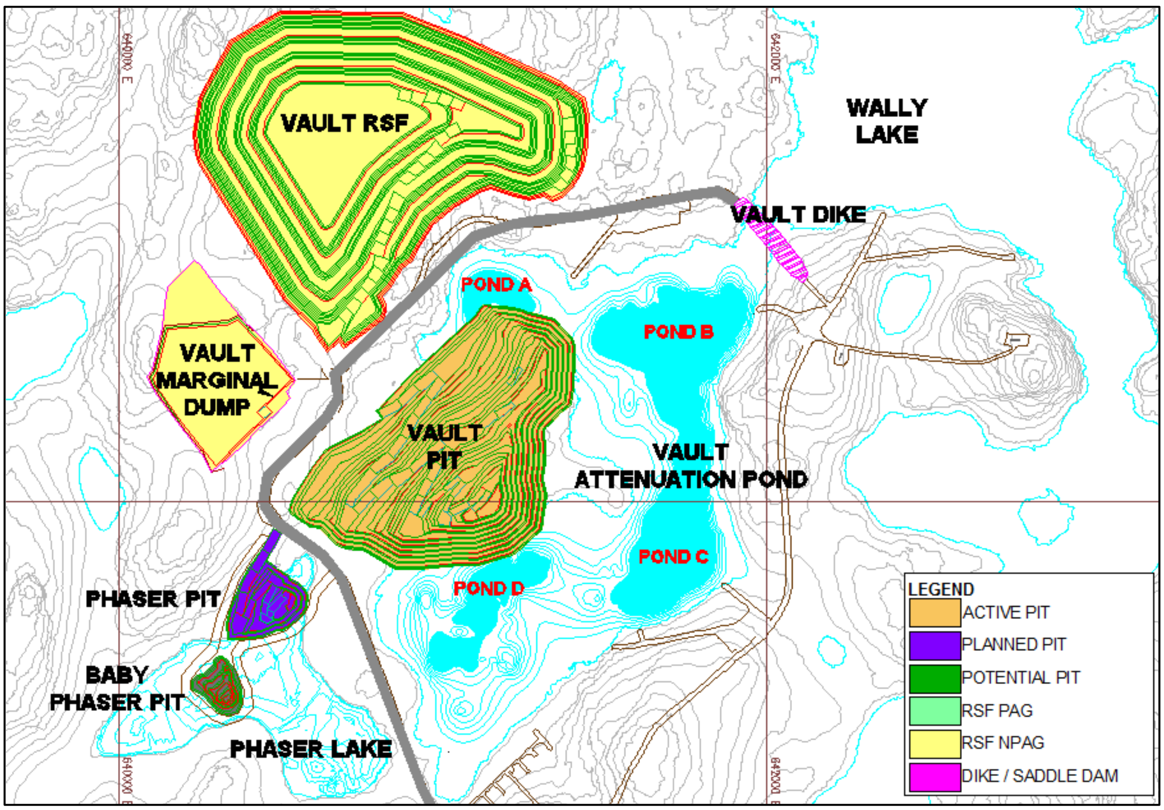


Figure 2-2: View of Vault area and the associated management ponds

2.2 WASTE ROCK STORAGE AREAS

2.2.1 PORTAGE RSF

The Portage Rock Storage Facility (RSF) will require weekly inspections around the perimeter beginning as soon as the freshet starts (May) until freeze up to identify any seepage. As will be noted in the following section, seepage was identified in 2013 at location ST-16. In the event that additional seepage is observed from the RSF, it must be reported to the Engineering and Environment Departments and samples must be taken to determine the water quality and source. A mitigation plan will be prepared and implemented if necessary.

2.2.2 VAULT RSF

Much like the RSF located near Portage pit, the Vault RSF will require some monitoring during the freshet period to ensure adequate water management. Weekly inspections around the RSF perimeter will be conducted to identify any seepage as soon as the freshet starts (May) until freeze. In the event that seepage is observed, the Engineering and Environment Departments must be notified and samples taken to determine water quality. The sample monitoring will be in accordance with the Water License requirements. It is anticipated that there will be no water quality issues as primary drainage is towards the Vault Pit and Vault Attenuation Pond and the waste rock from the Vault Pit is primarily NPAG.

2.3 NORTH CELL TAILINGS STORAGE FACILITY

Water management around the North Cell Tailings Storage Facility (TSF) is required to maintain integrity of the tailings pond and to prevent any adverse environmental impacts. This section describes the infrastructure in place to control runoff water and reduce possible impact on both the tailings storage facility and the receiving environment.

2.3.1 Diversion Ditches

The East and West Diversion ditches were constructed in 2012 around the North Cell TSF and the Portage RSF. The diversion ditches are designed to redirect the fresh water from the northern area watershed away from the tailings pond and RSF and direct it to Second and Third Portage Lakes. As seen in Figure 2-3, seven zones associated with the diversion ditches have been identified where actions will be taken during or before freshet:

2. 1. AWAR culvert – Discharge to Third Portage Lake;

2. 2. West Diversion Ditch elbow;

2. 3. Northwest corner of North Cell TSF;

2. 4. Waste Extension Pool sumps (WEP 1 and WEP 2);

2. 5. East Diversion Ditch Outlet to NP-2 Lake;

2. 6. North portion of NPAG waste rock expansion; and

2. 7. Vault road culvert – NP-2 Lake exit to NP-1 Lake.

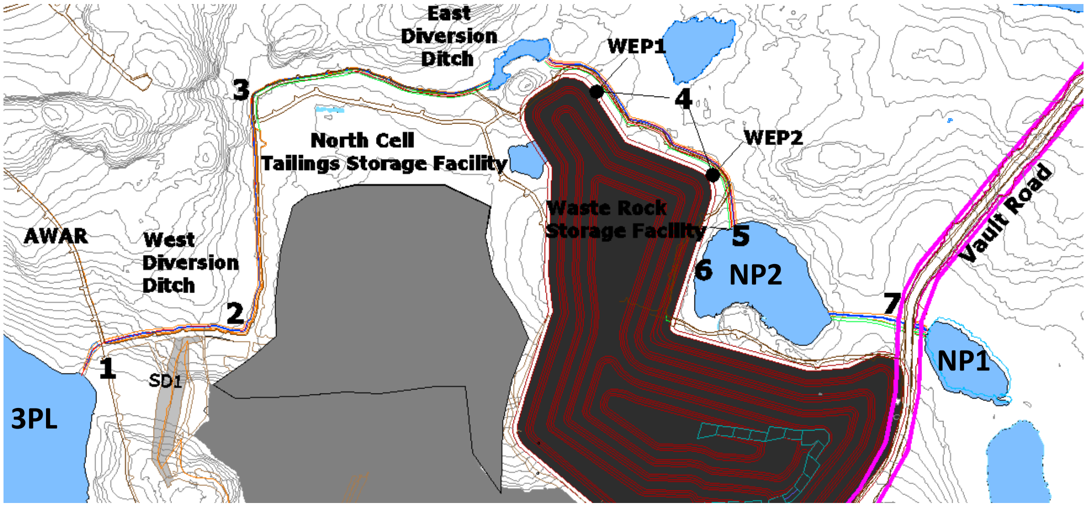


Figure 2-3: Location of the areas of interest for the 2017 Freshet Action Plan

2.3.1.1 AWAR culvert – discharge to Third Portage Lake

Ditch outflows are important to ensure proper flow of freshet drainage. The culvert under the AWAR (Figure 2-3 #1) is a critical section of the West Diversion Ditch. Snow removal must be performed to avoid ponding and damage to the ditch/trench structure as well as to maintain the integrity of the AWAR which, in turn, is critical to transportation at the Meadowbank mine site.

Figure 2-4 illustrates this culvert. Snow and/or ice must be removed using an excavator on each side of the culvert to allow water to flow through to prevent upstream ponding. The culvert may need to be steamed if blocked by ice. Before starting the cleaning operation, it is important to ensure that the electrical cable (5kV) location has been visually identified.

After flowing through the culvert the water discharges across the tundra into Third Portage Lake – see Figure 2-4 below. Snow and ice needs to be removed before May 20 to prevent any back up in the West Diversion ditch. If not completed, this could increase water levels upstream in the ditch causing problems discussed in Section 2.3.1.2.

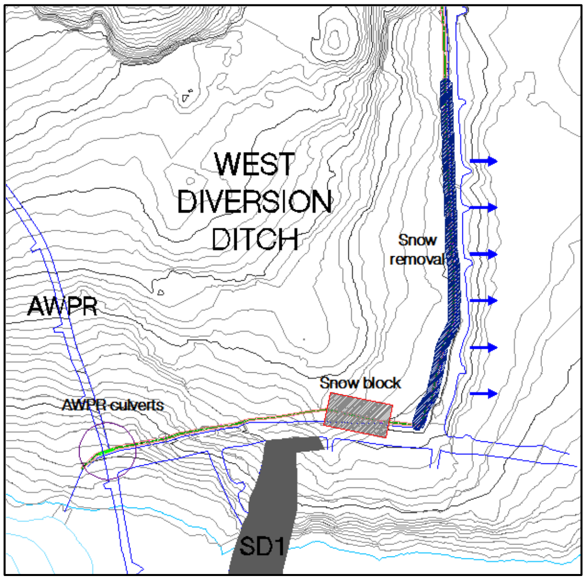


Figure 2-4: West diversion ditches area of interest

A turbidity barrier has been installed in Third Portage Lake as a precautionary measure. This barrier will remain in place over winter and will be replaced if damaged in the future. Additional barriers can be installed after ice melt as a contingency. Daily inspections will be conducted starting in May until Freshet is complete and after rain events. Sample monitoring will commence when open water is present in accordance with the Water License (ST-6). Sampling frequency of ST-6 may be increased if TSS results are near 30 mg/L (grab) and 15 mg/L (monthly average), which is the license limit, or visually elevated. If a discharge of TSS occurs, the Environment Department will notify ECCC and NWB (INAC's Water Inspector).

2.3.1.2 West Diversion Ditch Elbow

One of the deepest sections of the West Diversion ditch is located in the corner next to the Saddle Dam 1 – see Figure 2-4 and Figure 2-3 #2 above. In early May of each year, Agnico will remove the snow accumulation to allow the water to flow freely preventing the water upstream from increasing in level and hydraulic head pressure. In addition, large flows can scour the ditch system causing sediment migration through the ditches which could impact Third Portage Lake. To prevent this, snow must be removed from the corner area with a long reach excavator in early May.

As a further precaution, Agnico constructed an interception sump located at the west diversion ditch elbow location in 2014. The sump has a capacity of 3,000 m³. The sump is designed to intercept water coming from the most critical parts of the West Ditch. . Water is pumped back on a regular basis to the North Cell TSF. These measures will prevent any contaminated water from reaching Third Portage Lake. Eventually, this sump will also act as a settling pond to prevent water with elevated TSS from reaching Third Portage Lake. Daily inspections will be conducted from May until freshet is complete and after rain events. Sample monitoring will also be conducted. Figure 2-5 shows the North Cell interception/settling sump after the completion of the construction. In 2017, elevated TSS should not be an issue as a result of rock armour work conducted in 2015 on the banks of the West diversion ditch preventing sediment migration, but in 2017 the water will still be pumped back to the North Cell TSF to avoid any non-compliance.

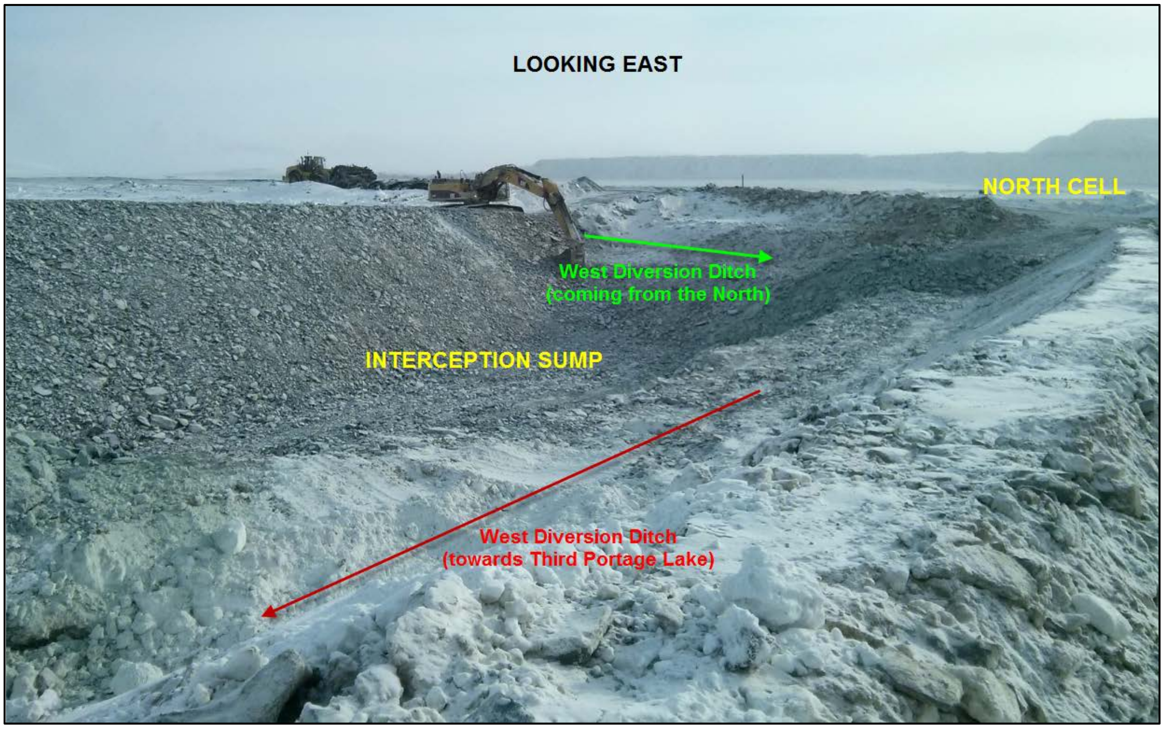


Figure 2-5: North Cell West Diversion ditch interception sump

2.3.1.3 Northwest Corner of North Cell TSF

The construction access road at the Northwest corner of the North Cell TSF (see Figure 2-6 and Figure 2-3 #3) was vulnerable to damage from the freshet water flow from the northern watershed (see watercourse flow in Figure 2-6 denoted by blue line The start of the West Diversion ditch is also located in this area and is designed to collect the freshet flow – note arrows in Figure 2-6. Water was observed ponding during the 2013 and 2014 freshet. Ponding is limited in this area once the freshet is done.

Tailings deposition was completed in the North Cell in October 2015. Water was removed in the North Cell TSF and capping was completed in the northern and eastern section along RF1 and RF2 outlined in (Figure 2-6) by the light grey areas. In 2017, Agnico will continue to conduct daily visual inspections of this area in May until freshet is complete and after rain events.

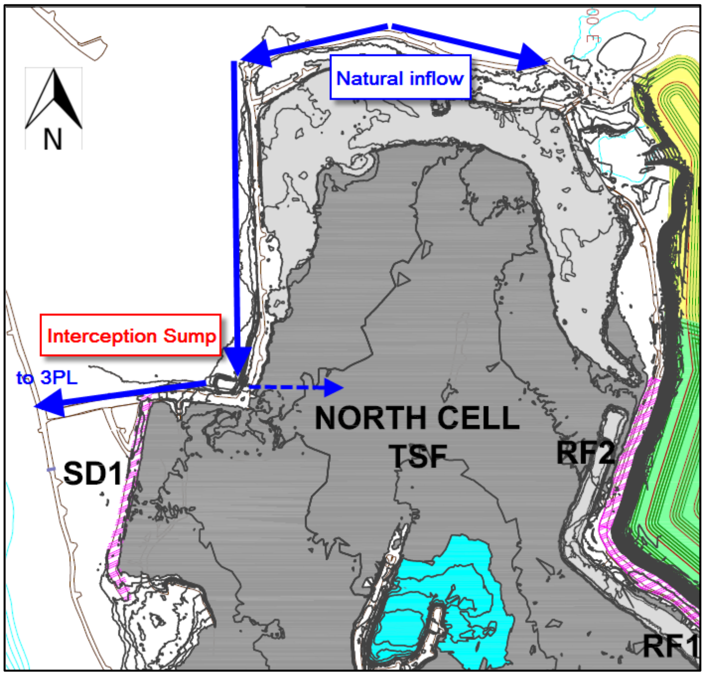


Figure 2-6. View of the northwest corner of the ditches

2.3.1.4 Waste Extension Pool (WEP) sumps

In 2014, as per inspections conducted within the framework of the Freshet Action Plan, run off was noted at the northeast side of the NPAG waste rock extension pile in a natural depression forming a collection system (WEP). WEP1 and WEP2 sumps were constructed in September 2015 to manage water around the northeast side of the RSF and to ensure that all water ponding behind the RSF is transferred back to the North Cell TSF – see Figure 2-7 below. The WEP1 and WEP 2 sumps replaced in 2016 the WEP collection system formed by the natural depression. Water collected at WEP1 will continue to be pumped to WEP2 which will in turn be pumped to ST-16 (RSF seepage pumping system). Water collected at the latter will be pumped back into the North Cell TSF. Daily inspections will be undertaken in May until freshet is complete and after rain events to ensure water remains contained within WEP1 and WEP2 and does not enter the East Diversion Ditch. Both sumps WEP1 (ST-30) and WEP2 (ST-31) will be sampled monthly as per the Water License during the open water period.

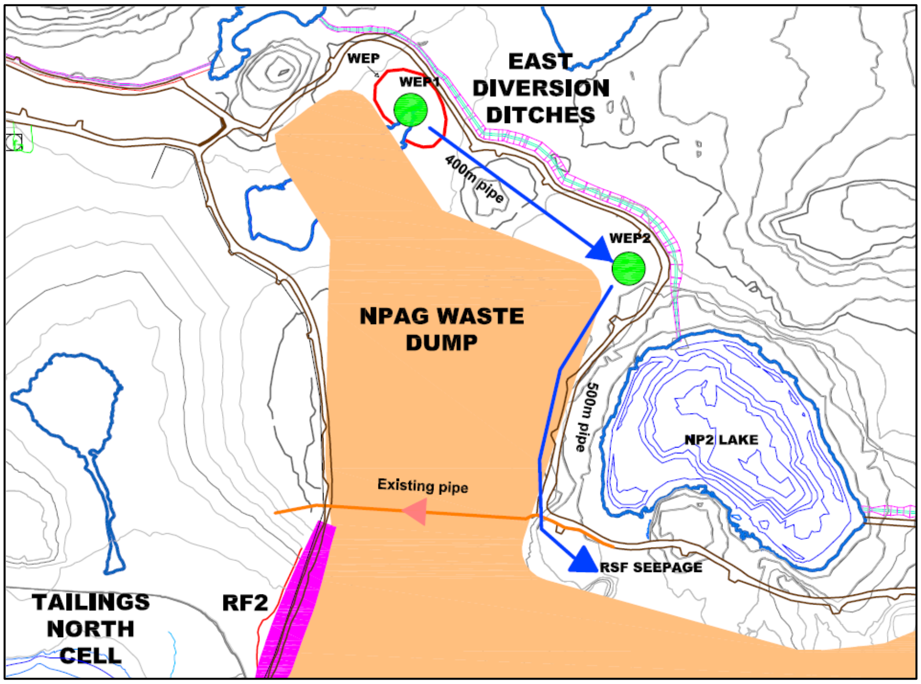


Figure 2-7. WEP1 and WEP2 sumps locations

2.3.1.5 East Diversion ditch outlet to NP-2 Lake

This area of the East Diversion ditch, seen in Figure 2-8 and Figure 2-3 #5, is critical as it acts as the outflow of the North part of the East Diversion ditch into NP-2 Lake. This outlet must be cleared of obstructions – snow and ice in early May to promote drainage through the ditch and into NP-2 Lake. The presence of ice blocks will be mitigated using the steam machine to melt away the obstruction. Daily inspections will be conducted starting in May until freshet is complete and after rain events. Sample monitoring will be conducted monthly during open water in accordance with the Water License (location ST-5). Sampling frequency of ST-5 may be increased if TSS results are near 30 mg/L (grab) and 15 mg/L (monthly average), or visually elevated. Turbidity barriers have been installed at the ditch outlet into NP-2 in 2013 to mitigate elevated TSS. This barrier will remain in place over winter and will be replaced if damaged in the future. Additional barriers can be installed after ice melt as a contingency.If a discharge of TSS occurs, the Environmental Department will notify ECCC and NWB (INAC's water Inspector).

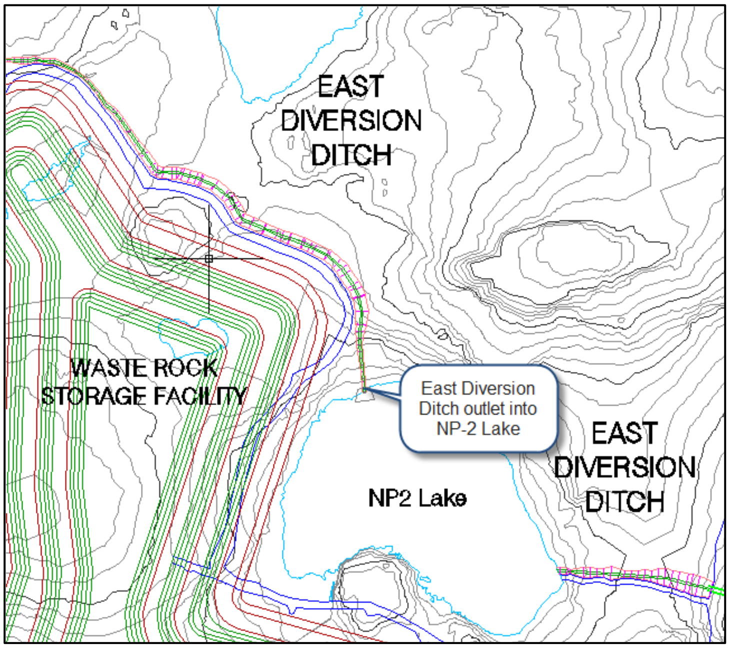


Figure 2-8: View of the East Diversion ditch outlet into NP-2 Lake

2.3.1.6 North Portion of NPAG Waste Rock Expansion

The northwestern area of the RSF, which consists entirely of NPAG material, extends towards the East Diversion ditch as shown in Figure 2-3 #6. Runoff from this area, while not anticipated to be contaminated could, if significant, discharge to NP-2 lake after crossing the tundra. No issue occurred in this area in 2016 and it is no longer considered as a primary area of concern during freshet. However, the Environmental Department will continue to conduct daily visual inspections in 2017 . Sample monitoring will be undertaken when water is observed in order to determine water quality. Contaminated water must be kept from reaching NP-2 Lake; and if required, water will be pumbed or diverted.

2.3.1.7 NP-2 Outlet,Vault Road Culvert and NP1

This area of the East Diversion ditch is critical as it acts as the outflow of NP-2 Lake through the Vault Road culvert (see Figure 2-3 #7). The culvert seen in Figure 2-9 connects the East Diversion ditch from Lake NP-2 to NP-1. Snow and ice must be removed from the culvert area, including upstream at the exit of NP-2 Lake in early May to ensure that the outlet of NP-2 flows freely to NP-1 and ultimately to Dogleg Lake. Back up could cause upstream water raises in Lake NP-2 which could cause overflow into the RSF ST-16 sump. First, snow from the ditch between NP1 and the road (1) will be removed in early May. Next, the culvert (3) will be steamed, if necessary, to remove any ice/snow. If needed snow/ice around the outlet of NP2 Lake (4) would be removed to allow free flow of melt water. Daily inspections will commence in May until freshet is complete and after rain events. TSS sample monitoring will be conducted monthly and as needed for turbidity. Sampling frequency may be increased if TSS results are near 30 mg/L (grab) and 15 mg/L (monthly average), or visually elevated. If a discharge of TSS occurs, the Environmental Department will notify ECCC and NWB (INAC's Water Inspector).

A turbidity barrier (orange barrier #1) was installed in 2014 at the ditch outlet into NP-1 to mitigate the risk of elevated TSS (Figure 2-10). As a result of an incident of elevated TSS observed in water running under the Vault Road Culvert in June, 2015 (reported to authorities and KIA), Agnico installed, in addition to a permanent turbidity and silt barrier, additional turbidity barriers (2) in and at the exit of NP-1 (non fish bearing) (Figure 2-10) and one at the inlet of Dodgleg (Figure 2-11). The incident was of short duration and the turbidity barriers prevented migration of TSS to Dogleg Lake which is fish bearing. Agnico also proceeded to raise the Vault road near NP-1 culverts. A different source of aggregate – NPAG from Vault was used (harder material) for the road raise which will prevent an accumulation of fine material and allow for water to runoff instead of accumulating or percolating through the road. Also, a snow management plan has been implemented that will ensure there are no large accumulations of stored snow, which could contribute to runoff problems. The additional turbidity barriers (4) were removed from NP-1 in the fall of 2015. A another barrier was put in place in May 2016 on the ice to ensure protection during melting conditions. These barriers are stored on site for rapid deployment in case they are needed in the future. This barrier was left on location over winter and will already be in place at the start of freshet. It will be inspected during regularly inspection.

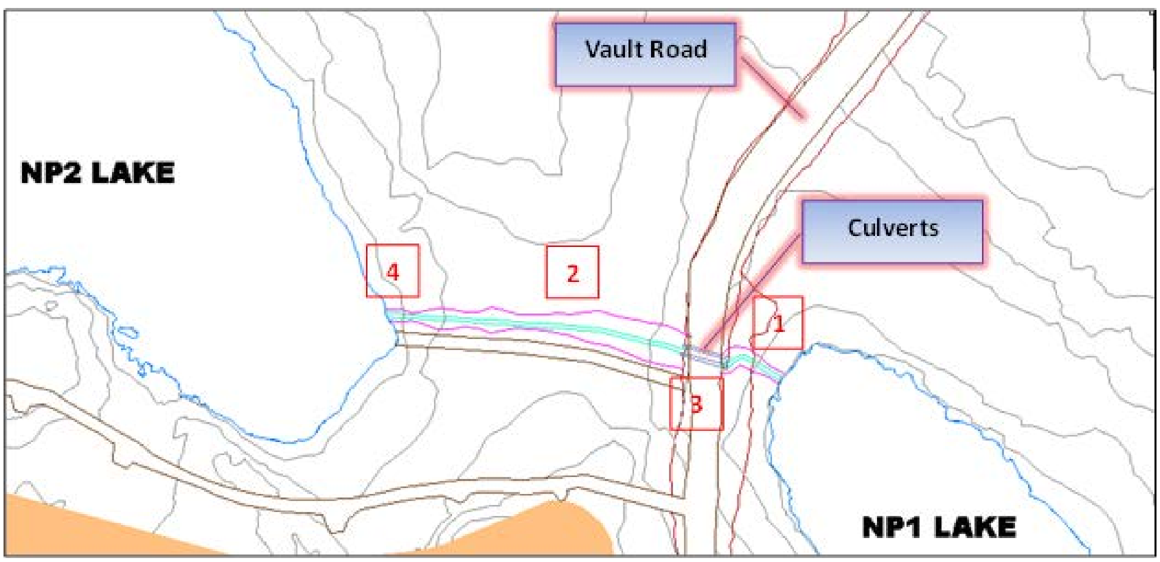


Figure 2-9: View of the diversion ditches at the Vault road area

Figure 2-10: Turbidity barriers at inlet of NP1 installed in July 2016

Figure 2-11: Turbidity barriers at the inlet of Dogleg Lake

2.3.2 Saddle Dams

2.3.2.1 Saddle Dam 1

This dam, peripheral to the North Cell TSF, is critical to the normal operation of the North Cell TSF. Daily inspections starting May until water freezes will be required for Saddle Dam 1 (SD1) to ensure that runoff water does not pool against the toe of the dike due to low topography. A pumping station located along the toe of the dike was installed previously to prevent the pooling of water at the toe. This pumping station must be operational once water is observed at the toe to pump the water to the TSF. The pumping system will be checked in early May to ensure proper operation. Monthly sampling will be conducted at this station (ST-S-2) during open water conditions in accordance with the Water License.

2.3.2.2 Saddle Dam 2

This dam, just South of SD1, is also critical to the normal operation of the North Cell TSF. Historically, this structure has not had any issues with water pooling at the toe, therefore monthly inspections starting May until water freezes will be required for Saddle Dam 2 (SD2) to ensure that water does not pool against the toe of the dike. If water is observed at the toe, a mitigation plan will be determined and implemented by the Engineering and Environmental department.

2.3.2.3 Saddle Dam 3

Saddle Dam 3 was built in 2015 to 137masl and raised to 143masl in 2016. A temporary sump was established in 2015 outside the 150masl footprint area to create a low spot that facilitates water management at freshet. In 2017, the downstream area of the SD3 embankment will continue to be pumped to the South Cell TSF to avoid water ponding against the structure. This pumping station must be operational once water is observed at the toe to pump the water to the TSF. The pumping system will be checked in early May to ensure proper operation. Monthly sampling will be conducted at this station (ST-32) during open water conditions in accordance with the Water License.

2.3.2.4 Saddle Dam 4-5

Since their initial construction in 2015, ponding in the downstream area is minimal due to the geometry where the downstream slopes downward and away from the embankment. Localized small ponds are sometimes present at the peak of the freshet period and should they manifest again in 2017, they will be redirected in the South Cell TSF footprint on their upstream side.

2.4 VAULT ROAD CULVERT

The Vault road crosses over a connection between two water bodies, Turn Lake and Drill Tail Lake, at approximately km 2. A system of culverts was installed to allow flow to occur between the two waterbodies. Beginning in May until freshet is complete and after rain events it will be important to complete daily inspections. In the case that excessive TSS is observed, samples will be taken and analyzed. In the case, where the TSS levels go beyond 30 mg/L (grab) and 15 mg/L (monthly average), a report will be made to the ECCC and NWB (INAC’s Water Inspector). Turbidity barriers will be installed as a mitigation measure if needed.

2.5 STORMWATER MANAGEMENT POND

The Stormwater Management Pond (SWMP) is a small shallow and fishless water body that can be seen in Figure 2-13 adjacent to Portage Pit. Treated sewage is discharged into this pond before being transferred to the active TSF. The quantity of water transferred each year is recorded. Weekly inspections in the spring and fall are undertaken to determine the commencement of pumping. From 2016 onward, the western part of the pond is used for snow storage (refer to the Snow Management Plan for more details) leading to bigger volumes being pumped.

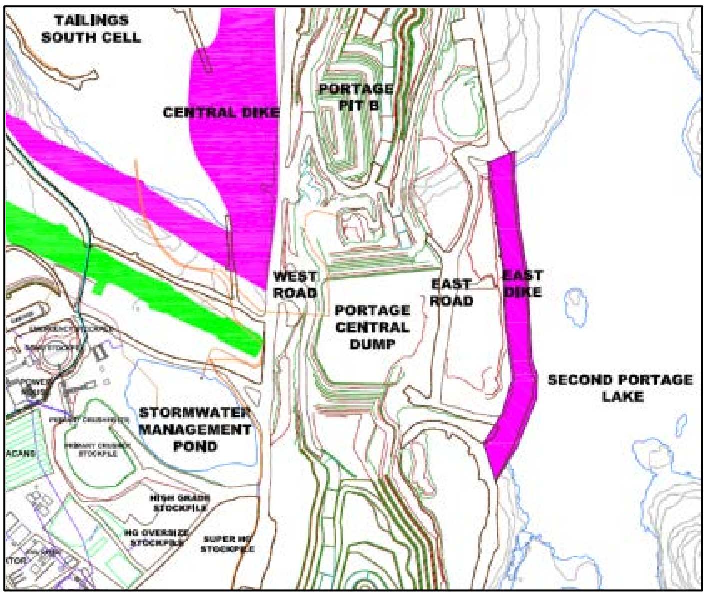


Figure 2-12: Portage Pit area with the Stormwater Management Pond

2.6 FUEL TANK FARMS

2.6.1 Meadowbank Tank Farm

Snow and ice accumulation within the fuel tank farm must be adequately managed to prevent overflow to the environment and/or damage to the fuel handling systems. The Energy and Infrastructure Department will advise the Environmental Department of their intent to pump the containment area once ice/snow begins to melt. Water samples will be taken in accordance with the Water License to ensure compliance prior to its release. A notice must be provided to the Inspector 10 days prior to this pumping activity. Once sample results have been obtained, the Environmental Department will advise the Energy and Infrastructure Department if pumping can begin. If sample results permit, the pumping may begin; to direct water to the tundra/ground in a way to prevent erosion. In the event that the water sample results do not meet discharge criteria the water shall be pumped to the Stormwater Management Pond.

2.6.2 Baker Lake Tank Farms

Snow and ice accumulation within the fuel tank farms at Baker Lake must be adequately managed to prevent overflow to the environment and/or damage to the fuel handling systems.

The Energy and Infrastructure Department will advise the Environmental Department of their intent to pump the containment area once ice/snow begins to melt. Water samples will be taken in accordance with the Water License to ensure compliance prior to its release. A notice must be provided to the Inspector 10 days prior to this pumping activity. Once sample results have been obtained, the Environmental Department will advise the Energy and Infrastructure Department if pumping can begin. If sample results permit, water can be directed to the tundra but the flow rate shall be such to avoid erosion or damage to the tundra. In the event that the water sample results do not meet discharge criteria the water cannot be pumped to the tundra. If this occurs the water will be pumped to a tanker and transported to the Meadowbank site to be disposed of in the TSF or placed in containers for shipment south as hazmat.

2.6.3 Vault Tank Farm

All fuel tanks at the Vault facility are approved double walled tanks. In accordance with CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (2013), secondary containment is not required. As a result, there is no pumping required at freshet.

2.7 AWAR CULVERTS ON THE BAKER LAKE PORTION

Weekly inspections will be undertaken starting in May at all culverts along the AWAR to ensure that water during freshet is flowing freely and no erosion is occurring. If elevated TSS/Turbidity levels are observed sampling will occur and the results assessed. Turbidity barrier will be installed if required. The Energy and Infrastructure department will also be advised if severe erosion/scouring is observed. In addition snow and ice removal may be required to allow the water to flow as per design specifications. Inspections will be performed during the freshet period by the Environment department.

3 INCIDENT RESPONSE

3.1 ST-16 SEEPAGE

In July 2013, it was noted that seepage from the Rock Storage Facility (RSF) had migrated through a rockfill road at a seepage sump located on the north-east side of the RSF (see ST-16 on Figure 3-1). The seepage, which contained elevated copper, nickel, ammonia and cyanide entered NP-2 Lake. It was determined through investigation that the likely source of the contaminants was reclaim water from the North Cell TSF. This water migrated underneath the RSF through a former watercourse into the seepage sump area (ST-16). Agnico took immediate measures to stop the seepage and implement corrective measures to prevent a recurrence. This included, keeping the sump area pumped to a low level, installation of an impermeable barrier (till plug) in the rockfill road, implementation of a comprehensive monitoring program and ensuring tailings deposition was enhanced in the North Cell to create beaches that would stop any water egress (this activity was continuous as part of AEM's Tailings Deposition Plan in 2014). A permanent pumping system was installed in 2014 in order to direct seepage back to the North Cell TSF. A filter was also installed at RF-1 and RF-2 to assist the beaches in preventing tailings water migration. In addition, as mentioned previously (Section 2.3.1.7), snow will be removed from the ditches and culvert at the outlet of NP- 2 to NP-1 Lake to ensure freshet flows do not back up and overflow into the ST-16 seep location and that the north watershed non-contact runoff flows freely through to NP-1 Lake and further downstream (Dogleg Lake). Pumped volumes will be documented and daily inspections of the area will be undertaken. Take note that 2016 pumped volumes are reported in the Agnico 2016 Annual Report within the Water Management Report and Plan and in Table 1 below. The lower volume of water pumped to the North Cell in 2015 compared to 2014, despite increased freshet volumes in 2015, further indicates that mitigation efforts (completion of tailings beaches and filter material against RF-1 and RF-2) were successful in minimizing any North Cell reclaim water from migrating to the ST-16 sump area. Since no other works have been done between 2015 and 2016, the 2016 outflow is similar to the one of 2015.

Table 1: Water pumped from ST-16 Seepage back to TSF

	Volume (m^3)			
	2013	2014	2015	2016
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	14,591	1,625	0
June	0	9,294	10,832	14,839
July	2,091	3,810	3,414	887
August	2,900	3,386	1,755	2,325
September	1,364	1,088	2,403	628
October	227	0	0	2,165

November	0	0	0	0
December	0	0	0	0
Total	**6,582**	**32,169**	**20,029**	**20,844**

During the renewal process for the Meadowbank Type A Water License (2014 – 2015) the KIA requested additional monitoring related to this incident. Details and the sampling schedule of the revised Monitoring program, which includes a full suite of total and dissolved metals plus Ammonia, Cyanide Total, WAD and Free analysis, are included in the attached Schedule 1. The KIA requested that Agnico continue monitoring until there is a 5 year period of non-detect cyanide results. To date (previous 3 years) the monitoring has indicated no CN levels in NP-2, NP-1 and further downstream lakes, Dogleg and Second Portage. Thus the current program will continue in ~~2016,~~ 2017 and 2018.

A discussion and analysis of the 2016 monitoring results can be found in the Agnico 2016 Annual Report (Section 8.3.3.11). The water quality in NP-2 Lake has improved significantly to the point that water quality for all parameters, including the main parameters of concern (Cn Total, Free and WAD as well as copper, nickel and ammonia) in NP-2 Lake is near or below CCME criteria for the Protection of Aquatic Life. No parameters of concern (ie Cyanide, copper and nickel) have been noted (above CCME criteria) in the aforementioned downstream lakes. It also should be noted that during the final approval process of several environmental management plans related to Agnico's renewed water license (July, 2015), including the Freshet Action Plan, the KIA stated that Agnico "proposes monthly sampling at the locations affected by freshet, which is insufficient for freshet as it may only last a month. Therefore sampling should be conducted weekly until a large proportion of snow and ground ice has melted". In response, Agnico agrees that the "initial" snowmelt of the freshet may only last a month however, the freshet, in fact, continues into early September as the water entrained in the active layer continues to melt and discharge through ditches and water conveyance infrastructure around the site. This is based on actual observations noted during the regular inspections undertaken as part of this Plan. Weekly sampling during the active melt period of snow/ice will not likely add any value to the current monitoring schedule as intial results during this period tend to be diluted. A sample monitoring program's value is based on data collected over time. To date, as mentioned previously, the results from 2013 – 2016 indicate a significant decrease in parameters of concern including at the ST-16 sump location. In fact, no cyanide in any form has been detected in NP-2 or downstream lakes for the past 3 years. A valid case can be made that the action plan implemented by Agnico has been very successful in preventing any further seepage into NP-2 Lake and into the ST-16 sump itself. The MDRB has commented on the success of this action plan. The till plug, pumping system, installation of filters and effective tailings beaches at RF-1 and RF-2, progressive tailings capping at RF- 1 and RF- 2 and the dewatering of the North Cell in 2015 and 2016 have effectively mitigated this problem. In addition, thermistors installed in the RSF indicate freezing in the former seep path is occurring (which would mean that no water is migrating). However, in consideration of the KIA's concern regarding extra monitoring during freshet, Agnico will conduct extra weekly monitoring in July for parameters of concern, namely Cyanide – Total, Free and WAD, copper and nickel at sample stations in the immediate area of ST-16, namely NP-2 South and NP–2 West. These were the elevated parameters noted initially and are indicative or TSF reclaim water. If these sample events detect any concerns or elevated levels Agnico will increase the monitoring immediately and include all sampling stations (including downstream lakes).

As soon as the Lake and seep area are ice free the sample monitoring program will commence. Agnico also conducts winter sampling in NP-2 Lake as part of the monitoring program.

In the event that seepage water flows through the rockfill road reaching NP-2 Lake, the Environmental Department will notify authorities.

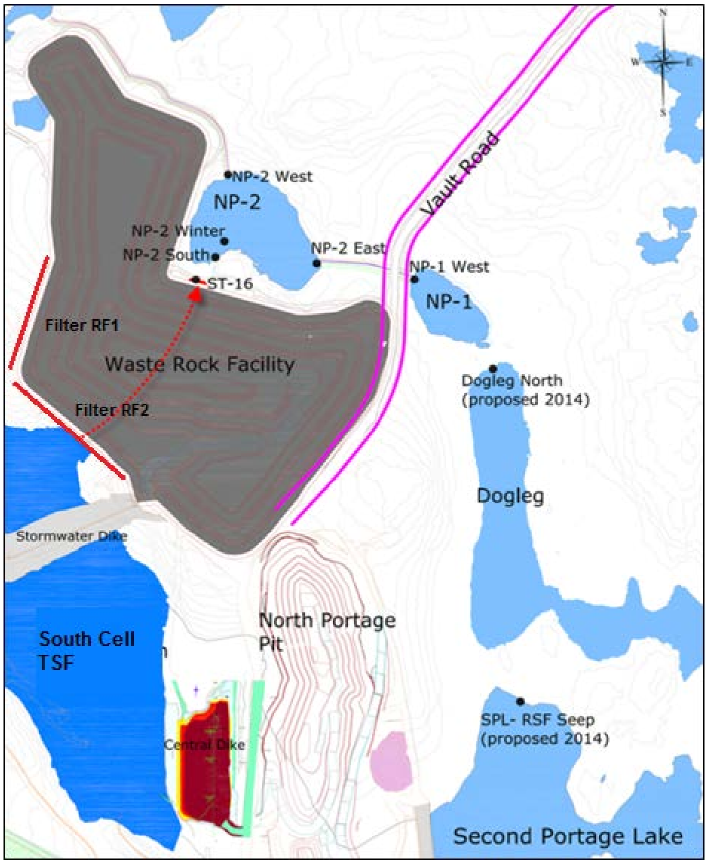


Figure 3-1. View of the RSF seepage observed at the ST-16 station.

Footnote: The dotted red arrow represents the assumed seepage flow. Red Lines represent installed filters and areas where tailings beaches were built up to minimize flow through.

3.2 MILL SEEPAGE

In November 2013, Agnico observed seepage discharging at a location West of the site access road in front of the Assay Lab (see Figure 3-2). Initial sample results revealed elevated cyanide and copper which is indicative of mill processes. After an investigation, which included sampling, the source was determined to be seepage from several containment areas within the mill; the worst being the CIP tank overflow collection sump. Repairs to seal all the mill sumps and containment areas was completed in 2014 thus stopping the source of the seep. Agnico engaged Tetra Tech in December 2013 to propose a drilling delineation program and further steps necessary to control the seepage and prevent offsite migration to Third Portage Lake – see Figure 3-2 for the seep location. Agnico completed the drilling program and based on the results constructed an interception/collection trench prior to the 2014 freshet (completed early May 2014).

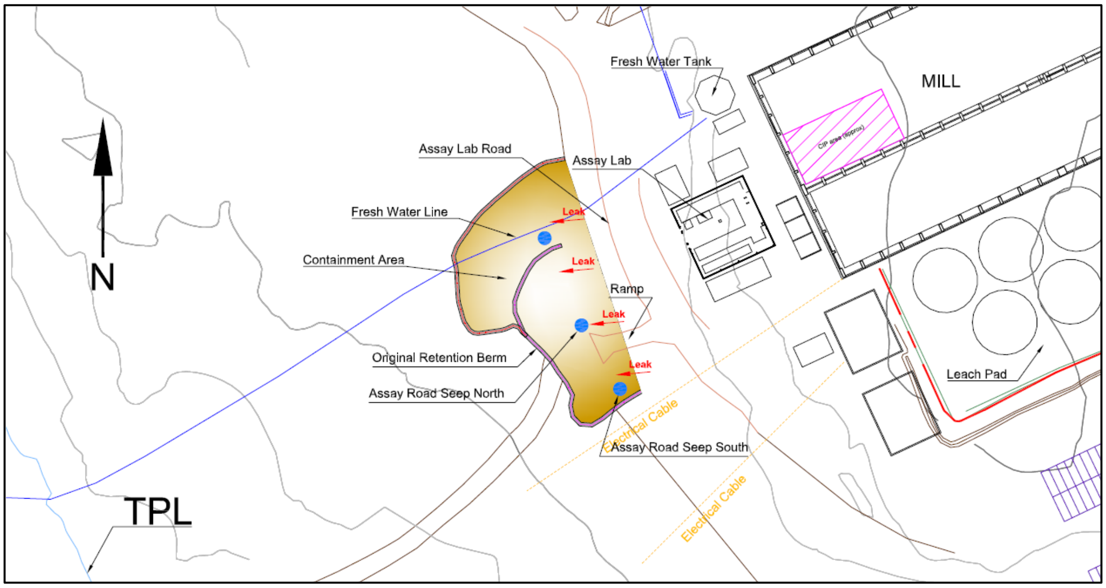


Figure 3-2. View of the mill seepage area and initial retention berm construction

The design of the trench can be seen in Figure 3-3. A pumping system was installed and all water collected is pumped back to the mill. Pumping begins as soon as water is evident and volumes are recorded monthly – See Table 2 below.

Table 2: Water pumped from Mill Seepage back to the mill

	Volume (m^3)			
	2013	**2014**	**2015**	**2016**
January	0	0	871	0
February	0	0	306	0
March	0	0	500	0
April	0	0	680	0
May	0	2,450	347	0
June	0	1,935	10,803	2,588
July	0	1,158	6,633	2,270
August	0	3,979	4,467	3,599
September	0	2,420	4,584	2,109
October	0	1,043	1,188	512
November	Ice	842	164	0
December	0	871	0	0
Total	**0**	**14,698**	**30,543**	**11,078**

In addition, a recovery/monitoring well, MW-203, located beside the Assay Lab upstream of the trench is pumped back to the mill to intercept the seepage when water is present. 2016 pumped volumes from interception/collection trenches are reported in the Agnico 2016 Annual Report. and included in Table 2 above. The increased volume in 2015 was due to increased snow and freshet flows above those seen in 2014. This is confirmed by decreasing contaminant levels. In 2016, the flow reduced and return values similar to 2014. More details are provided in Section 8 of the 2016 Annual Report.

CN WAD (on site uncertified lab) levels in MW-203 have diminished significantly. This well will remain in operation. MW-203 can be considered as an interception well.

As soon as the trench, monitoring wells and Third Portage Lake are unfrozen a comprehensive monitoring program will be implemented. This program is attached in Schedule 2. In accordance with a KIA request during a review of the Plan during the Water License renewal process Agnico will sample the Mill Trench on a weekly basis for CN Total, Free and Copper during the month of July in 2017. The monitoring program will be re evaluated (as is the case every year) at the end of 2017 to determine if any changes are warranted in 2018. A complete discussion of the monitoring results for 2016 is included in Agnico's 2016 Annual Report . In summary, the results of monitoring indicate that the interception trench and initial containment berm were substantially successful in preventing any contaminants from reaching Third Portage Lake. The levels of contaminants decreased significantly during the monitoring period in the interception trench. The seepage appears to have been effectively contained and the source area has been repaired.

Regular inspections will be conducted of the pumping, collection systems and perimeter area and the pumped volumes will be recorded in 2017.

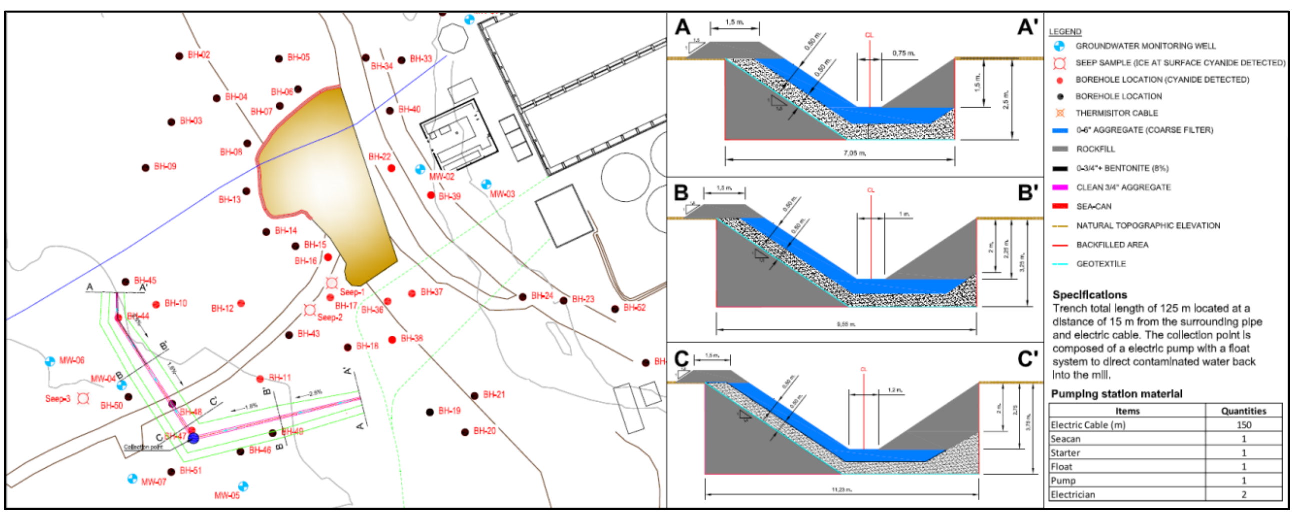


Figure 3-3. View of the mill seepage area and interception trench design

3.3 CENTRAL DIKE ST-S-5

Central Dike seepage is located at the downstream area of the Central Dike embankment. A permanent pumping system is in place to manage the seeping water beneath the dike by keeping the downstream pond at a constant elevation of 115masl as recommended by Golder in 2015.

More details to be found in the Water Management Plan 2016. The pumping system in place has contingency to handle a significant snowmelt or rain event at freshet that would drain and eventually mix in the downstream pumping area. The downstream pond acts as a drain for the water percolating to the pond but only accounts for roughly 17ha of drainage area. Daily inspection of the area will be held by enginnering as well as weekly by environment. Environment department will also conduct monthly sample as per the Water License (See Schedule 3)

4 SNOW MANAGEMENT

The snow management procedure developed internally in 2015 and updated annually is illustrated in Appendix 3. Temporary snow storage dumps and snow accumulation areas of concern are identified on the map.

APPENDIX 1

2017 Freshet Action Plan Procedure

Section	Area of Concern	Role/Action	Responsbilities	Dates
2.1	**Mining Pits and Pit Walls**			
2.1	Mining Pit and Pit walls - General	1) Clean all ice, mud and snow on all permanent ramps, jump ramps, etc.	Mine Operations	Before May
		2) Check and service all pumps.	E&I (Energy and Infrastructure)and Maintenance	Before May
		3) Check that all piping systems starting from the different pits leading to the South Cell TSF are free of ice by validating pumping values (if pumping systems is active) and/or performing an air test in the pipe with a compressor.	E&I	Before May
2.1.1	**Goose Pit**			
2.1.1	Goose Pit	1) No further action in this area during the freshet period as mining is complete in Goose Pit. Water and/or ice will remain as part of the pit reflooding activity.	Engineering	N/A
2.1.2	**Portage Pit**			
2.1.2	Portage Pit	1) Runoff water accumulated in ponds GP-4 and GP-5 will be pumped into Goose pit; 2) Runoff water accumulated in pit B will be pumped to the South Cell Tailings Storage Facility (TSF); 3) Runoff water accumulated in pit E will be pumped to the South Cell Tailings Storage Facility (TSF).	Engineering and Mine Operations	Before June
2.1.3	**Vault Pit**			

2.1.3 Vault & Phaser Pits	1) The dewatering of Vault Lake was completed in 2014. During the freshet period water management consists of making sure all sumps are pumped to the Vault Attenuation Pond.	Mine Operations	May to Sept
	2) Set-up pumping from pond A & D to Vault Attenuation Pond to prevent water from flowing into the Vault pit area.	Mine Operations	May
	3) Perform required Phaser transfers into Vault attenuation pond.	E&I	May to Sept
	4) Notify Environmental Department before discharging any water to Wally Lake. **NOTE: Any discharge of contact water must be through the Diffuser.**	Engineering	Freshet/Summer 2017
	5) Inspect all piping and discharge diffuser	E&I	May
2.2 WASTE ROCK STORAGE FACILITY			
2.2.1 Portage RSF Inspection	1) Weekly inspection around the RSF perimeter to identify any seepage.	Env. Department	May - as soon as freshet starts until freeze up
	2) If seepage observed notify Eng and Env Department AND sample for CN and Water License Parameters – ST-16.	Env. Department	May - as soon as freshet starts until freeze up
2.2.2 Vault RSF Inspection	1) Weekly inspection around the RSF perimeter to identify any seepage.	Env. Department	May - as soon as freshet starts until freeze up
	2) If seepage observed notify Eng and Env Department	Env. Department	May - as soon as

		AND sample for Water License Parameters – ST-24.		freshet starts until freeze up
2.3	**NORTH CELL TAILINGS STORAGE FACILITY**			
2.3.1	**North Cell Tailings Storage Facility (Diversion Ditch areas)**			
2.3.1.1	AWAR Culvert - West Diversion ditch exit to TPL	1) Snow and/or ice must be removed with an excavator on each side of the culvert to allow water flow.	Engineering to coordinate with E&I, Mine	Before May 20
		2) If needed, steam to free any ice blockage.	Engineering to coordinate with E&I, Mine and Dikes/Dewatering	Before May 20
		3) Before starting snow clearing operation, make sure the electrical cable location has been visually identified in the field.	Engineering to coordinate with E&I, Mine	Before May 20
		4) Daily inspection - keep record under freshet file.	Env. Department	May - until Freshet complete and after rain events
		5) ST-6 sampling as per Water License and TSF weekly inspection (keep record).	Env. Department	Monthly as soon as freshet starts (open water) and continue until freeze up.

		6) Increase frequency of ST-6 sampling if TSS near 30 mg/L (grab) and 15 mg/L (monthly average), or visually elevated,. Any extra samples to external lab..	Env. Department	Depends on TSS result
		7) Have turbidity and silt barriers in place at TPL (2) and maintain.	Env. Department	May - before freshet starts and until water freezes up
		8) Report any discharge of TSS to ECCC/NWB (grab > 30 mg/L).	Env. Department	May - as soon as freshet starts and until water freezes up
2.3.1.2	West Diversion Ditch elbow near SD1	1) Snow and/or ice must be removed with an excavator to allow water flow and prevent ponding upstream.	Engineering to coordinate with E&I, Mine	Early May
		2) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
		3) Sample for TSS monthly (external Lab) and as needed for Turbidity	Env. Department	May - until Freshet complete and after rain events
2.3.1.3	Northwest corner of North Cell TSF (West Diversion ditch)	1) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events

2.3.1.4 Waste Extension Pool sumps	1) Snow removal to allow free water flow.	Engineering to coordinate with E&I, Mine Operations	Early May
	2) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
	3) Sample monthly during open water as per Water License ST-30 (WEP1) and ST-31(WEP2)	Env. Department	May - until Freshet complete and after rain events
2.3.1.5 East Diversion ditch outlet to NP-2 Lake	1) Snow and/or ice must be removed with an excavator on each side of the culvert to allow water flow.	Engineering to coordinate with E&I, Mine Operations	Early May
	2) If needed, steam to free any ice blockage.	Engineering to coordinate with E&I, Mine Operations	Before May 20
	3) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
	4) ST-5 sampling as per Water License and TSF Weekly inspection (keep record).	Env. Department	Monthly as soon as freshet starts and until water freezes up

		5) Increase frequency of ST-5 sampling if TSS near 30 mg/L (grab) and 15 mg/L (monthly average). Extra samples to external lab if necessary.	Env. Department	Depends on TSS result
		6) Install turbidity barriers in NP-2, if needed, and maintain.	Env. Department	May - before freshet starts and until freeze up or water clears
		7) Report any discharge of TSS to ECCC/NWB (if grab > 30 mg/L).	Env. Department	May - as soon as freshet starts and until water freezes up
2.3.1.6	North portion of NPAG Waste Rock Expansion	1) Daily inspection - keep record	Env. Department	May until runoff complete
		2) Sample for ST-S-XXwhen water observed; sample upstream (background) in diversion ditch for same parameters and compare results (rush analysis). If results indicate potential for impact, ie results are > background, meet with engineering and determine necessity of ditching	Env. Dept + Engineering assistance if ditches needed	May until runoff complete
		3) Prevent **contaminated** contact water from reaching NP-2.	Env. Department	May until runoff complete
2.3.1.7	East Diversion Ditch - NP2 Oulet and Vault Road culvert.	1) Snow and/or ice must be removed with an excavator on each side of the culvert and upstream at the exit of NP-2 Lake to allow water flow.	Engineering to coordinate with E&I, Mine Operations	Early May
		2) If needed, steam culvert to free any ice/snow blockage.	Engineering to coordinate with E&I, Mine Operations	Before May 20

	3) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
	4) Install turbidity barriers in NP-1, if needed, and maintain.	Env. Department	May - before freshet starts and until freeze - up
	5) Sample for TSS monthly (external lab) and as needed for Turbidity. Increase frequency of sampling if TSS near 30 mg/L (grab) and 15 mg/L (monthly average). Multi Lab for any increased sampling frequency.	Env. Department	May - until Freshet complete and after rain events
	6) Report any discharge of TSS to ECCCO/NWB (if grab > 30 mg/L).	Env. Department	May - as soon as freshet starts and until water freezes up
2.3.2 Saddle Dams			
2.3.2.1 Saddle Dam 1	1) Inspect pumping system	E&I	Early May
	2) Daily inspection - keep record	Engineering and E&I	May and until water freezes
	3) Start pumping to TSF when water observed. Keep volume pumped out.	Engineering and E&I	After May and until water freezes
	4) ST-S-2 sampling as per Water License.	Env. Department	Monthly as soon as freshet starts and until water freezes

2.3.2.2	Saddle Dam 2	1) Weekly Inspection - keep record.	Engineering	May until water freezes
		2) If water observed at the toe, notify Eng and Env departmetn	Engineering and Environment	May until water freezes
2.3.2.3	Saddle Dam 3	1) Inspect pumping system	E&I	Early May
		2) Daily inspection - keep record	Engineeringand E&I	May and until water freezes
		3) Start pumping to TSF when water observed. Keep volume pumped out.	Engineering and E&I	After May and until water freezes
		4) ST-32 sampling as per Water License.	Env. Department	Monthly as soon as freshet starts and until water freezes
2.3.2.4	Saddle Dam 4-5	5) Monthly Inspection - keep record.	Engineering	May until water freezes
2.4	**VAULT ROAD CULVERT**			
2.4	Vault road culvert from Turn Lake to Drill Trail Lake (~km 2 on Vault road)	1) Daily inspection - keep record	Env. Department	May - until Freshet complete and after rain events

		2) Install turbidity barriers, if needed (elevated TSS observed), and maintain	Env. Department	May - until freshet complete and after rain events
		3) Sample monitoring for TSS, if excess turbidity observed - use external lab.	Env. Department	May - until freshet complete and after rain events
		4) Report any discharge of TSS to Drill Tail to ECCC/NWB (if grab > 30 mg/L).	Env. Department	May - until freshet complete and after rain events
2.5	**STORMWATER MANAGEMENT POND**			
2.5	Stormwater Management Pond	1) Pump Stormwater to applicable TSF in Spring/Fall - pumped volume must be kept.	E&I	When required in Spring and/or Fall
2.6	**FUEL TANK FARMS**			
2.6.1 Meadowbank Tank Farm		1) E&I Dept to advise Env Dept in advance of intent to pump once ice melts in containment area.	E&I and Env. Department	Probably mid-June and September
		2) Sample water in accordance with Water License to ensure compliance with limits prior to release.	Env. Department	Probably mid-June and September
		3) Provide notice to Inspector 10 days prior to pumping.	Env. Department	Probably mid-June and September

	4) Advise Energy and Infrastructure Dept if pumping can begin based on sample results.	Env. Department	Probably mid-June and September
	5) Pump to tundra/ground or Stormwater Mgt Pond (note pumping to Stormwater Mgt Pond does not require compliance with limits - at Meadowbank only). **NOTE: The water cannot be pumped out to the tundra if it does not meet the Water License criteria.**	E&I	Probably mid-June and September
2.6.2 Baker Lake Tank Farms	1) E&I Dept to advise Env Dept in advance of intent to pump once ice melts in containment area.	E&I and Env. Department	Probably mid-June and September
	2) Sample water in accordance with Water License to ensure compliance with limits prior to release.	Env. Department	Probably mid-June and September
	3) Provide notice to Inspector 10 days prior to pumping.	Env. Department	Probably mid-June and September
	4) Advise Energy and Infrastructure Dept if pumping can begin based on sample results.	Env. Department	Probably mid-June and September

		5) Once approval given by Env Dept, E&I Dept can pump to tundra but must avoid erosion during pumping, ie., low flow, the volume must also be determined by E&I Dept personnel. **NOTE: The water cannot be pumped out to the tundra if it does not meet the Water License criteria. Any wastewater unsuitable for discharge will be transported back to Meadowbank for disposal in the TSF or shipped south for disposal.**	E&I Dept Env Department	Probably mid-June and September
2.7	**AWAR CULVERTS ON THE BAKER LAKE PORTION**			
2.7	AWAR Culverts on the Baker Lake Portion	1) Weekly inspection of culverts along AWAR to Baker Lake.	Env. Department	May 2017
		1) Sample for TSS and Turbidity if elevated TSS observed.	Env. Department	May - until freeze up
		2) Notify E&I Dept if severe erosion/scouring observed - for repair action.	Env. Department	May - until freeze up
		3) Install turbidity barriers if required.	Env. Department	May - until freeze up
3.0	**INCIDENT RESPONSE**			
3.1	**ST-16 Seepage**			
3.1	ST-16 Seepage	1) Check Piping from pump to discharge area at North Cell TSF.	Engineering and E&I	Early May

	2) If the snow accumulation is judged to be too great, then snow must be removed.	Engineering to coordinate with E&I, Mine operations	Early May
	3) Daily inspection - keep record.	Env. Dept, Engineering and E&I	May - as soon as freshet starts until freeze up
	4) Notify Eng. Dept and E&I when water present and pumping can start. **Water level to be maintained, as a minimum, below the till plug elevation. Water should not pond against the Till plug for extended time periods - ie < 2 - 3 hours. For emergencies the mine water trucks can be requested. Start pumping.**	Env. Department	May/early June - as soon as free water present and ice has melted until freeze up
	5) Water sampling program starts when water present in accordance with attached Schedule 1.	Env. Department	May/early June - as soon as water present until freeze up
	6) Any seepage through rockfill road to NP-2 must immediately be reported to Env Dept and authorities.	Env. Dept, Engineering and E&I	May/early June - as soon as water is present until freeze up
	7) Thermistor Monitoring.	Env. Department	Ongoing throughout the year
	8) Submit progress/update report to regulators.	Env. Department	Annual Report 2016
3.2	**Mill Seepage**		

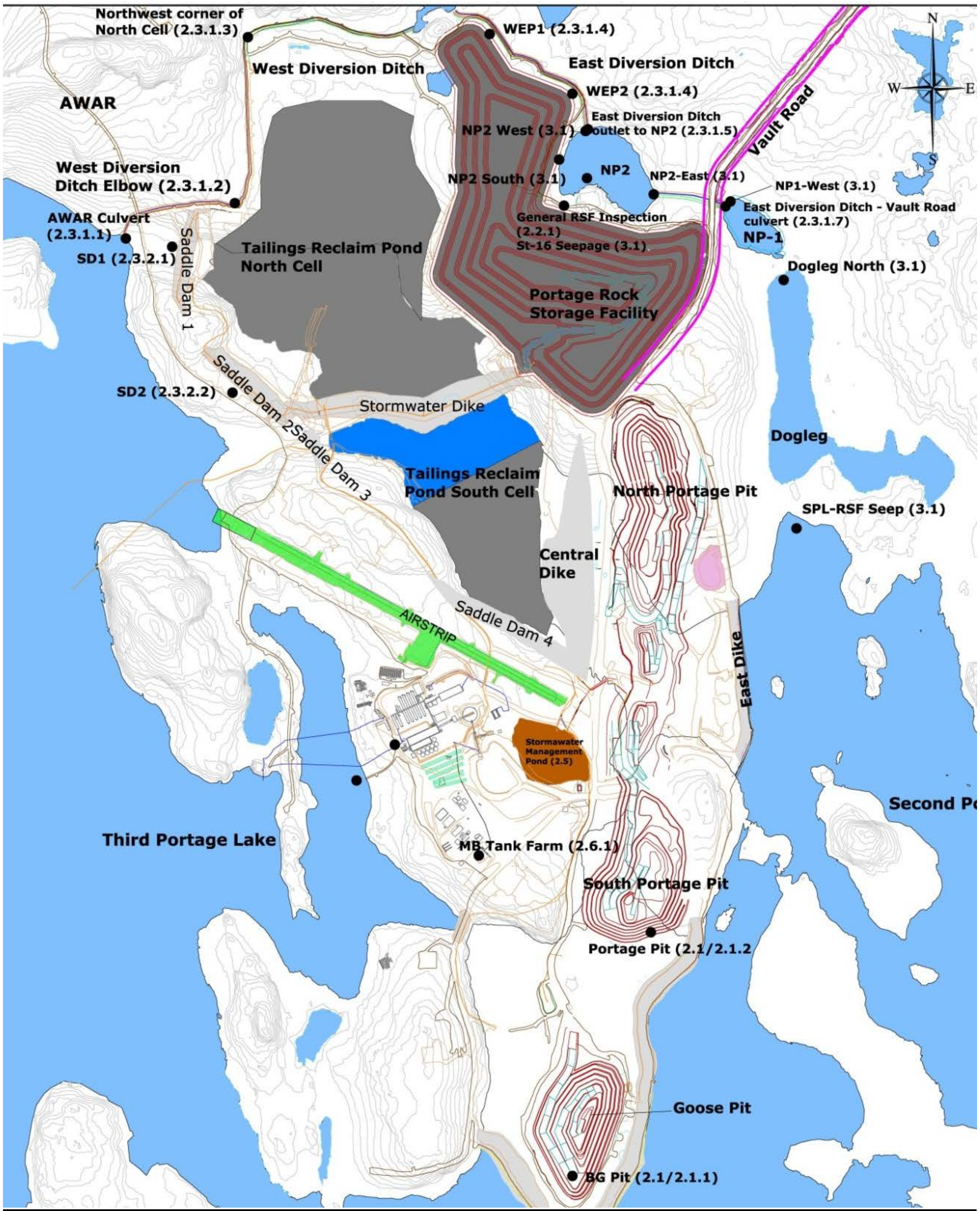
3.2	Mill Seepage	1) Pump water from the trench to the mill - volumes documented.	Env. Dept with assistance from E&I	Start May/early June when water present until freeze-up
		2) Daily inspection of pumping, collection systems, bermed areas and perimeter area – keep record. **For emergencies the mine water trucks can be requested.**	Env. Department	Start May/early June when water present until freeze-up
		3) Monitoring Program – in accordance with attached Schedule 2, commences when water present and ice has melted.	Env. Department	May/early June as soon as water present until water freeze
3.3	Central Dike Seepage	1) Pump water to the South Cell TSF - volumes documented.	Engineering	All year round
		2) Daily inspection of pumping, collection systems, bermed areas and perimeter area – keep record.	Engineering	All year round

	3) Monitoring Program – in accordance with attached Schedule 3, commences when water present and ice has melted.	Env. Department	All year round

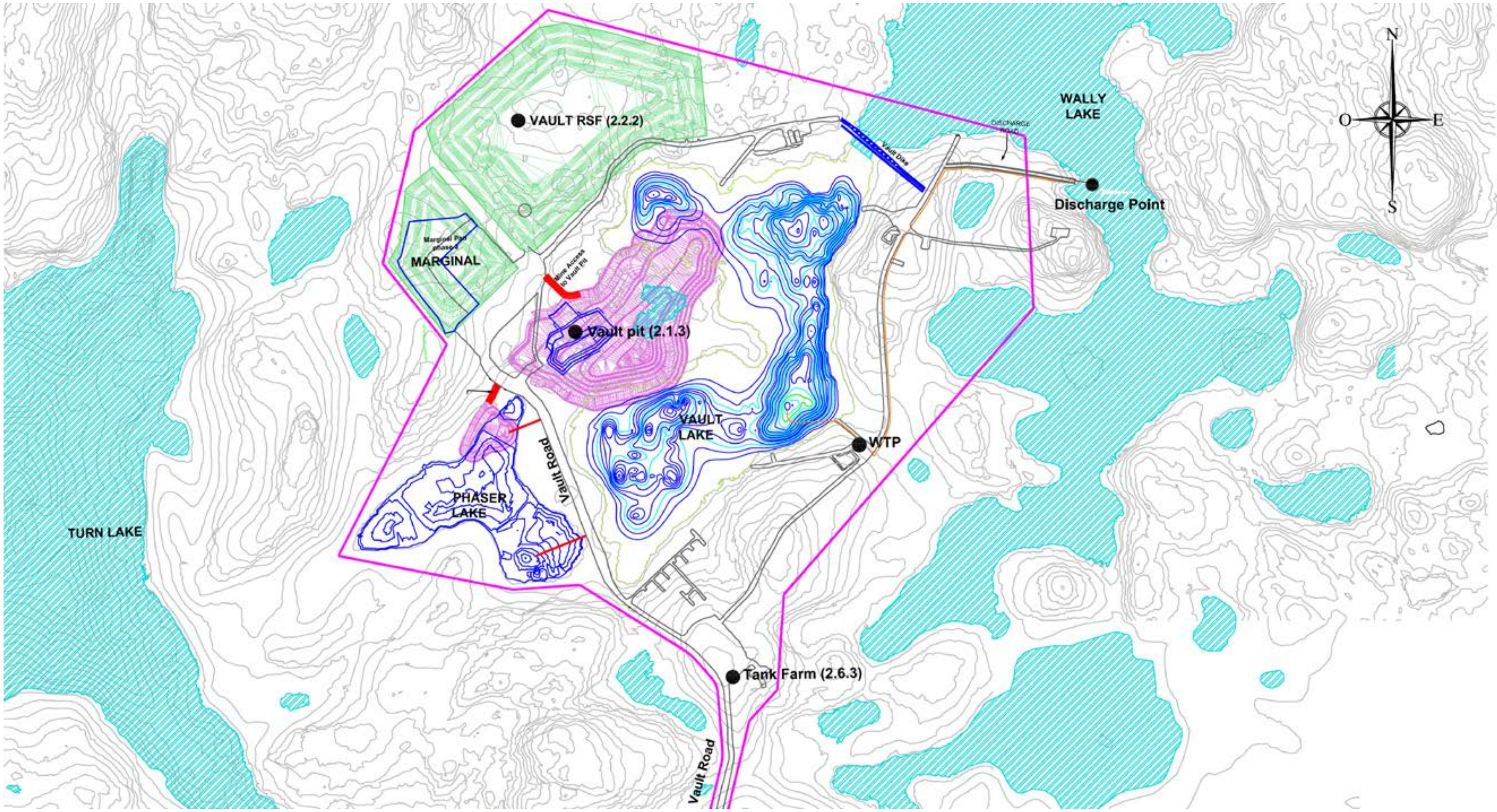
APPENDIX 2

2017 Monitoring Locations and Areas of Concern for the Freshet Action and Incident Response Plan

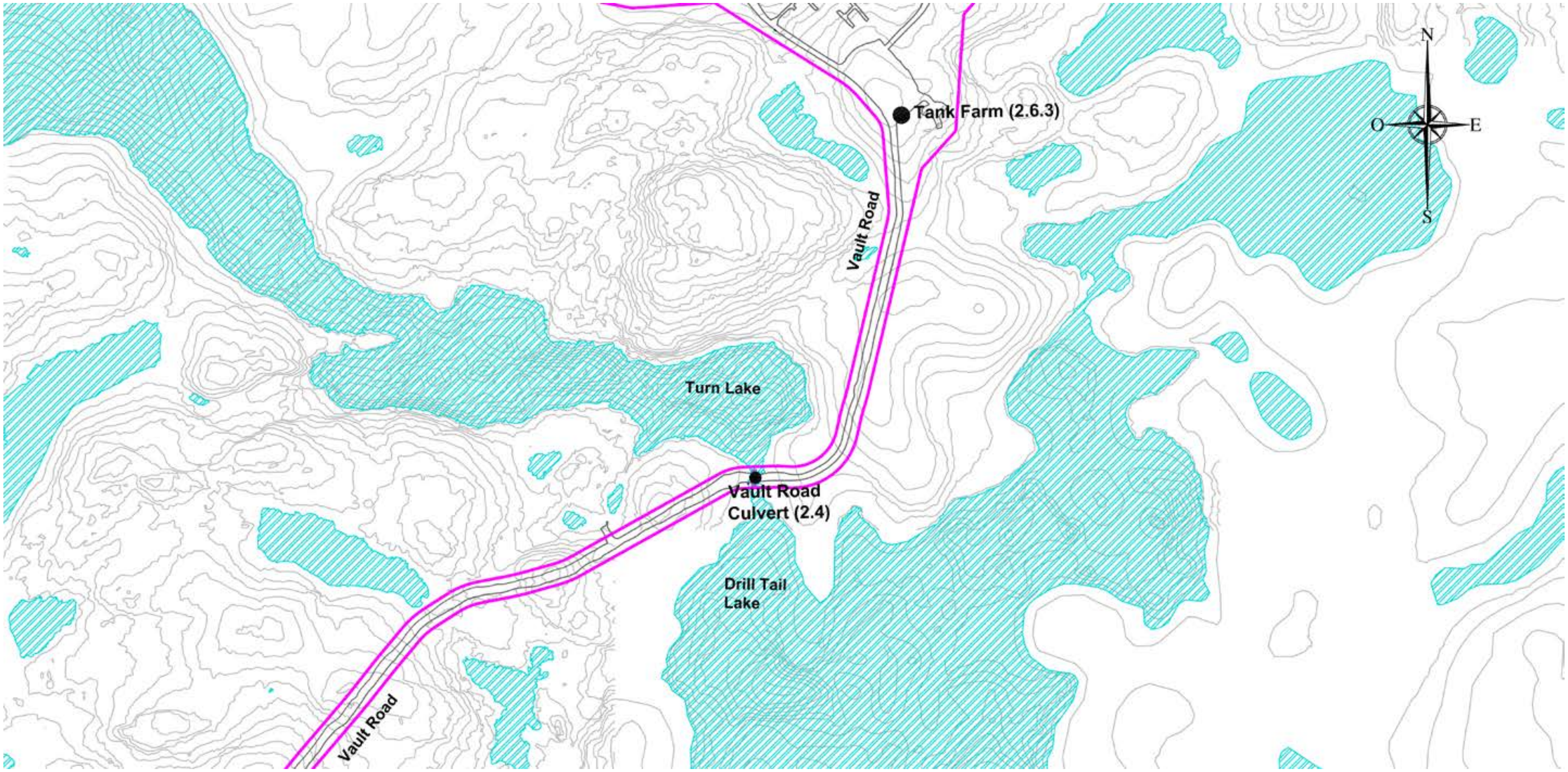
Meadowbank Areas of Concern and Monitoring Locations



Vault areas of concern



Vault Road areas of concern



SCHEDULE 1

ST-16 Seepage Monitoring Program

ST-16 Seepage Monitoring Program (May/early June - as soon as water present until freeze up)			
Parameters	**Laboratory**	**Station**	**Frequency**
pH, Conductivity, Temperature, Turbidity, Colour, Hardness, Bromide,, Fluoride, Thiosulphate, Thiocyanate, Alkalinity, Bicarbonate Alkalinity, Carbonate Alkalinity, Ammonia-nitrogen, Total Ammonia, Nitrite, Nitrate, Reactive silica, TDS, Chloride, Sulfate, Ortho-Phosphate, DOC, TOC, TSS, Dissolved Oxygen (DO), Total Kjeldahl Nitrogen (TKN), Ca, Na, K, Dissolved and total metal: Al, Sb, As, B, Ba, Be, Cd, Cu, Cr, Co, Fe, Li, Mn, Mg, Hg, Mo, Ni, Pb, Se, Ag, Sn, Sr, Te, Ti, Tl, U, V, Zn, and Chlorophyll A (Lake site), CN tot / CN Wad, Total Phosphorus	External Lab	ST-16 NP-2 South NP-2 West NP-2 East NP-1 Dogleg SPL	Monthly during open water
		NP2 Winter	Monthly during winter
CN Free	External Lab	ST-16 NP-2 South NP-2 West NP-2 East NP-1 Dogleg SPL	Monthly during open water
		NP2 Winter	Monthly during water
CN Wad	Assay Lab	ST-16 NP-2 South	2x/week initially and 1x/week after 1 month
CN Total, CN Free, CN Wad, Copper, Ni	External Lab	ST-16 NP-2 South NP-2 West	Only in July - once a week

SCHEDULE 2

Mill Seepage Monitoring Program

Mill Seepage Monitoring Program (May/early June - as soon as water present until freeze up)			
Parameters	**Laboratory**	**Station**	**Frequency**
CN Total CN Free Cu Fe	External Lab	Original Sump MW 4-5-6-	Monthly
pH, Conductivity, Temperature, Turbidity, Colour, Hardness, Bromide,, Fluoride, Thiosulphate, Thiocyanate, Alkalinity, Bicarbonate Alkalinity, Carbonate Alkalinity, Ammonia-nitrogen, Total Ammonia, Nitrite, Nitrate, Reactive silica, TDS, Chloride, Sulfate, Ortho-Phosphate, DOC, TOC, TSS, Dissolved Oxygen (DO), Total Kjeldahl Nitrogen (TKN), Ca, Na, K, Dissolved and total metal: Al, Sb, As, B, Ba, Be, Cd, Cu, Cr, Co, Fe, Li, Mn, Mg, Hg, Mo, Ni, Pb, Se, Ag, Sn, Sr, Te, Ti, Tl, U, V, Zn, and Chlorophyll A (Lake site), CN tot / CN Wad, Total Phosphorus, CN Free	External Lab	TPL-Assay	Monthly
Total and Dissolved metals: Al, Sb, As, B, Ba, Be, Cd, Cu, Cr, Fe, Li, Mn, Hg, Mo, Ni, Pb, Se, Sn, Sr, Ti, Tl, U, V, Z Nutrients: Ammonia-nitrogen, total kjeldahl nitrogen, nitrate nitrogen, nitrite-nitrogen, ortho-phosphate, total phosphorous, total organic carbon, total dissolved organic carbon and reactive silica; Conventional Parameters: bicarbonate alkalinity, chloride, carbonate alkalinity, conductivity, hardness, calcium, potassium, magnesium, sodium, sulphate, pH (by env dept), conductivity (by env dept), total alkalinity, TDS, total cyanide, CN Free, TSS, and turbidity (by env dept)	External Lab	Trench MW-7 MW-8	Monthly
CN Wad	Assay Lab	Trench Original sump MW 2-3-7-8-201-202-203	1x/week
CN Total, CN Free, CN Wad, Copper, Ni	External Lab	Trench	Only in July - once a week

SCHEDULE 3

Central Dike Seepage Monitoring Program

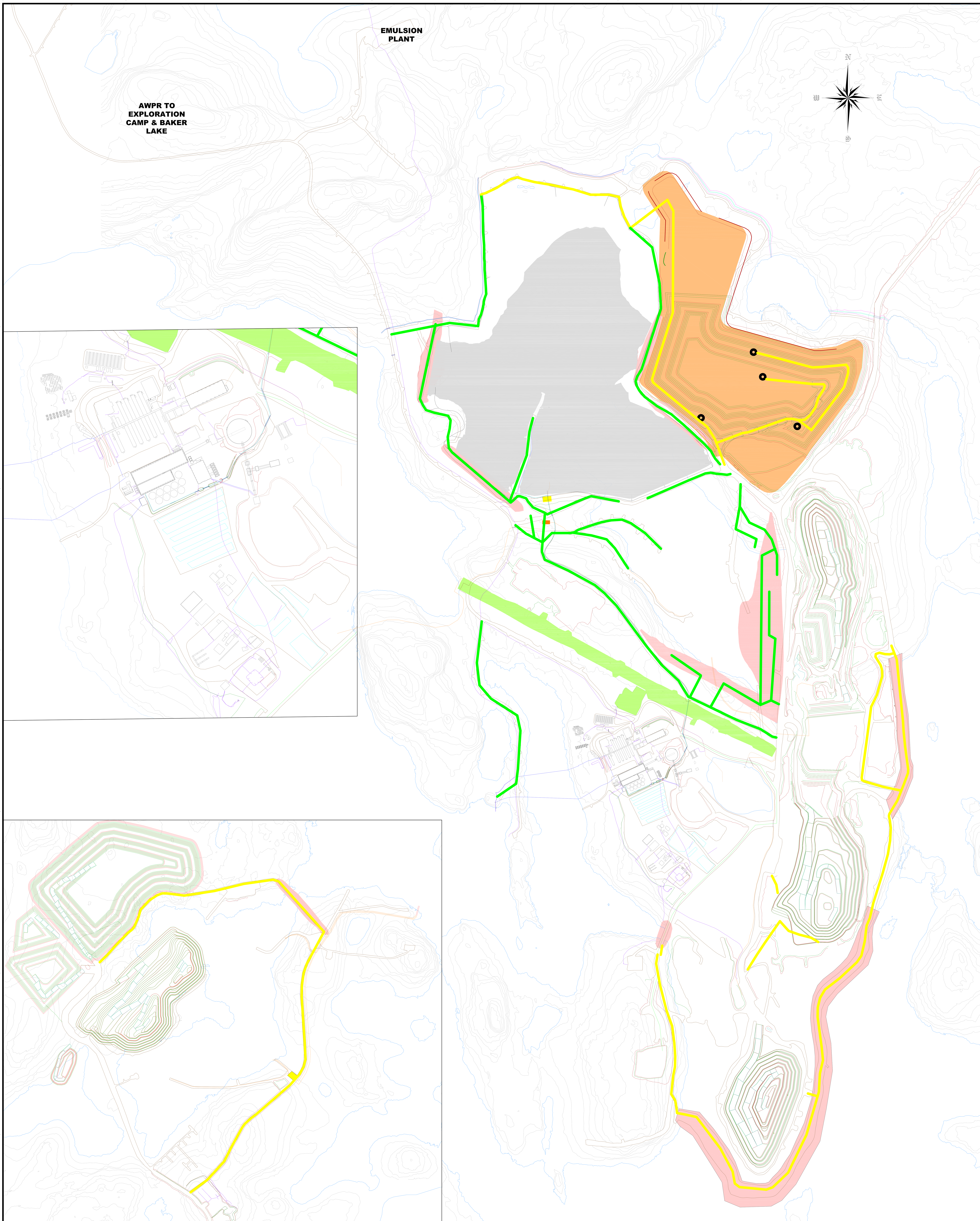
Central Dike Monitoring Program (May/early June - as soon as water present until freeze up)			
Parameters	**Laboratory**	**Station**	**Frequency**
Turbidity	On field	ST-S-5	Every second day
pH, Turbidity, Alkalinity, Hardness, TDS, TSS, Chloride, Fluoride, Sulphate, Ammonia (NH_3), Ammonia nitrogen (NH_3-NH_4), Nitrate, Nitrite, Cyanide, Total cyanide, Cyanide WAD, Cyanide Free, Total Metals: Aluminium, Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Manganese,Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Zinc, Dissolved Metals: Aluminum, Silver, Arsenic, Cadmium, Chromium, Copper, Iron, Manganese, Mercury, Molybdenum, Nickel, Lead, Selenium, Thallium, Zinc	External Lab	ST-S-5	Monthly

APPENDIX 3

2017 Snow management

DRAWING NO.

FORMAT ANSI E-PORTRAIT



GENERAL NOTES

TITLE	# DWG	REV	DESCRIPTION	DATE	BY

REFERENCE DRAWINGS | REVISIONS

AGNICO EAGLE MEADOWBANK

DRAWN BY	P.GAGNON	DATE	07/08/2014
CHECKED BY			
APPROVED BY			
PROJECT NO.			
DATE			

TITLE
AGNICO–EAGLE – MEADOWBANK DIVISION

SITE MAP UPDATED Q4 2013

SCALE	N.T.S.	FILE	.DWG
DRAWING NO.		REVISION	SHEET 1 / 1

FILE NO. .DWG

P:\Engineering\05-Geotechnic\05-WaterManagement\Snow Removal\Snow Plowing Map for 2016_UPDATE.dwg, 04 Nov 2016

APPENDIX E – 2015 AMMONIA MANAGEMENT PLAN

MEADOWBANK GOLD MINE

AMMONIA MANAGEMENT PLAN

MARCH 2015

EXECUTIVE SUMMARY

AEM is committed to continue the sample monitoring program, which includes monitoring for Ammonia in all mine pit sumps, seeps, etc., in accordance with the site Water License, implement a comprehensive, regular inspection program related to explosives management within the mine pits, conduct regular inspections at the explosives manufacturing facility (Dyno Nobel) to ensure all explosive products are stored in locked, sealed containers prior to use and continue to perform continuous review of analysis results such that mitigation measures can be implemented when increasing trends of ammonia are determined. It is important to note that AEM has not exceeded any ammonia discharge criteria (Water License or MMER) to date.

This technical note provides guidance for monitoring ammonia levels at the mine site, as part of the conditions applying to waste disposal and management listed in the water license (NWB 2008) for this water quality parameter.

DOCUMENT CONTROL

Revision				Pages Revised	Remarks
#	Prep.	Rev.	Date		
00	SNC		February 2013	All	
01	AEM	1	March 2015	13	Table 1 update
				16	Add section 6

Prepared By: ______________________________

Environmental Department

Approved by:

____

Environmental Department

TABLE OF CONTENTS

List of Appendix

1 INTRODUCTION

The previous version of the Water Management Plan (WMP) for the Mine was presented in 2009 (Doc. 833), updating the first edition of the WMP, support document (Doc. 500) to the Type-A Water License Application for the Mine. The WMP was then updated in 2011 (Doc. 1270). This technical note was produced as an appendix to the 2012 WMP update and covers the ammonia management plan for the mine site. The Ammonia Management Plan is being updated at this time in response to concerns raised during the Water License renewal process (January, 2015 - NWB Technical Meetings – Baker Lake). These concerns were in regard to ammonia loading to mining infrastructure, i.e., the Tailings Storage Facility (TSF) from cyanidation, the use and management of exposives and sewage management. In addition, there was a request for loading calculations of ammonia to the receiving environment. It should be noted that there is no further discharge of mine contact water to Third Portage Lake from the Portage Attenuation Pond. The onsite CREMP program takes into account the overall ammonia levels in Third Portage Lake and to date AEM has not reached any level of concern (no trigger levels have been reached for ammonia).

As a result of these concerns AEM is committed to continue the sample monitoring program, which includes monitoring for Ammonia in all mine pit sumps, seeps, etc., in accordance with the site Water License, implement a comprehensive, regular inspection program related to explosives management within the mine pits, conduct regular inspections at the explosives manufacturing facility (Dyno Nobel) to ensure all explosive products are stored in locked, sealed containers prior to use and continue to perform continuous review of analysis results such that mitigation measures can be implemented when increasing trends of ammonia are determined. It is important to note that AEM has not exceeded any ammonia discharge criteria (Water License or MMER) to date.

This technical note provides guidance for monitoring ammonia levels at the mine site, as part of the conditions applying to waste disposal and management listed in the water license (NWB 2008) for this water quality parameter.

Ammonia is a naturally occurring nitrogen compound found in the environment. However, there are two sources at the mine site that can contribute to the mobilization of ammonia in the groundwater or surface runoff:

1. Blasting of ammonium-nitrate (AN) explosives is typically the primary source of ammonia in areas of mining operations. AN readily absorbs water and dissolves easily, thereby mobilizing ammonia in either groundwater or surface runoff.

2. In gold mine operations using a cyanidation process to extract the gold from the ore, the cyanide in solution is oxidized to cyanate (CNO^-) using a sulfur dioxide (SO_2) air process before discharge to the Tailings Storage Facility. The cyanate can then hydrolyze to ammonia in the Tailings Storage Facility reclaim pond.

Ammonia dissolved in water exists in equilibrium of interchanging un-ionized (NH_3) and ionized (NH_4^+) forms. The equilibrium is influenced by pH, temperature, and ionic strength (salinity) where the amount of un-ionized ammonia is favoured as the pH becomes more basic or as the water temperature or salinity increases. Un-ionized ammonia can readily pass across the gill surface and enter into the bloodstream of fish, while ionized ammonia passes with greater difficulty. Once inside the fish, both forms of ammonia can cause toxic effects (CCME, 2010). Furthermore, it should be noted that ammonia oxidizes to nitrite (NO_2) and nitrate (NO_3), the former being particularly toxic to fish and humans. Both nitrite and nitrate are regulated by the CMME for the Protection of Aquatic Life.

This ammonia management plan (AMP) proposes monitoring of blasting practices for the assessment of explosive quantity used and blast performance, and monitoring of water quality to determine ammonia levels in waters within the mine site. The monitoring results can be used to review and adjust blasting practices or water management if ammonia levels need to be reduced.

In addition to ammonia, monitoring of nitrate and nitrite is also considered in the AMP, as both water quality parameters are signature compounds of AN explosives. NO_3 is listed with a discharge level threshold in the conditions applying to waste disposal and management in the water license (NWB 2008).

2 EXPLOSIVE MANAGEMENT AND BLASTING PRACTICES

2.1 SITE DESCRIPTION

2.1.1 Explosive Storage

Storage of explosive products will be located at the mine site emulsion plant area. The explosive products arrive by barge at the Baker Lake marshalling area. They are then transported by ground to the emulsion plant located at the Meadowbank mine site.

The emulsion plant area is located approximately four kilometers north of the mine plant and camp site, and is accessible from the All Weather Access Road (AWAR). This area consists of an emulsion plant for the preparation of bulk emulsion explosives, two buildings for the storage of AN, and four explosive magazines along the access road to the plant.

Explosive products at the storage facilities are packed in sea containers, which limit the possibility of spillage. The products are only removed from these containers prior to use at the mine site emulsion plant area. Surface areas are graded to collect water runoff within the storage facilities.

2.1.2 Roads

The AWAR is a restricted access road constructed and operated by AEM for ground transportation between the Meadowbank mine site and Baker Lake. This road is used to transport explosive products from the Baker Lake site facilities to the emulsion plant area at the mine site. In preparation for blasting operations, explosive products are transported from the emulsion plant area to the appropriate blasting locations via local site roads and the Vault Haul Road.

Spillage control protocols, procedures and handling of spilled material, and explosive management for both storage and transport have been established by Dyno Nobel Inc. (Dyno) and are provided in Appendix 2. Explosive products and spills on the AWAR are also referenced in the Meadowbank Spill Contingency Plan.

2.1.3 Pits

The development sequence of the mine site is provided in Section 3 of the 2014 Mine Waste Rock and Tailings Management Plan. Explosives are used for the excavation of waste rock and mining of the ore at the Portage, Goose and Vault pits.

2.2 AMMONIA PATHWAYS

Ammonia not fully detonated within the in-pit blasting operations mobilizes through several pathways on the mine site. Water from drainage runoff is the primary mechanism of mobilization for ammonia residuals remaining within the pits. This water is collected at pit sumps and then has been pumped to the Portage Attenuation Pond, which became the South Cell TSF Reclaim Pond on November 2014. Blasting residuals are also expected to be attached to waste rock and ore materials, which are transported from the open pits to their respective storage and processing facilities. Residuals from waste rock may be washed off by precipitation and be ultimately conveyed to the South Cell TSF (former Attenuation Pond), or the Vault Attenuation Pond. Residuals from the ore may be carried in the tailings to the Tailings Storage Facility. All of these pathways (mine sumps, Vault Attenuation, South Cell TSF are monitored in accordance with the Water License).

2.3 EXPLOSIVES AND BLASTING

Based on experience at other open pit mines in the Canadian Arctic, the largest potential source of ammonia in mine water will be from explosive residue from blasting. Depending on the wetness of the site, water may leach explosives from blastholes prior to the blast. Other forms of ammonia released from AN are explosives flowing into cracks and fissures in the rock and not detonating, or leading to an incomplete detonation of the explosive column and misfired blastholes. An AN based emulsion is used as a blasting agent at the Meadowbank site. This material is designed to repel water thus minimizing the potential for ammonia to impact mine water.

Blasting operations on site include monitoring of explosive quantities and blast design, procedures and practices. Combined with water monitoring, the compilation of these data is used to assess blasting performance. The results of this assessment are used to adjust blasting practices as needed to:

a) Optimize the use of explosives; and

b) Increase the completion and efficiency of explosive detonations.

Any modifications to blast design are intended to decrease the amount of ammonia that may become available for mobilization in mine water.

This section summarizes the explosive products and blasting design parameters, procedures and practices employed at Meadowbank. Associated monitoring is also discussed.

2.3.1 Explosive Products

Explosive products used at the mine site include bulk explosives (bulk emulsion), packaged explosives, cast boosters, detonating cords, non-electric delay detonators and non-electric lead lines. The material safety data sheets (MSDS) for these products are provided in Appendix 4. Of these products, the greatest potential for water contamination comes from the bulk explosives. Presently, Meadowbank uses emulsion as the primary bulk explosive for its blasting operations.

Bulk emulsions typically contain some or all of the following components:

- Ammonium, sodium and/or calcium nitrate;
- Fuel and/or mineral oil;
- Methylamine nitrate;
- Emulsifiers; and
- Ethylene glycol.

Although bulk emulsions are water resistant, contaminants can be leached from the product if it is left in contact with standing or flowing water for extended periods of time. The performance of the explosive, and hence the potential for post-blast contaminations, deteriorates with the length of time that the emulsion remains in the blasthole after it has been loaded (i.e., sleep time). Blast procedures currently in use are designed to minimize sleep time so that standing or flowing water is not in contact with the bulk emulsion for extended periods of time.

2.3.2 Procedures and Practices

Quality control procedures are in place to verify AN content in bulk explosives. Quality control procedures for the emulsion occur at the plant and density tests are done at the blast site (on the trucks). Loading procedures specify that blastholes be loaded with emulsion from the bottom of the blastholes to provide a continuous explosive column. Details on the explosive quality control and loading procedures have been established by Dyno and are provided in Appendix 2.

The primary factors that may reduce the amount of ammonia available for mobilization in mine water are:

- Explosives handling
- Completeness of detonation

Bulk emulsion spillage during blasthole loading could (as bulk emulsion is resistant to water) be a source of ammonia that could be carried by water collected in the pits. Spillage control protocols, procedures and handling of spilled material, and explosive management for storage and transport, as well as the emergency response plan, have been established by Dyno and are provided in Appendix 2 and 3.

Incomplete detonation results in higher ammonia residue on the blasted rock. Evidence of incomplete detonation is often observed as an orange fume after a blast and sometimes an orange pigment on the blasted rock. Explosives that have failed to detonate may be observed in the muckpile. Muckpiles are routinely inspected by Meadowbank staff for signs of incomplete detonation.

2.4 MONITORING

Monitoring of explosive handling and blasting is as follows:

a) Explosive quantities: Records of explosive quantities used for in-pit blasting are kept for each blasting event and will be conserved throughout the mine life. Furthermore, a record of blast location (i.e., pit and elevation), blast date, and bulk explosive type and name used (emulsion, with the corresponding ratio of AN over emulsion) is kept for all events.

b) Design parameters: Blast design parameters, as well as changes in the blast design parameters from the standard are recorded and dated.

c) Loading instructions: Loading instruction forms are completed for each blast event and provide a record of the as-loaded parameters for all blastholes in the blast pattern including:
    - Hole depth
    - Collar height
    - Priming (single or double)

- Other observations made by the blast crew (e.g., wetness of holes, use of liners, collapsing holes or difficulty loading)

d) Video footage: Videos are taken of each blast. This practice provides a visual, qualitative record of the results of each blast and provides insight into potential problems such as incomplete detonation (e.g. orange fumes) and misfires, as well as areas of poor muckpile heave and forward movement.

e) Blast audits: Blast audits are conducted on a monthly basis to ensure that best practices are being followed in the field (audits may be adjusted to a lesser frequency if low ammonia levels are consistently observed, or conversely may be adjusted to a higher frequency if high ammonia levels are consistently observed).

An additional monitoring technique commonly used is the measurement of the Velocity of Detonation (VOD), which has been shown to be directly related to the volumetric fraction of the explosive that has been consumed. This technique will be implemented if poor or incomplete detonation is consistently suspected.

3 MILL EFFLUENT

3.1 SITE DESCRIPTION

The mill effluent consists of tailings produced at the mill that is pumped as slurry and deposited in the Tailings Storage Facility (TSF) where the tailings particles are allowed to settle and consolidate. The reclaim water is pumped back to the mill for re-use. Prior to discharge of the mill effluent to the TSF, the effluent is sent to the cyanide destruction process. The cyanide destruction process at Meadowbank uses the sulfur dioxide (SO_2) and air process to oxidize weak acid dissociable cyanide (CN-WAD) to a less toxic form: cyanate (CNO^-) based on the following reactions:

$$SO_2 + O_2 + H_2O + \text{CN-WAD} \rightarrow CNO^- + H_2SO_4$$

The process can also use sodium metabisulfite ($Na_2S_2O_5$) instead of sulfur dioxide in case there are operating issues with the dosing of sulfur dioxide gas in the process. This ensures that chemicals required for the cyanide destruction process (either SO_2 or $Na_2S_2O_5$) are always available.

3.2 AMMONIA PATHWAY

Cyanate produced from the oxidation of CN-WAD can readily hydrolyze to ammonia (NH_3) and carbon dioxide (CO_2) based on the following reaction:

$$CNO^- + H^+ + H_2O \rightarrow NH_3 + CO_2$$

Thus, the mill effluent provides an ammonia loading to the TSF reclaim water.

During the operation of the TSF, the reclaim water will be pumped to the mill for re-use in a closed loop system. Consequently, there will be no discharge of reclaim water to the environment during this period. Furthermore, it is expected that the ammonia concentration will gradually increase in the TSF reclaim pond over time, even though (1) there may be some slight attenuation of ammonia due to microbial/algae activity in the summer and (2) ammonia may oxidize to nitrite and nitrate, particularly near the top of the pond where oxygen is most present.

The Water Quality Forecasting – Update based on the 2014 Water Management Plan Report (SNC, 625618-0000-40ER-0001) provides a forecast of the concentration for ammonia in the TSF reclaim pond during the life of the mine. Furthermore, the report provides a forecast of the ammonia concentration in the Portage and Goose Island Pit once flooding activities has started.

3.3 MONITORING

Concentrations of ammonia, nitrate and nitrite are parameters that are monitored on a monthly basis as part of this sampling campaign of the TSF reclaim water at station ST-21.

In the Water Quality Forecasting – Update based on the 2014 Water Management Plan Report (SNC, 625618-0000-40ER-0001), a maximum ammonia concentration in the TSF reclaim water is evaluated in order to meet the CCME guidelines for the Protection of Aquatic Life in the Portage and Goose Island Pits once flooding activities are completed. If this concentration is exceeded before the end of the flooding operation, measures could be undertaken to lower the ammonia concentration, as well as nitrate and nitrite if required, in the TSF reclaim pond prior to the transfer of TSF reclaim water to the pits.

Ammonia treatment technologies that could be further investigated, if the need arises, include:

i) Biological nitrification / denitrification during the summer months.

ii) In-situ volatilization of ammonia during the summer months.

iii) Ammonia removal by snow making.

4 WATER MANAGEMENT

Water quantity and quality monitoring assist in the monitoring of ammonia loadings from explosive residuals, as well as ammonia concentration found in the Tailings Storage Facility reclaim pond. The Meadowbank water quality and flow monitoring plan (AEM 2015) and water license (NWB 2008) includes monitoring stations that are used for the monitoring of ammonia loadings. The stations that specifically monitor for ammonia are listed in Table 1 and are shown in the Figures in Appendix 1.

Table 1 Water Monitoring Station Included under the Meadowbank Water License

Station	Description	Phase	Parameters	Frequency
ST-9	Portage Attenuation Pond prior to discharge through Third Portage Lake Outfall Diffuser	Early operation	Ammonia, nitrite, nitrate	Prior to discharge and Weekly during discharge
			Water Volume	Daily during periods of discharge
ST-10	Vault Attenuation Pond prior to discharge through Wally Lake Outfall Diffuser	Late operation	Ammonia, nitrite, nitrate	Prior to discharge and Weekly during discharge
			Water Volume	Daily during periods of discharge
ST-16	Portage Rock Storage Facility	Late operation	Ammonia	Monthly during open water
		Closure	Ammonia, nitrite, nitrate	Bi-annually during open water
ST-17	North Portage Pit Sump	Operation	Ammonia	Monthly during open water
			Nitrite, nitrate	Bi-annually during open water
			Water Volume	Daily during periods of discharge
	Portage Pit Lake	Late operation	Ammonia, nitrite, nitrate	Monthly during open water
		Closure	Ammonia, nitrite, nitrate	Bi-annually during open water
ST-19	South Portage Pit Sump	Early operations	Ammonia	Monthly during open water
			Nitrite, nitrate	Bi-annually during open water
			Water Volume	Daily during periods of discharge
	Third Portage Pit Lake	Late operations	Ammonia, nitrite, nitrate	Monthly during open water
ST-20	Goose Island Pit Sump	Early operations	Ammonia	Monthly during open water
			Nitrite, nitrate	Bi-annually during open water
			Water Volume	Daily during periods of discharge

	Goose Island Pit Lake	Late operations	Ammonia, nitrite, nitrate	Monthly during open water
		Closure	Ammonia, nitrite, nitrate	Bi-annually during open water
ST-21	Tailings Reclaim Pond	Early (North Cell) and late (South Cell) operation	Ammonia, nitrite, nitrate	Monthly during open water
ST-23	Vault Pit Sump	Late operations	Ammonia	Monthly during open water
			Nitrite, nitrate	Bi-annually during open water
			Water Volume	Daily during periods of discharge
ST-24	Vault Rock Storage Facility	Late operation	Ammonia	Monthly during open water
			Nitrite, nitrate	Bi-annually during open water
		Closure	Ammonia, nitrite, nitrate	Monthly during open water
ST-25	Vault Attenuation Pond	Late operation	Ammonia	Monthly during open water
			Nitrite, nitrate	Bi-annually during open water

In addition to the monitoring listed in Table 1, the following actions are undertaken as part of the AMP:

- If runoff or seepage is detected at the rock storage facility, water samples collected at the Portage or Vault Rock Storage Facility during late operation will also be analyzed for nitrate and nitrite to complete the suite of signature compounds found in explosive residuals.
- Tailings slurry volumes and density from the mill pumping facility to the TSF are recorded on a monthly basis.
- The records of water volumes pumped from the Portage Pit sumps include the destination: South Cell TSF (former Attenuation Pond).
- The records of water volumes pumped from the Portage or Vault Attenuation Pond will include the destination: Third Portage Lake, Wally Lake or other future destination.

Sampling frequency at the pit sump will also be increased if high variability is identified in observed constituent concentrations as a result of the blasting schedule.

5 REPORTING

Reporting of ammonia concentrations at the sampling stations listed in Table 1 is included as part of the requirement of the water license (NWB 2008). The reporting frequency is provided in AEM (2009b), and includes:

- Brief monthly reports of the compiled water quality monitoring results, sent to the Nunavut Water Board (NWB), the AANDC Water License Inspector and to the Kivalliq Inuit Association (KIA); and
- An annual report submitted to the NWB, KIA, Aboriginal Affairs and Northern Development Canada, Nunavut Impact Review Board, Government of Nunavut, and other interested parties. This report summarizes monitoring results for each sampling station, annual seep water chemistry results, annual groundwater monitoring results, receiving water monitoring results, spills and any accidental releases, measured flow volumes, effluent volumes and loadings, and results of QA/QC analytical data.

Mine operation personnel reviews on a monthly basis the data gathered from the sampling stations in Table 1 and from the monitoring action proposed under the AMP. If the data indicates that further studies and/or significant changes to the water management infrastructure are required to assess or control ammonia concentrations, AEM will notify the Nunavut Water Board as early as practical. Results of these further studies and/or changes to the AMP monitoring actions will be transmitted to the Nunavut Water Board for review.

6 INSPECTION

On a weekly basis, the environment department will conduct inspection in the blasting area to ensure that the Dyno Nobel loading procedures are being implemented (this will minimize blasting residues). In addition inspections will be undertaken at explosive product storage facilities (Dyno Nobel) to ensure that explosives products are stored in sealed containers and there is no spillage. If any non-conformities are observed follow up action will be undertaken andcorrective measure will be put in place. See Appendix 5 for copy of the AMP inspection form.

7 REVIEW OF AMMONIA MANAGEMENT PLAN

Review of the results of the site water quality and AMP monitoring during the year may provide new information, and/or indications that changes to the AMP are necessary. When revisions are warranted, an updated AMP will be submitted to the Nunavut Water Board for review.

8 REFERENCES

AEM (2015), Meadowbank water quality and flow monitoring plan. January 2015.

CCME (2010), Canadian Water Quality Guidelines for the Protection of Aquatic Life, Ammonia.

Golder (2009). Updated Water Management Plan. Agnico-Eagle Mines. July 2009

Golder (2011), Updated Water Management Plan, Agnico-Eagle Mines, July 2011

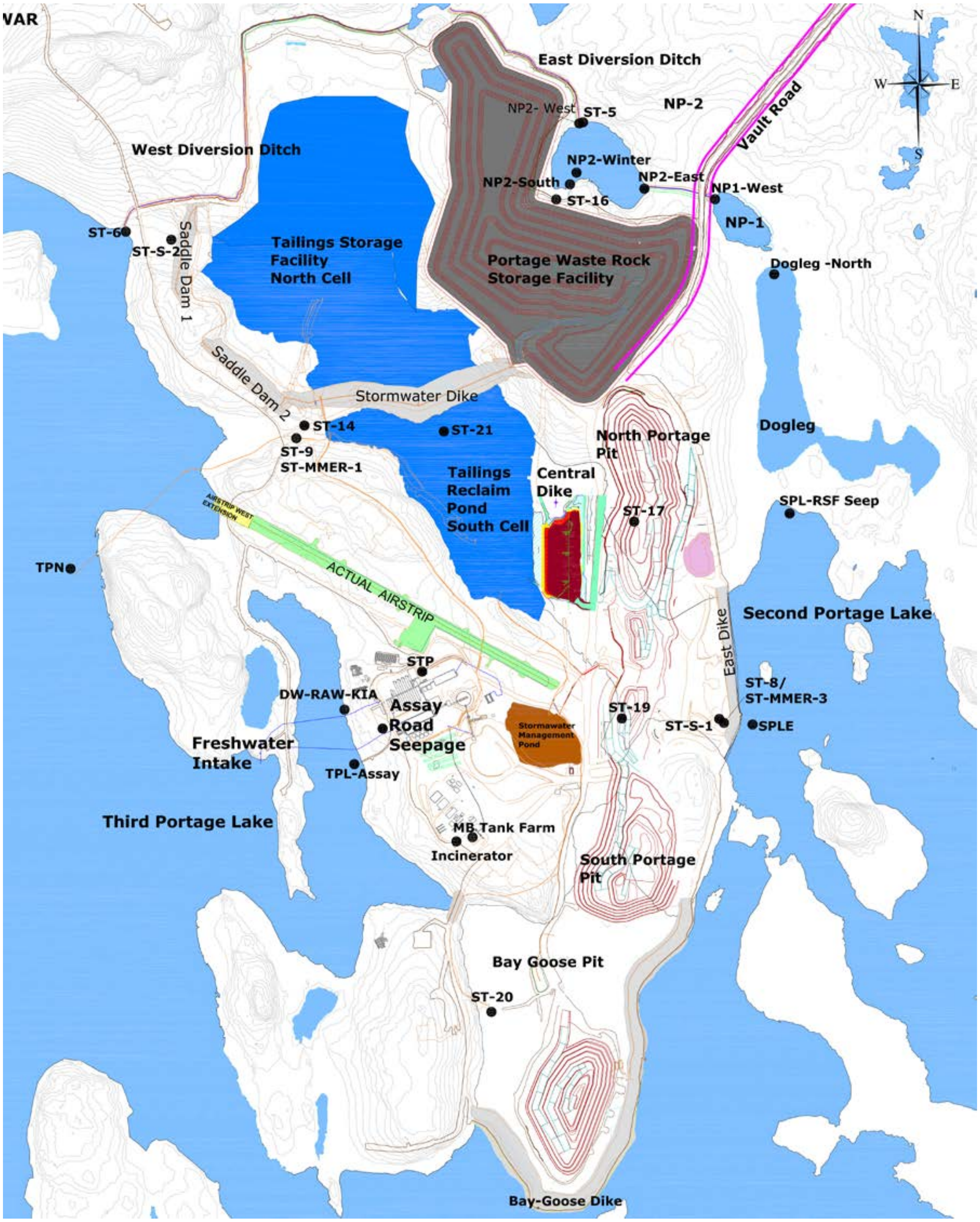
NWB (Nunavut Water Board License) (2008). Water License No: 2AM-MEA0815. Agnico- Eagle Mines Ltd. June 2008.

SLI (2012). Water Management Plan 2012. Agnico-Eagle Mines. Document No. 610756- 0000-40ER-0001, Rev. 02. March 2013.

SLI (2012). Water Quality Forecasting for the Portage Area 2012-2025. Agnico-Eagle Mines. Document No. 610756-0000-40ER-0002, Rev. 01. March 2013

APPENDIX 1

ENVIRONMENT FIELD STATIONS – MINE SITE VIEW


VAR
East Diversion Ditch
NP2- West
ST-5
NP-2
Vault Road
West Diversion Ditch
NP2-Winter
NP2-South
NP2-East
NP1-West
ST-16
NP-1
ST-6
ST-S-2
Saddle Dam 1
Tailings Storage Facility North Cell
Portage Waste Rock Storage Facility
Dogleg -North
Saddle Dam 2
Stormwater Dike
ST-14
ST-21
ST-9
ST-MMER-1
North Portage Pit
Dogleg
Tailings Reclaim Pond South Cell
Central Dike
ST-17
SPL-RSF Seep
AIRSTRIP WEST EXTENSION
TPN
ACTUAL AIRSTRIP
Second Portage Lake
East Dike
STP
DW-RAW-KIA
Assay Road Seepage
ST-19
ST-8/ ST-MMER-3
ST-S-1
SPLE
Stormwater Management Pond
Freshwater Intake
TPL-Assay
Third Portage Lake
MB Tank Farm
Incinerator
South Portage Pit
Bay Goose Pit
ST-20
Bay-Goose Dike
N
W
E
S

APPENDIX 2

SPILL CONTROL AND LOADING PROCEDURE PLAN

Dyno Spill Control and Loading Procedure Plan

1) All trucks are washed inside shop to contain any residue that may have contacted trucks. The water from the washing of the trucks and or the shop floors themselves is then picked up by the AEM e vacuum and disposed of in the onsite Stormwater Management Pond.

2) A.N. Prill is brought to the Emulsion Plant site in 20 ft Seacans and is stored in the Seacans on the A.N. Pad for the site till it is needed. It is then taken out of the Seacan /s and brought into the Plant for use. Sometimes enough product for the next batch is stored outside to speed up Batching time when it is necessary. A.N. Prill is not left outside if weather looks like it is going to be damp or raining to prevent the leaching of Prill through the Tote bags and on to the ground surface.

3) Any A.N. spills that occur are promptly cleaned up and disposed of in 1 of 2 ways:
   i. Any contaminated prill is put into containment barrels or buckets inside Plant, depending on amount, and put into the next Ansol batch to be made.
   ii. Any contaminated Prill is put in Barrels or Buckets (depending on amount) and then transferred from barrels to buckets for the Emulsion Truck Operators to take to the Blast Pattern and placed into the boreholes after they have been loaded (disposal via blast).

   Any spills that are too difficult (some of our drummed Products) to take care of in this manner are placed in Metal Drums or HAZMAT bins etc. with absorbing materials, sealed and sent to AEM HAZMAT AREA (for shipment south).

4) Emulsion waste (with contaminants) is also either contained in drums or bins until it can be transferred into buckets and taken to Blast patterns and placed into boreholes for disposal (disposal via blasting).
   Any non contaminated Emulsion is put back through the system and on to Trucks.
   When Trucks need to be de-contaminated or process lines of trucks or plant need to be cleaned out, the excess water is strained through a Sack (this allows the water to go through, but contains the Emulsion) to minimize nitrites in our plant sump containment.

5) When an Emulsion Truck has completed loading on a blast pattern the remaining emulsion is flushed out of the loading hose by running water through the hose (water holding tank on trucks) until water discharges out the end of the hose into the borehole.
   This does not completely remove all of the Emulsion out of the Hose; there is still a residue amount left in the hose. Thus, when the Truck operator starts up on the next blast pattern, the hose is put into the borehole and the Operator primes the hose and all the residue Emulsion is contained in borehole and disposed of when hole/s are blasted.

APPENDIX 3

DYNO NOBEL EMERGENCY RESPONSE PLAN – MAGAZINE, PLANT AND WORK SITE

EMERGENCY RESPONSE PLAN
QAAQTUQ
Agnico Eagle Meadowbank (Baker Lake)
Nunavut

For Dyno Nobel Canada Inc.

Magazine, Plant and Work Sites

This Emergency Response Plan (ERP) addresses incidents and potential incidents involving the manufacturing, handling and storage of explosives and related products in Dyno Nobel Canada Inc.' magazines, plants and worksites. This ERP has been developed for Dyno Nobel Canada Inc. and all of it's wholly-owned subsidiaries (DNX Drilling). Actions detailed within this plan are compulsory, under the approval and authorization of DNCI's Regional Operations Managers.

"This document, as presented on Dyno Nobel's database, is a controlled document and represents the version currently in effect. All printed copies are uncontrolled documents and may not be current".

Note: Information provided within this document may be privileged and is not intended for general distribution.

Original Date of Publication: 15 October 2003, as amended site specific, December 19, 2011

Publication/ Amendment Date	Changes To Prior Edition	Pg.
15 Oct 03	**New document**	All
26 Apr 04	**Amendment # 1**	
	Renumbering of Appendices 6 – 13	App. 7 – 14
	Miscellaneous Typos & Amendment Dates	All
17 March 08	**Amendment #2**	
	Updated Contact information	
	Addition of definitions	
	Included Calling and responding emergency procedures	
	Addition Duties of Key personnel	
	Addition of response to Natural disasters	
	Addition of visitor and contractors access control -	
	Replaced the Appendices and renumbering	
	Included a Emergency Report form	
	Addition of Nitric acid, Aluminum and Diethylene glycol and CFE	
	Addition of alternate methods of communication	
	Addition of Reportable Substance list	
	Miscellaneous Typos & Amendment Dates	All
August 18, 2010	**Amendment #3**	
	Updated Scope and ERP Outline	
	Added Sign-off sheet for Annual Fire Department Review	
	Added Appendix for Employee Training sign-off	
	Updated Reporting Incidents Flowchart	
	Updated procedure for Raw Material Truck Spills	
	Updated Bomb Threat Checklist	
September 29, 2011	Amendment #4	
	Updated contacts and phone numbers	
November 15, 2011	Amendment #5	
	Amended Appendix 8	
	Addition of Appendix 10	

Table of Contents

1.0 SCOPE

This document provides a Work Site Emergency Response Plan covering fire/explosion, spills, security breach, bomb threat, evacuation and prescribed actions that employees must take to ensure employee and public safety in the event of an emergency. The general reference to DNCI's "Work Sites" throughout this document includes magazines, plants and miscellaneous work locations.

The Emergency Response Plan appearing on Dyno Nobel Canada Inc.' database is a controlled document. Uncontrolled copies of this ERP are provided to customers and associates who own the land on which DNCI's worksite is located, plus applicable municipal and regulatory authorities. As well, uncontrolled copies are issued to all Company employees and are placed in all central offices and Company delivery vehicles.

2.0 RELATED DOCUMENTS

The following documents also relate to emergency situations that can arise and should be held at each Work Site:

- Federal, Provincial and Municipal regulations, standards and guidelines
- Corporate Policies plus MSA Standards & Procedures
- Standard Operating Procedures (SOP's)
- Dyno Nobel General and Specialized Work Rules
- Material Safety Data Sheets
- Prime Contractor's / Customer's ERP
- Transportation ERAP #2-1037
- Crisis Communication Plan

3.0 ERP OUTLINE

3.1 The following materials are covered by this ERP:

Fuel Oil
ATF Hydraulic Fluid
Ammonium Nitrate Prills and Solution
Sodium Nitrite
Sodium Thiocyanate
ANFO
Emulsion

Packaged Explosives
Detonators
Acetic acid
Diethylene glycol
Aluminum
Enviro CFE

3.2 The following situations are addressed in this ERP:

- Fire / Explosion
- Storage Tank Failure
- Spills from Product Delivery Trucks
- Spills from Raw Material Delivery Trucks
- Process Spills
- Shut down due to weather, floods, lightning, fires, explosions and other threats to the security and operation of DNCI's facilities, equipment and material.
- Bomb Threats
- Quantities of spills and reportable to Dyno Nobel and authorities

3.3 This ERP covers:

Preparation	Reporting
Training	Waste Disposal Permits
Lines of Authority	Containment
Notification	Inspection
Decontamination	Maintenance

3.4 The following definitions apply to this plan:

DNCI Corporate contact : A DNCI corporate employee who is assigned to receive Emergency Calls at all times from the answering service.

ER Advisor: Emergency Response Advisor (ERA), who will normally be the applicable General Manager, Area Manager, or Technical Advisor who will liaise with First Responders.

OSC: (DNCI) On Scene Coordinator, the Senior DNCI employee at an incident site who manages and controls DNCI resources in support of First Responders and incident recovery.

ERT: Emergency Response Team, DNCI personnel dispatched to an incident site to assist First Responders and conduct incident recovery under the direction of the OSC.

4.0 PREPARATION AND PLANNING

4.1 In order to provide competent emergency response at Dyno Nobel Canada Inc.' magazines, plants and worksites, first responders (local fire departments and mine rescue personnel) must be thoroughly briefed on an annual basis of the potential hazards involved in a Dyno Nobel Canada Inc. worksite fire. To this end, Work Site Supervisors must take fire department plus mine safety and security representatives on an annual magazine / plant tour to view:

Explosives Storage Areas	Evacuation (Meeting) Area
Bulk Emulsion Equipment	Communications Equipment
ANFO Blending Area	Facility Layout
Fire Fighting Equipment Sites	(Waste) Burn Facilities

A record of each explosives worksite tour and the names of the first responder representatives attending are to be documented and kept on file.

Annual Fire Department Review Form (Appendix 9)

4.2 All DNCI employees shall review this ERP on an annual basis and participate in ERP drills / exercises when scheduled.

4.3 All worksite accidents involving fire, explosion, reportable spills/emissions, breaches of security and bomb threats are to be reported to applicable authorities and senior management. As per incident reporting procedure

4. 4 Spill procedures for each of the materials listed in section 3.1 are outlined in Table 6-3. All procedures specify: Method of Cleanup, Method of Disposal and Protective Clothing. Based on the procedures presented in Table 6-3, worksite supervisors must ensure that adequate clean-up equipment and materials are readily available and in good condition.

4.5 Worksite information for each of DNCI's facilities is contained in the attached appendices. The ERP is revised whenever significant changes are made.

4.6 Current Material Safety Data Sheets (MSDS) are to be kept at each Work Site for all hazardous materials that are stored and handled at the Work Site. Copies of current product MSDS' are also made available to customers and landowners. Obsolete MSDS' will be replaced as new ones are issued.

4.7 Each Work Site will hold and maintain in good repair, appropriate fire fighting and spill control equipment for potential emergencies. Fire extinguishers, hoses and other fire fighting equipment are to be visually inspected on a monthly basis to ensure Magazine, Plant, Work Site and delivery vehicle readiness.

5.0 TRAINING

5.1 All employees will complete training on the contents of this Plan during their "new hire" orientation and review the plan annually.

5.2 A trained person is considered to have reviewed all related documents (Section 2.0), to have been instructed on the use of related equipment and procedures, and to have discussed with their Supervisor or trainer, questions and issues of concern.

5.3 Training records, including certificates for training completed, are to be kept onsite in the Employee's Training Record.

5.4 The Magazine, Plant or Work Site Supervisor/Manager will certify their employees as having received training by signing the training form. In signing the training form, the Supervisor / Manager will have satisfied themselves that trained employees are able to:

- Recognize fire and explosive hazards for the materials and processes to which they are exposed /involved with;
- Competently use Fire Fighting / Fire Protection Equipment (Note: employees should receive refresher training in the use of fire extinguishers at least every three years)
- Competently use applicable personal protective equipment (PPE) when handling hazardous substances;
- Recognize and be familiar with substances which become hazardous wastes when spilled; and

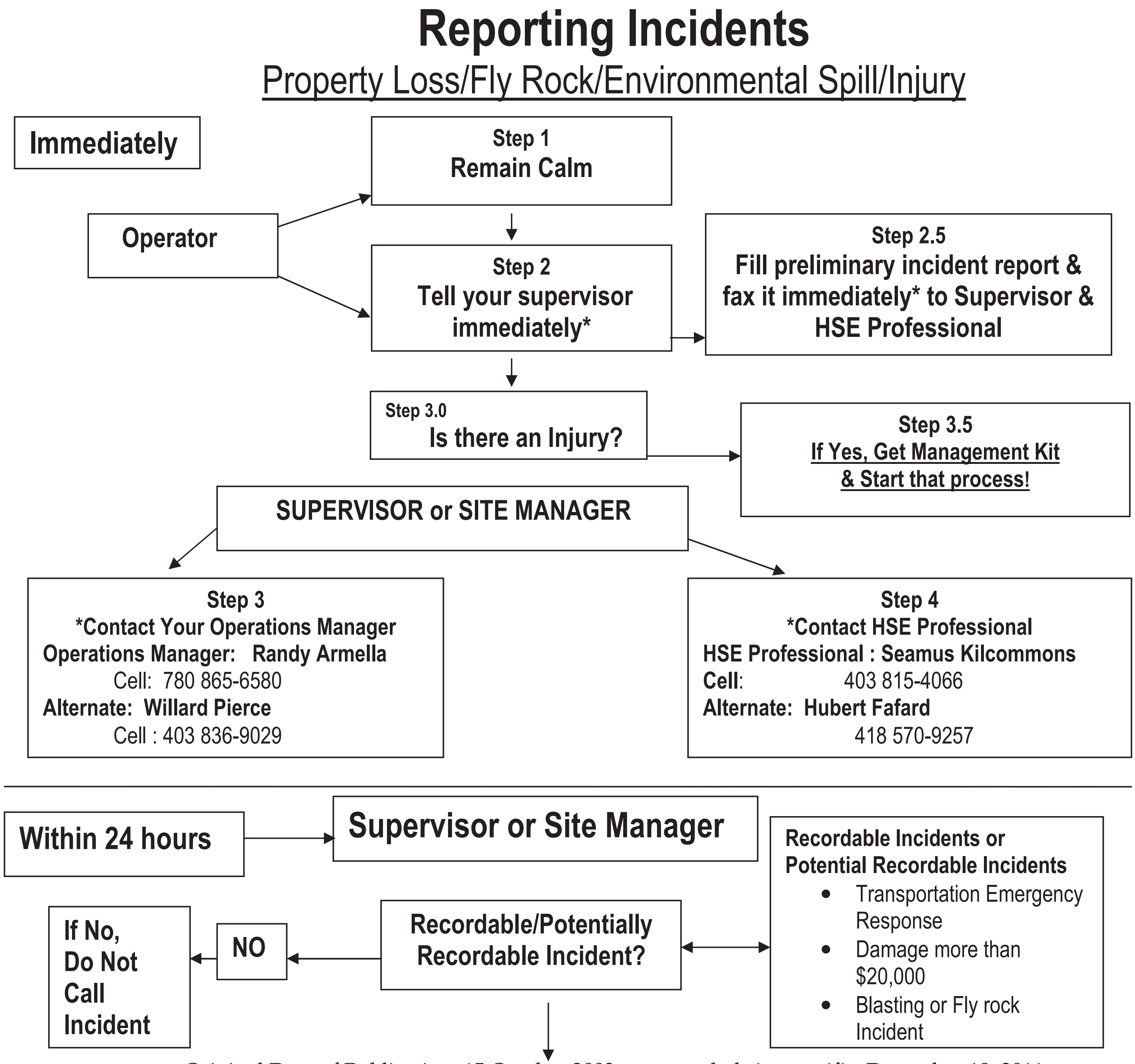
- Follow SOP's and use established work practices to minimize the potential for fires, explosions, environmental releases and other accidents.
- Worksite Managers / Supervisors will ensure that all contractors receive a worksite orientation before commencing work or being left unaccompanied in the worksite. Following the orientation process, the contractors will be required to sign off on the Contractor Checklist acknowledging training in the applicable areas including the site emergency response plan.
- All Plant & Magazine sites will have in place, a continuous (24 hour) access control system to control the entrance, presence and exit of visitor and contractors and their equipment and materials
- Employees must be trained on Reportable Quantities to the Government in the unlikely event of a spill.
- All employees are aware of evacuation routes, muster point location, and all-clear notice procedure.
- New/Transferred employee or Annual Refresher sign-off form located in Appendix 8

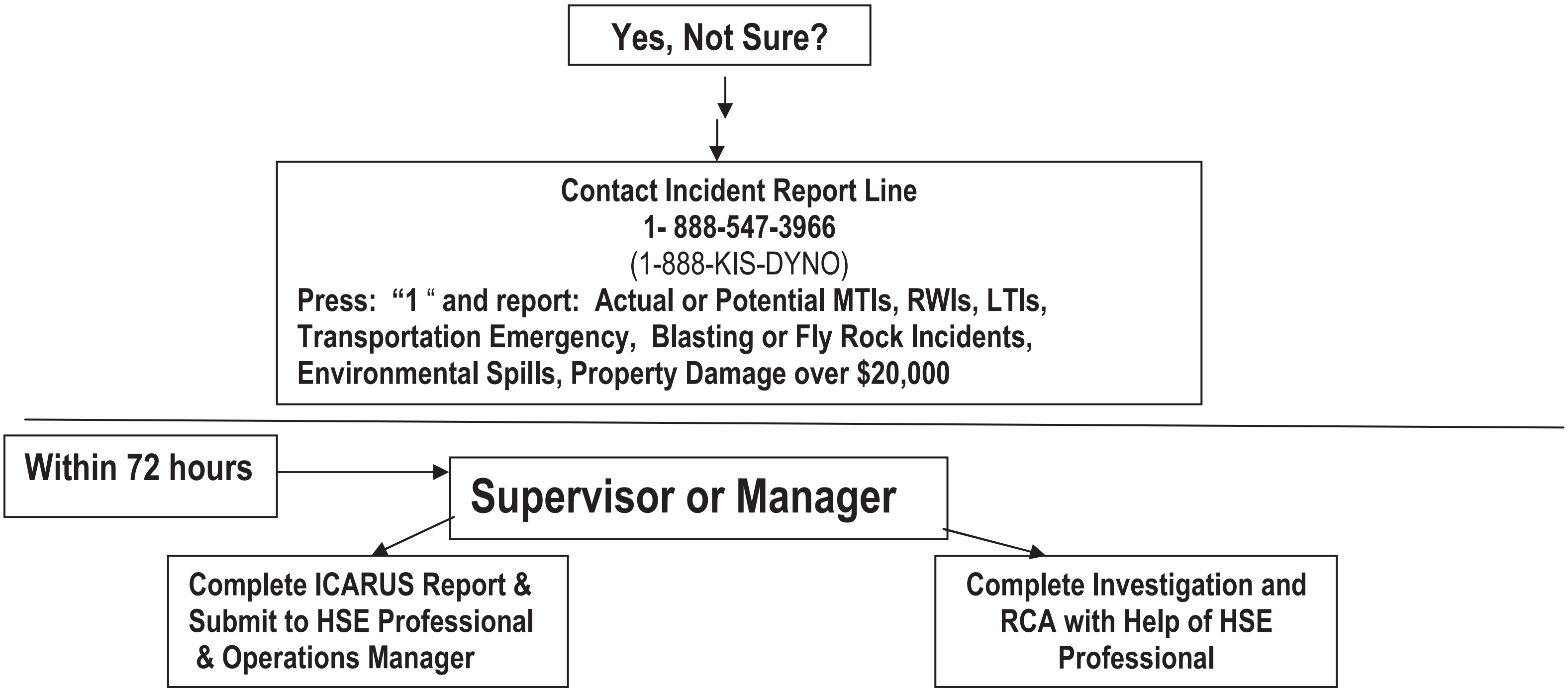
6.0 EMERGENCY PROCEDURES AND LINES OF AUTHORITY

6.1 GENERAL

Reporting Incidents Flow Chart (continued on next page)

Table 6-1
Emergency Response Flow Chart





SITE SUPERVISOR/DELAGATE
EXPERIENCING EMERGENCY / POTENTIAL EMERGENCY

- **CALL FOR EMERGENCY ASSISTANCE**
  In the event of an emergency, accidental release or imminent accidental release involving explosives, eliminate potential sources of detonation where possible (eg. turn off the ignition of a vehicle), call **911** (or the local police number) for immediate assistance, **call the site Supervisor/ Area Manager** and initiate the site's Emergency Response Plan. If normal phone systems are down other methods of communication can include two way radios, satellite phones, pager, e mail and vehicle satellite tracking systems.

- **WARN PUBLIC WITHIN EVACUATION DISTANCES IF RISK OF DETONATION**
  Should there be explosive detonations, or the risk of detonations due to the presence of fire or other detonating factors, advise the First Responders (or anyone within the immediate vicinity if First Responders are not at the scene) of the risk and applicable safety distances per Table 6-4, page 17 (liaise with Emergency Response Advisor (ERA) if time permits). Help organize perimeter guards to prevent people from entering the evacuation zone.
  Note: See ERP, page 17 Table 6-4 for Evacuation Procedures.

- **ASSIST LOCAL AUTHORITIES**
  Assist First Responders and Local Authorities in eliminating the emergency situation, and liaise with DNCI's On-Call Employee / ERA until relieved by the Company's Emergency Response Team (ERT).

TO RESPOND TO AN EMERGENCY CALL

DNCI Corporate contact instructions:

Upon receiving a call for emergency response assistance, keep a log of all subsequent communications and actions, and do the following:

1. Immediately obtain the name and callback number of the caller, in case the telephone line is lost.
2. Obtain information as fully and accurately as possible following the emergency report form (see appendix 1).
3. Call an ER Advisor for the applicable Region (see appendix 2) and report the emergency situation. In turn, the ER Advisor will phone the emergency scene caller, establish ongoing contact, assess the emergency, determine what Company resources and/or contracted emergency response services are required and organize an Emergency Response Team – ERT to proceed to the emergency scene if required.
4. Assist the Emergency Response Advisor (ERA).
5. Liaise with Company Executive / Senior Managers.

Emergency Response Advisor (ERA) instructions:

1.Call the Branch/Plant Supervisor nearest the emergency scene plus provincial & federal authorities (see applicable appendix to Annex D) to advise them of the situation and the need for an emergency response.

2. Designate, assemble and dispatch an Emergency Response Team (ERT), made up of Groups 1 & 2 personnel (see ERAP pg. 16 and Annex D) under the leadership of an On Scene Coordinator (OSC), if required.

3. Authorize the dispatching of additional resources, communications, transportation and contracted services as necessary.

4. Contact and instruct the designated Emergency Response Team (ERT) to proceed to the emergency scene with the required vehicles and equipment.

5. Liaise with the Person in Charge of the Emergency) and/or Local Authorities to obtain a situation update.

6.Advise Local Authorities as appropriate, regarding the properties, hazards and handling procedures for the explosives involved in the emergency. In particular, advise the Local Authorities of appropriate evacuation distances per Table 6-4 pg. 17.

7. Continue to consult with the Local Authorities as appropriate, plus the Company's On-Scene Coordinator (OSC), to stabilize and eliminate the emergency.

8. Refer to **Regional Manager** *Tom Medak or Cory Redwood .(see appendix2))* for any media requests in accordance to the Crisis Communication Plan (CCP). Media contacts shall be through Regional Manager designated for the area.

9. Contact the explosives supplier and / or transporter (if other than DNCI) to advise them of the emergency and to request their assistance if/as required.

ON-SCENE CO-ORDINATOR (OSC)

- The On-Scene Coordinator (OSC) is the Company's representative and local authority in charge of all company actions and resources at the emergency scene. Once the OSC arrives at the emergency scene, the ERA will transfer communication with First Responders/Local Authorities to the OSC. In turn, the OSC will liaise with the ER Advisor as required. Throughout the Company's emergency response, the OSC will ensure that First Responders and Company personnel (employees and contractors) observe all safety and regulatory standards and procedures.
- The OSC may revise / adjust the composition of the Emergency Response Team (ERT) and supporting resources as required. The OSC may, in consultation with the ER Advisor, contract commercial services to assist in addressing and resolving the emergency situation.

- The OSC will oversee the Company's local involvement with emergency services, government (municipal & provincial) and public interests until the emergency is fully resolved. Post-emergency activities (clean-up, restoration, etc.) under the direction of the Environment Manager may be delegated to an appropriate Branch, Plant or Area Manager. **EMERGENCY RESPONSE TEAM (ERT)**

- Selected emergency response personnel will take their direction to assemble and proceed to the emergency scene from the ERA or their representative. Team members will immediately report to the On-Scene-Coordinator.

- The primary role of the ERT is to provide a competent and trained / certified workforce plus specialized equipment and material to assist First Responders / Local Authorities in the stabilizing and elimination of an 'explosives emergency', and to retrieve / recover, repackage and remove to safe and secure storage, non-detonated explosives.

- While at the emergency scene, ERT members will take their direction from the Company's OSC and remain available until released by the OSC.

NOTE:

ONLY INDIVIDUALS WHO HAVE RECEIVED TRAINING AS REQUIRED UNDER THE TRANSPORTATION OF DANGEROUS GOODS (CLEAR LANGUAGE) REGULATIONS, OR WHO ARE WORKING UNDER THE DIRECT AND CONTINUOUS SUPERVISION OF AN EMPLOYEE WHO HAS BEEN TRAINED FOR CLASS 1 DANGEROUS GOODS UNDER TDG, MAY PARTICIPATE IN SITE CLEAN-UP ACTIVITIES SUCH AS PICKING UP, REPACKAGING AND TRANSPORTING EXPLOSIVE MATERIAL.

6.1.1 In any emergency the Work Site Supervisor/Manager or their delegate must take certain actions, including the following:

- Call local fire/emergency authorities (at mine sites, also call Mine Fire, Safety and Security if different and give relevant information).
- Account for all employees and visitors. Arrange for Rescue of anyone who may be trapped, without endangering oneself or others.
- Notify Dyno Nobel Canada Inc. ERA's so that necessary arrangements can be made for technical / administrative support, including accident reporting and investigation plus continued/alternate production. The following information should be provided and refer to appendix 1:

What Occurred	Time of Occurrence
Action Taken	People Contacted
Status of Situation	Anticipated Follow-up

6.2 FIRE & EXPLOSIVES

6.2.1. There are three categories of fire that may involve explosives:

I. Fires Directly Involving Class 1 Explosives and Blasting Agents

- **DO NOT FIGHT THE FIRE.** Instruct all fire fighters on the scene not to fight fire with explosives.

- Shut off power at main breakers if possible. At mine sites, call Mine Security or Fire/Rescue. At all other DNCI locations call local Fire/Rescue personnel.
- Evacuate all personnel from the Work Site to the safe meeting place as outlined in the Work Site Appendix.
- Set up a communications base at the meeting place and guard
- against anyone entering the area.

II. <u>Fires Involving Components For Manufacture of Blasting Agents</u>

Bulk blasting agents may be in the form of emulsion or ANFO. ANFO is a mixture of prilled ammonium nitrate and fuel oil.

Under conditions of large mass, intense heat, confined dust / vapor buildup, and the right mixture combination of the basic ingredients, emulsion and ANFO will explode. The probability of explosion with ammonium nitrate (AN) alone is very small, but increases when under intense heat and confinement. Table 6-1 includes recommended fire fighting procedures for each of these substances.

III. <u>Fires Involving Dyno Nobel Canada Inc. Trucks</u>

In cases where the Dyno Nobel Canada Inc. delivery trucks are in a building that is on fire, if there is no explosives and safe to do so, may be moved provided access to the truck and exit from the building is not barred by flames or smoke, with available fire extinguishers with caution only if the fire is small and not in the storage compartment.

Fires on re-pump or other bulk explosive delivery vehicles shall not be fought if the fire involves the explosives compartment. Fire fighting measures should be taken immediately to prevent any fire such as a tire, electrical or cab fire from reaching the explosives compartment.

Fires on other transport vehicles may be fought with caution. Fires that cannot be controlled sufficiently to avoid involvement of the vehicle's fuel compartment shall be left and personnel evacuated to a safe distance.

6.2.2. When a fire is small and does not involve any explosive agents, it may be fought with plant extinguishing equipment. If the fire is widespread and intense, all personnel, including visitors and contractors should be evacuated to the meeting area outside the main gate.

Table 6 - 2
FIRE FIGHTING INFORMATION

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Ammonium Nitrate Prill – Odorless white to light tan crystaline solid	Use flooding amounts of water in early stages of fire. Keep upwind. AN is an oxidizing agent which supports combustion and is an explosive hazard if heated under confinement that allows high-pressure buildup. Ensure good ventilation and remove combustible materials if it can be safely done. Evacuate to designated area if fire cannot be controlled.	Toxic oxides of nitrogen are given off during combustion. Fire fighters require self-contained positive pressure breathing apparatus. Avoid contaminating with organic materials. Many powdered metals such as Al, Sb, Si, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, Sn, Zn and brass react violently and explosively with fused AN below 200°C Sensitivity to detonation increases when heated.
Ammonium Nitrate Solution- Colorless/Odourless Liquid – white paste like solid when cooled	Use flooding amounts of water in early stages of fire. Cool containing vellels with with flooding quantities of water until after fire is out	Material will not burn, but thermal decomposition may result in flammable/toxic gases being formed. These products are nitrogen oxides and ammonia. (NO,NO_2 NH_3). Product may form explosive mixtures when contaminated and comes in contact with organic materials. Explosive when exposed to heat or flame under confinement. Avoid temperatures over 210°C (410°F) A self contained breathing apparatus should be used to avoid inhalation of toxic fumes
Acetic Acid – Colourless liquid with a pungent odour	Use dry chemicals, CO_2, Alcohol foam or water spray	Isolate and restrict area access, stay upwind. Water run-off and vapour cloud may be corrosive.
Sodium Thiocyanate – White solid - odourless	Use extinguishing media most appropriate for the surrounding fire	Wear self contained breathing apparatus – MSHA/NIOSH approved or equivalent, and full protective gear. During a fire, irritating or highly toxic gases may be generated by thermal decomposition or combustion.
Sodium Nitrite – Oxydizing agent - white to light yellow crystals- faint odour	Flammability class – not regulated. Flood with water only – Isolate materials not involved in the fire and cool containers with flooding quantities of water until well after the fire is out.	Self contained apparatus should be worn in a fire involving Sodium Nitite.Thermal decomposition will cause reddish brown nitrogen oxides to be released.
Fuel Oil (No. 2 diesel) Dyed or pale yellow liquid with petroleum odor; and/or ATF Fluid	Use water spray to cool fire-exposed surfaces and to protect personnel. Shut off fuel from fire. Use foam, dry chemical or water spray to extinguish fire. Avoid spraying water directly into storage container due to danger of boil-over.	Avoid strong oxidizing agents.

Explosive emulsions, ANFO, packaged explosives and firing devices.	**Fire involving explosive materials must never be fought. Evacuate the incident scene. Do not confine (ventilate to prevent / reduce pressure build-up if safe to do so).**	Explosion hazard.
Enviro CFE	Dry chemical, foam, water spray (fog). Use water spray to cool exposed surfaces and containers	OIL FLOATS ON WATER. Do not use direct or heavy water stream to fight fire. Use organic vapour respirator or self-contained breathing apparatus to fight fire.

Table 6 - 3
CONTROL MEASURES FOR FIRE

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Acetic acid	Small fire: type ABC dry chemical or CO_2 fire extinguisher. Large fire: water fog or foam.	May react violently with oxidizers and nitric acid. May react with aluminum powder and give off highly flammable hydrogen gas.
Aluminum	Small fire: type D fire extinguisher, dry sand. **Never use water**.	May react with oxidizers (nitrate and perchlorate) and acids. Avoid contact with water. Highly flammable hydrogen gas may be released.
Diethylene glycol	Small fire: type ABC dry chemical or CO_2 fire extinguisher. Large fire: water fog.	Keep away from oxidizers (nitrates and perchlorate). Explosion hazard if heated under confinement.

EVACUATION PROCEDURES

Advise the first emergency responders at the scene (police or fire) of the need to evacuate using the guidance in the Emergency Response Plan. Employees at the scene should assist local emergency services to the best of their ability to accomplish this. For incidents within a worksite such as a mine, quarry or construction operation, in most cases access is radio controlled. The quickest way of alerting people, therefore, is by site radio. Clearly state your location, situation and call for assistance in evacuating the area.

DO NOT FIGHT EXPLOSIVES FIRES. EVACUATE THE AREA AND LET THE FIRE BURN ITSELF OUT.

THE MINIMUM EVACUATION DISTANCE IS AS OUTLINED IN TABLE 6-4 (Pg. 17) FOR ALL DIRECTIONS (which is based on a higher traffic / risk / population density within the area, without benefit of protective features such as berms and hills. (**Transport Canada requires 1,600 meters for situations that involve high-risk surroundings**) upon determining actual quantity of explosives refer to Table 6-4 as per ERD quantity of distances.

Table 6 - 4
EVACUATION DISTANCES
Based On Amount of Explosives Present

Explosive Quantity		**Metric Distance**		**English Distance**
250 kg		70 Meters		230 Feet
500 kg		100 Meters		320 Feet
1,000 kg		150 Meters		500 Feet
2,000 kg		240 Meters		800 Feet
5,000 kg		400 Meters		1,300 Feet
7,000 kg		450 Meters		1,450 Feet
10,000 kg		480 Meters		1,550 Feet
20,000 kg		700 Meters		2,300 Feet
40,000 kg		800 Meters		2,640 Feet
60,000 kg		870 Meters		2,860 Feet
80,000 kg		960 Meters		3,150 Feet
100,000 kg		1040 Meters		3,420 Feet
120,000 kg		1100 Meters		3,610 Feet
>120,000 kg		1600 Meters		5,250 Feet

6.3 ENVIRONMENTAL RELEASES

6.3.1 Procedure For Fuel Oil Storage Tank Failure

- Assess the magnitude of the leak.
- If the leak is slow and the source can be determined, take the appropriate action to prevent further leakage.
- Transfer fuel from storage tank into drums if necessary.
- Collect spilled material, including contaminated soil, with absorbent pads or inert solid absorbent and store in drums labeled for disposal.
- If the leak is large and further leakage cannot be prevented, allow the dyke to fill. Transfer to drums, label for reuse or disposal, and store.
- Inspect empty tank to identify failure/cause of leak and repair tank.

6.3.2 Procedure For Raw Material Truck Spills

- Identify the material involved, assess the magnitude of the spill or leak and assist the driver to take appropriate action to stop the leak, taking care to prevent run off and/or entry into any water course or drainage system near the spill site.
- For AN prill, shovel spilled material into drums, label for reuse or disposal, and store. Use a non-sparking shovel to transfer spilled material into lined drums.
- For spilled fuel, contain by dyking with earth. Collect spilled fuel with absorbent pads or solid inert absorbent, transfer into drums, label and store for disposal.
- Remove contaminated soil for disposal in conformance with Environment Canada standards.

6.3.3 Procedure For Process Spills

- Identify the material involved and assess the magnitude of the spill or leak, taking care to prevent run off and/or entry into any watercourse or drainage system near the spill site.
- For AN prill, shovel spilled material into drums, label for reuse or disposal, and store.
- For spilled fuel, contain by dyking with earth. Collect with absorbent pads or solid inert absorbent, transfer into drums, label, and store for disposal.
- In the case of leaking bags of ANFO, sweep or shovel the spilled material into a clean drum or other suitable container, label for reuse or disposal, and store.
- Remove contaminated soil for disposal in conformance with Environment Canada standards.

- Have any process equipment (pumps, process lines, parts, gauges, etc.) involved in a leak or spill inspected and repaired or replaced. Re-inspect and test if necessary after repair is affected.

6.3.4 **Procedure For Emulsion Tank Failure**

- Assess the magnitude of the leak.
- If the leak is slow and the source can be determined, take the appropriate action to prevent further leakage.
- Transfer remaining emulsion from leaking storage tank into another storage tank, a tanker trailer if available, or into drums as necessary.
- Collect spilled material using double diaphragm pump(s) and store in labeled drums for reuse or disposal at the mine.
- If the leak is large and further leakage cannot be prevented, allow the room to fill. Transfer to drums, label for reuse or disposal, and store.
- Inspect empty tank to identify failure/cause of leak and repair or replace the tank

6.3.5 **Procedure For Fire**

- In the event of a raw material or product fire, take care to protect all persons from exposure to smoke and gaseous emissions from the fire.
- Potential toxic gaseous emissions from fires involving explosive materials include:

    Oxides of Nitrogen
    Carbon Monoxide
    Cyanide Gas

- All fires must be reported to local authorities and Mine Site Security as soon as possible.
- Self contained breathing apparatus is required for fighting a fire in the plant.
- Follow procedures outlined above for any spills and leaks resulting from fire when it is safe to do so

Table 6 – 5
ENVIRONMENTAL RELEASE PROCEDURES

MATERIAL	SPILL AND LEAK PROCEDURES	WASTE DISPOSAL
Ammonium Nitrate Prill (odorless white to light tan crystalline solid)	Remove source of heat and ignition. Sweep or shovel spill into a clean, non-combustible container. Wash remaining trace residues with water. Wear rubber gloves and safety glasses to minimize contact with skin and eyes.	Re-use if possible or give it to a farmer as a fertilizer. If not possible, dispose of as-is in approved. Remove as much as possible the spilled material as a solid.
Ammonium Nitrate Solution- Colorless/Odourless Liquid – white paste like solid when cooled	Small spill - Dike and contain spilled material. Ensure spilled material does not enter sewers, wells or water courses. Allow to solidify. Use appropriate tools to place in container for disposal. Larger spill - Dike and contain spilled material. Ensure spilled material does not enter sewers, wells or water courses. Notify downstream water users. Allow to solidify. Use appropriate tools to place in container for disposal.	Call for assistance for disposal. Ensure disposal complies with regulatory requirements and regulations.
Fuel Oil (dyed or pale yellow liquid with petroleum odor)	Eliminate any source of ignition. Prevent spills from entering watercourses or drainage systems. Contain with sand or earth. Recover with pump or inert absorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	Dispose of recovered material in approved landfill or other waste disposal facility.
ANFO (Ammonium Nitrate Fuel Oil)	This material is an explosive. Remove all sources of heat and ignition. Transfer into clean plastic container with a plastic shovel. Label drums. Wear rubber gloves.	Recycle product, if possible. If not practical, explode it inside a borehole or burn it in an authorized burning ground.
Emulsion	This product is a blasting agent. Remove all sources of heat and ignition. Prevent spills from entering watercourses or drainage systems. If large amount of emulsion is involved, contain spill with earth or sand found locally. Recover spilled material with a diaphragm pump. Use of a diaphragm pump also requires an air compressor. Limitation of the pump suction is approximately 2.5 meters, pump discharge is approximately 8 meters. Use a screening device on pump suction hose. Out of area spills will require taking two pumps and extra hose. Transfer the product into a tanker trailer or clean 200 liter drums. If small amount of emulsion is involved, transfer material into a clean plastic container with a plastic shovel. Label tanker trailer or drums. Wear rubber gloves and rubber boots.	Recycle product, if possible. If not practical, explode it inside a borehole or if large amount is involved, demulsify it with liquid detergent.

Enviro CFE	Eliminate any source of ignition. Prevent spills from entering watercourses or drainage systems. Contain with sand or earth. Recover with pump or inert absorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	Dispose of recovered material in approved landfill or other waste disposal facility.
Sodium Thiocyanate – White solid - odourless	Ensure adequate ventilation whe handling Sodium Thiocyanate. Keep containers closed when not in use. Wear appropriate PPE – eye protection, gloves and appropriate clothing to prevent skin exposure.	Vacuum or sweep up material and place into a suitable disposal container. Avoid run off into storm sewers and ditches which lead to waterways. Not regulated as a hazardous material. Chemical waste generators must consult appropriate hazardous waste regulations to ensure complete and accurate classification.
Sodium Nitrite – Oxydizing agent - white to light yellow crystals- faint odour	In the event of a spill or leak, contact the vendor (403-263-8660) for advice. Wear respirator, protective clothing and gloves. Vacuuming is the recommended method to clean up spills. Do **not** sweep or use compressed air for clean up. Recover spilled material on non-combustible material, such as vermiculite. Use non-sparking tools and place in covered containers for disposal. Any recovered material mau be used for it's intended purpose , depending on contamination.	Dispose of the waste material at an approved hazardous waste treatment/disposal facility.
Acetic Acid – Colourless liquid with a pungent odour	Wear appropriate PPE – evacuate downind areas as required to prevent exposure and to allow fumes and vapours to dissipate. Prevent entry into sewers or streams. Dike if needed. Eliminate all sources of ignition. Neutralize the residue with sodium carbonate or crushed limestone. Absorb win an inert dry material and place in an appropriate container for disposal. Flush area with water to remove trace residue.	Waste disposal must be done in accordance with provincial and federal regulations. Empty containers must be recycled or disposed of through an approved waste management facility.

6.4 SECURITY

6.4.1. In the event of a breach of security at a Dyno Nobel Canada Inc. Work Site, a call is to be made to the RCMP / local Police Department at the discretion of the Supervisor/Manager, or their delegate. In the case of a breach of security, Dyno Nobel Canada Inc.' HSE, Regulatory Affairs and Executive / Senior Management shall also be informed immediately and provided with the same information as outlined in Section 6.1

6.4.2. Any person(s) apprehended during the course of a serious security breach shall be detained until the Police arrive (note: employees are not to put themselves at undue risk by attempting to apprehend or restrain a potentially violent person).

6.5 BOMB THREAT

6.5.1. The safety of employees and the public is of primary concern. A person receiving a bomb threat over the telephone should attempt to remain calm and keep the caller talking by asking the questions listed in Table 6-6 (ERP pg. 20). Recording (writing) as much information about the caller and their comments is also very important for future reference. If possible, alert a co-worker to the situation while talking to the caller.

6.5.2. The police / mine security should be advised of the bomb threat as soon as possible. Unless there is good reason to the contrary, all personnel should evacuate the Work Site and await the arrival of the police / first responders at the designated meeting area. Suspicious objects should be reported but not tampered with and other people should be prevented from entering the Work Site until the local authority has authorized a return to the Work Site. Employees should be prepared to assist local authorities in their search / inspection of the Work Site as necessary.

Table 6 - 6
CONVERSATION GUIDELINES IN THE EVENT OF RECEIVING A BOMB THREAT

See Appendix 7

6.6 LINES OF AUTHORITY

6.6.1 Based upon the information available at the time of the incident, the Work Site Supervisor/Manager, in consultation with others (such as DNCI Senior Management, Mine/local authorities and/or Dyno Nobel advisors), will evaluate the incident and proceed with appropriate steps to implement this ERP. A decision on when to return to the scene of a serious incident will be made in like fashion, subject to approval by public authorities overseeing the incident.

6.6.2 The Work Site Supervisor/Manager will have overall responsibility for the implementation of this ERP and the supervision of all Company activities. Public authorities and the site owner have ultimate authority regarding the resumption of normal production activities.

7.0 NOTIFICATION AND REPORTING

7.1 Any incident that activates this ERP shall be documented on the DYNO Incident (Cintellate) Report. The Corporate Emergency Response Advisor must also be notified and in turn will advise the:

HSE Manager	Vice President Operations
Area Manager	

It is the responsibility of the HSE Manager or his delegate to report the incident to DYNO's HSE Management Team. A major incident involving a fire with emissions and/or a hazardous material spill shall be reported to a provincial Environment Officer under the direction of the Environmental Manager. Major incidents shall also be reported to the Chief Inspector, Explosives Branch, Natural Resources Canada; a Provincial/Territorial Safety Officer; and as applicable, an Emergency Measures Official.

Any incident which involves a spill at a Mine Site shall be immediately reported to the Mine Site Environmental Representative, and followed up with a copy of the incident report when complete.

7.2 Spills and Releases – Reportable and Significant Classifications

1) Determine if the spill/release is reportable

All environmental incidents are to be input into Cintellate. Reportable spills/releases are not only input into Cintellate, but the investigation and corrective action sections of Cintellate must be completed. To assist in determining if a spill/release is reportable, a listing of common materials with assigned reportable quantities is referenced (see Appendix 5, Reportable Substance List). The reportable quantities utilize the most stringent "reportable quantity" in Canada. Even if the spill/released material is recovered, the media impacted by the spill/release may be reportable to authorities (e.g., a portion of a spill reaching a source of drinking water or wetland). In addition, a spill/release is reportable if the amount equals or exceeds the Dyno Nobel Default Threshold.

2) Determine if the spill/release is significant

- Significant spills/releases are disclosed in the company's annual report. Significant spills/releases trigger time-critical internal actions as required by the company's procedures (crisis communication, internal investigation, etc)

The following table is provided to assist in making these determinations:

Reporting of Environmental Spills

Is the spill reportable?

- Yes if above a Reportable Quantity
- Yes if oil sheen is visible or sludge/emulsion is deposited beneath water surface
- Yes if water quality standards are exceeded
- Yes if from a UST exceeding 25 gallons or result in a sheen

Is the spill significant?

- Yes if authorities implement a national contingency plan
- Yes if "sensitive" environmental features have been impacted
- Yes if neighbors are evacuated
- Yes if authorities and/or neighbors file complaints and/or demand response activities
- Yes if financial impact is >US$100K
- Yes if media coverage is adverse.

7.3 Internal investigation reports will include:

- Name, work address, and phone number of the investigating (reporting) individual
- Identification and quantity of the released substance
- Time, duration, and location of the release
- Nature and quantity of injuries, property damage, production loss, administrative penalty and/or legal liability
- Precautions taken during the incident
- Relevant environmental conditions
- Corrective actions taken at the time of the incident
- Recommended corrective actions to prevent future occurrence

7.4 Senior Management shall be immediately informed by telephone of any major incident that requires Government notification as per Dyno Nobel's reporting procedures.

7.5 Major incidents involving explosive material shall also be reported to the Chief Inspector, Explosives Branch, and Natural Resources Canada by the applicable Regulatory Affairs Coordinator.

Table 7 – 1
REPORTABLE SUBSTANCE QUANTITY LIST

Material Released	Reportable to Authorities		Dyno Nobel Default Threshold (Proposed)
	If Recovered	If Unrecoverable/ Abandoned / Disposed	
AN Solution	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	44 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
AN Prill	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	45 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
SN Prill	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
Acetic Acid	453 Kg (1,000 lbs)	454 Kg (1,000 lbs)	225 Kg (500 lbs)
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
Sodium Nitrite	45 Kg (100 lbs)	45 Kg (100 lbs)	225 Kg (500 lbs)
	Report if released to Drinking Water (DW std at 1mg/L-N)	Report if released to Drinking Water (DW std at 1mg/L-N)	
Fuel Oil	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261 L (69 gallons)
	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	
	95 L (25 gallons) from UST	96 L (25 gallons) from UST	
Mineral Oil	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261 L (69 gallons)

	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	
	95 L (25 gallons) from UST	96 L (25 gallons) from UST	
Emulsifier Agents	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261 L (69 gallons)
	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	
Granular Aluminum	Not Reportable	Not Reportable	225 Kg (500 lbs)
ANFO	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	45 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
	Reportable if sheen on surface of pond, stream, etc.	Reportable if sheen on surface of pond, stream, etc.	
Emulsion	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	44 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	
Ethylene Glycol	2250 Kg (5000 lbs)	2250 Kg (5000 lbs)	225 Kg (500 lbs)
Sodium Thiocyanate	45 Kg (100 lbs)	45 Kg (100 lbs)	225 Kg (500 lbs)
	Report if released to Drinking Water (DW std at 1mg/L-N)	Report if released to Drinking Water (DW std at 1mg/L-N)	

8.0 DECONTAMINATION

8.1 DNCI's Standard Operating Procedures and safety rules establish work practices that minimize employees' direct and indirect contact with hazardous substances.

8.2 Equipment, rubber boots, gloves and clothes that have been contaminated can be washed with soap and water. Wash water should be collected and disposed of in an approved manner with other contaminated material.

9.0 WORKSITE CLOSURE / SHUT DOWN

9.1 <u>Plant Shutdown</u> **(use appropriate lock-out/tag-out procedures)**

- In the event that a plant is shut down due to weather, flood, or other adverse situation, the Plant Manager / Supervisor or his delegate will ensure that all non-essential power is shut off. The Plant Manager / Supervisor will secure all valves and flow devices so as to prevent accidental opening.
- The Plant Manager / Supervisor shall determine if any raw material or raw material storage will be contaminated or at risk of fire/explosion, and take steps to move the material or isolate it from the contamination / hazard source.
- If the power and/or gas will create a dangerous situation the Plant Manager / Supervisor will cut the outside supply of power, thereby isolating all plant equipment.
- The Plant Manager /Supervisor will advise local Mine authorities of the plant shutdown and preventative actions taken.
- All sensitive documents must be secured.

9.2 <u>Magazine Closure</u> **(use appropriate lock-out/tag-out procedures)**

- In the event that a magazine is closed due to weather, flood, or other adverse situation, the Supervisor/Manager or his delegate will ensure that all non-essential power is shut off. Also, the Supervisor/Manager will ensure that all magazines and compound gates are locked before leaving the site.
- The Supervisor/Manager shall determine if any products or raw materials will be contaminated and take steps to move the material or isolate it from the contamination source.
- If power and/or gas will create a dangerous situation the Supervisor/Manager will cut the outside supply of power, thereby isolating all magazine equipment.

10. RESPONSE TO NATURAL DISASTER

Hurricanes, tornadoes, floods, slides, forest fires, and earthquakes, have the ability to damage or destroy everything in their path. Yet much of the damage or destruction associated with such phenomena is the result of some secondary event, e.g. fallen power lines, ruptured tanks valves, pipes etc. If reasonable warning of an approaching disaster is received, efforts can be made to minimize damage by taking specific preventative measures. These measures are outlined in the following procedures.

1.Consult the Site Supervisor for guidance and proceed according to his direction. **SEE SITE SPECIFIC POTENTIAL HAZARDS APPENDIX 10**
2. If so directed, notify key personnel regarding the action being taken.
3. Collect important files, records and papers for safekeeping.
4. Open main electrical breaker to cut off all power to the site. (The main breaker is marked for easy identification).
5. Secure all buildings and equipment and lock the site gate.
6. Evacuate the site taking mobile equipment to safety.
7. Post Guards on site access routes to monitor the activities of unauthorized personnel.
8. A report of the incident must be submitted to the Area Manager within 24 hours.

10.1 PREVENTIVE MEASURES

10.2 Waste Disposal Permits

If nitrate waste is generated, a disposal permit must be obtained and kept up to date if the product will be disposed of off-site, or in mine tailings. Permits to dispose of other collected waste in the event of spills or leaks (such as described in Section 6.3) must also be obtained in consultation with mine / provincial environmental representatives

10.3 Liquid Containment

All fuel / oil storage tanks must be dyked according to the provisions of Federal and/or Provincial regulations (eg. National Fire Code, Environmental Protection Act), or have a double-walled tank.

A plan must be in place and materials on hand to create a dyke in the event of a large fuel or solution leak or spill or other emergency spill situation.

10.4 Inspection

All site emergency storage areas and equipment must be inspected monthly by qualified personnel, monthly for physical condition and serviceability, and the results recorded according to quality and safety standard operating procedures.

All recommendations/orders made by NRC Explosives Branch inspectors, Fire Marshals and insurance inspectors must be responded to and acted upon accordingly. Copies of their reports are to be forwarded to DNCI's HSE representative for the region.

10.5 **Maintenance**
All preventive and breakdown maintenance must be carried out and recorded in accordance with standard operating procedures.

11.0 WORK SITE START UP (Restoration of Business)

11.1 Before startup, the condition prompting the shutdown / closure must be over / corrected (i.e. flood, fire, explosion or blizzard).

11.2 All decontamination procedures must be followed and the site cleared and cleaned of any environmental waste hazards.

11.3 All repairs to plant equipment involving safety shutdowns and essential operating machinery must be completed.

11.4 All electrical circuits, plumbing and piping must be tested.

11.5 The Work Site Supervisor / Manager will ensure that all lockout and tag-out procedures have been followed and signed off.

11.6 The Work Site Supervisor / Manager will start up the facility by turning on individual switches to the components that have been shutdown.

11.7 Operational checks will be done to ensure that all equipment is functioning at safe working pressures and voltage.

11.8 The Work Site Supervisor / Manager will give the verbal "all clear" before workers will be allowed to return to work.

11.9 The Work Site Supervisor / Manager or one of their delegates will cancel / remove all roadblocks, terminate evacuation activities, and notify employees to return to normal activities.

APPENDIX 1

Basic Investigation Report

(Factual Report not prepared Under Legal Professional Privilege)

Incident Title	
Incident No.	
Incident Date	
Site	
Department / Location	
Report Author	
Report Date	
Investigation Manager	
Investigation Team Members	
Report Distribution	

Who was involved? **name, job, title**
When did it happen? **date & exact time**
Where did it happen? **The exact location**
What was the person doing at the time? **What product or equipment was involved**
What went wrong? **Not your opinion, only factual information. Eg: an operator fell off a ladder, the hose broke; spill / quantity**
What happened? **Describe the sequence and timing of events**
Immediate Control Actions **What first aid treatment was given and or actions taken (valve turned off, electricity isolated) immediately after the incident to make the situation safe**
Interim Control Action **The interim corrective actions to prevent re-occurrence**
5-Why Analysis - Consolidate the information above into a flow chart Double click on chart to enter visio and update as required

Contributing factors **What factors combined to make the situation unsafe – in descending order of importance**
Root Cause **What were the root causes identified in the 5Why analysis – in descending order of importance**

Corrective Action	**Who**	Due Date

Comments

APPENDIX 2

DNCI Corporate contact

Name	Position	Cell number
Benoit Choquette	Environmental Manager - Canada	(514) 246-6285
Seamus Kilcommons	H&S Manager Western Canada	(403) 815-4066
Tim Marles	H&S Advisor Artic	(403) 723-7540
Willard Pierce	Regional Manager West/ Central Canada	(403) 836-9029
Hubert Fafard	H&S Manager Eastern Canada	(418) 570-9257
Greg Brown	Sales Manager Western	(403) 512-5127
Ralph Olson	Operations Manager of Western Canada	(250) 713-8720
Randy Armella	Bulk Operations Manager	(780) 865-6580
Rick Chopp	H&S Manager – Central Canada	(705) 498-2855
Pierre St Georges	Regulatory Affairs Coordinator	(613) 677-1051
Cory Redwood	General Manager Western Canada	(867) 444-8533

APPENDIX 3

DNCI Emergency Response Advisors (ERA) per area

Name	Position	Cell number	Area (West, Central or East)
Tom Medak	Mgr, Bulk operations	(403) 818-4434	West / Arctic
Dennis Wall & Doug Robertson	Meadowbank Operations Supervisors	(867) 793-4610 opt 2 ext 6804 Cell (867) 222-3930	Arctic
Seamus Kilcommons	H&S Manager Western Canda	(403) 815-4066	West
Tim Marles	H&S Advisor Arctic	(403) 723-7540 office	Artic
Tyrone McClean	Operations manager, Manitoba and Saskatchewan	(204) 687-0046	Central
Corey Rachuk	Plant Supervisor – Flin Flon	(204) 687-0028	Central
Joss Forget	Operations Manager Northern Ontario	(705) 471- 8745	East
David Roy	Manager Plant operations	(418) 570-5604	East
Francois Lambert	Operations Manager	(514) 212-3490	East
Daniel Roy	Dyno Consult , Ste-Sophie	(514) 213-5889	East

APPENDIX 4
SITE: QAAQTUQ / Meadowbank Operations

MANAGEMENT AND WORK SITE CONTACT LIST

NAME	TITLE	BUSINESS PHONE	2 WAY RADIO	CELL PHONE
Dennis Wall	Site Supervisor	(867)793-4610 opt#2 ext 6804		(867) 222-3930
Doug Robertson	Site Supervisor	((867)793-4610 opt#2 ext 6804		(867) 222-3930
Tom Medak	Bulk Manager	(403) 236-9160		(403) 818-4434
Tim Marles	H&S Advisor Arctic	403 723-7540		TBA
Seamus Kilcommons	H&S Manager	(403) 236-9160		(403) 815-4066
Benoit Choquette	Environmental Manager	(450) 818-7176		(514) 249-6285
Pierre St George	Regulatory Affairs Coordinator	(613) 632-5844		(613) 677-1051

Agnico-Eagle Mines Ltd. – Meadowbank WORK SITE CONTACT LIST

NAME	TITLE	BUSINESS PHONE	2 WAY RADIO	CELL PHONE
Meadowbank Mine		(867)793-4610		
Julie Belanger	Agnico-Eagle	(867)793-4610 ext 6721		

EXTERNAL CONTACT NUMBERS

ORGANIZATION/CONTACT	LOCATION	PHONE NUMBER
NT Oil & Chemical Spills	Iqaluit, NU	(867) 979-8130
Environment Canada, NT	Yellowknife, NT	(867) 669-4700
NRC / Explosives Branch	Ottawa	(613) 995-5555
RCMP	Baker Lake, NU	(867) 793-1111 or (867)-793-0123
RCMP 'G' Division	Yellowknife, NT	(867)669-5100

APPENDIX 5

Area Office Address:
Agnico-Eagle Mines Ltd. - Meadowbank
PO BOX 540
Baker Lake, Nunavut
X0C 0A0

Type of Facility:
Bulk Explosives Site

Customer/Client Information:
Customer: Agnico-Eagle
Contact:
Title:

Evacuation and Emergency Meeting Place Upon Evacuation:
As identified on site orientation forms (Designated Muster Points)

Emergency Shutdown switch location:

"ONLY A CERTIFIED PERSONELLE ARE TO ACTIVATE THIS SWITCH"

Magazine and Plant Site Address:

Agnico-Eagle Meadowbank Mine

NRC License:

Site Plan and Evacuation Route:
Posted in site offices – site specific orientations required

Site Rescue Plans:
Site Supervisor or designate to conduct review of attendance sheet. If employees, visitors or contractors are unaccounted for, Site Supervisor will advise mine LPO of unaccounted persons and last known location. Site Supervisor shall attend last known location with mine rescue team and jointly determine potential hazards of re-entering area to locate unaccounted for persons. Site Supervisor and Rescue team entering the evacuated area must don all required PPE due to unknown potential dangers that may have come about. Proper fire retardant suits, SCBA and/or other PPE as determine by the site to protect rescuers from becoming overcome by physical, chemical or other hazards. If determined safe to enter site and/ or buildings, a counter clockwise sweep of the area is to be conducted.

Medical Emergencies: In the unlikely event of a medical emergency, the site shall ensure that it is compliant to OH&S Code. As per legislation requirements, the site shall have adequate first aiders and equipment to attend to individuals as required.

All incidents, first aid/ medical treatment/property damage/near miss or other, shall be in compliance with HSE MS Standard 9.2, which meets or exceeds legislative requirments.

Site First Aiders:	LOCATION	PHONE NUMBER
TBA		
Security (Mine Emergency Services –fire, EMS)		

Emergency Equipment On Hand:
Fire Extinguishers, Spill Kits, First Aid Kits, non-sparking shovels as outlined in site plan.

Delivery Vehicles:

Unit #	Vehicle	(EVC/ETP) TC Permit #	Carrying Capacity (80% of Max.)

APPENDIX 6
BOMB THREAT CHECKLIST

Exact time of call:
Exact words of caller:
QUESTIONS TO ASK
1- When is bomb going to explode?
2- Where is the bomb?
3- What does it look like?
4- What kind of bomb is it?
5-What will cause it to explode?
6- Did you place the bomb?
7- Why?
8- Where are you calling from?
9- What is your address?
10- What is your name?

CALLER'S VOICE (circle)

1-	Calm	Slow	Crying	Slurred
2-	Stutter	Deep	Loud	Broken
3-	Giggling	Accent	Angry	Rapid
4-	Stressed	Nasal	Lisp	Excited
5-	Disguised	Sincere	Squeaky	Normal

If voice is familiar, whom did it sound like?	
Were there any background noises?	
Remarks:	
Person receiving call:	Telephone number call received at:
Date:	Report call immediately to:

APPENDIX 7

Dyno Nobel Inc.
JOB-SPECIFIC ORIENTATION CHECKLIST

(Modify as needed to meet site-specific needs)
Employee Name: Job Title:
Location: Hire Date:

CHECK COMPLETED ITEMS. FOR ALL ITEMS THAT ARE NOT APPLICABLE, ENTER "NA" ON THE LINE RETURN COMPLETED AND SIGNED CHECKLIST TO APPROPRIATE HR REPRESENTATIVE

1. JOB SPECIFIC ORIENTATION TO DNA WORK SITE(S)

a. ____ DN Safety & Quality Policy
b. ____ General Safety Rules
c. ____ Site Specific Safety Rules and Instructions
d. ____ Products and Services
e. ____ Tour of Site
f. ____ Rest Rooms, Lockers, Eating Areas
g. ____ Dress and Uniform Standards
h. ____ Personal Protective Equipment
i. ____ First Aid Procedures
j. ____ How to Report Near-Misses and Accidents
k. ____ Workers' Compensation and Return to Work
l. ____ Smoking Policy and Designated Areas
m. ____ Drug and Alcohol Policy
n. ____ Site Emergency and Evacuation Plans
o. ____ Fire Extinguishers
p. ____ DN Crisis Communication Plan
q. ____ Parking and Traffic Plan
r. ____ Security Issues
s. ____ Electrical Hazards
t. ____ Review Job Description
u. ____ Take 5 Program
v. ____ Site Specific SOPs

2. OCCUPATIONAL HEALTH AND SAFETY ACT - REGULATION (OHSA)

a. ____ Mobile Equipment (Forklifts/Bobcats)
b. ____ Review Site MSDS
c. ____ Confined Spaces
d. ____ Lockout/Tagout
e. ____ DNA Hearing Conservation
f. ____ Bloodborne Pathogens
g. ____ Worker's Rights

3. ENVIRONMENT CANADA

a. ____ Spill/Release Reporting
b. ____ Proper disposal of Waste
c. ____ Waste Minimization/Pollution Prevention
d. ____ Used Oil Management
e. ____ Drum/Container Management

4. TRANSPORTATION CANADA (TDG)

a. ____ Road Test
b. ____ TDG Transportation
c. ____ TDG Hours of Service Policy
d. ____ Pre and Post Inspections

5. NATURAL RESOURCES CANADA, EXPLOSIVES SAFETY AND SECURITY BRANCH

a. ____ Site Security Plans / Key Policy
b. ____ Magazine Rules
c. ____ Inventory Accuracy
d. ____ Guidelines for bulk explosive facilities

6. QUESTIONS AND SUMMARY

____ Ask employee if there are any questions or areas of employment not clearly understood. Advise employee what's next.

Comments: ____

___________________________________ ____________ _________________________________ _____________ Employee Signature Date Trainer/Supervisor Signature Date

Job Specific Orientation Page 1 of 1 Canadian Standard Revised 12/17/09

APPENDIX 8

ANNUAL FIRE DEPARTMENT REVIEW FORM

Information to be released to Emergency Services

From: Local Emergency Services

Subject: Emergency Response Plan for ______________________________.

The following is a copy of the Emergency Response Plan that has been prepared by Dyno Nobel Inc. Has been received from _________________ operations. The ERP has been discussed and being kept on file for future reference. If questions arise, we have been given the contact information for the __________________________ operations staff.

Signed:____

Position:______________________________________

Date:____

EMERGENCY RESPONSE REPORT/DEBRIEF TEMPLATE (found in NEXUS Std 9.1)

Site:.. **Date**: .... **Drill or Actual Event** (circle)

Emergency Call placed with: Mine Emergency ☐ 911 ☐

Supervisor/Manager Advised: ☐

Incident Details:

Sequence of Events

Time	Activity	By

Gaps Identified:

	Details of Gaps Identified	*Action Required
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

A report should be raised in SHAERS/ICARUS listing all gaps identified and action required.

Fax completed form to Health & Safety Advisor for your site

APPENDIX 9
Transportation of Dangerous Goods Regulation
Class Quantity Emission Limit

1	Any quantity that could pose a danger to public safety or 50 kg
2	Any quantity that could pose a danger to public safety or any sustained release of 10 minutes or more
3	200 L
4	25 kg
5.1	50 kg or 50 L
5.2	1 kg or 1 L
6.1	5 kg or 5 L
6.2	Any quantity that could pose a danger to public safety or 1 kg or 1 L
7	Any quantity that could pose a danger to public safety. An emission level greater than the level established in section 20 of the *Packaging and Transport of Nuclear Substances Regulations*
8	5 kg or 5 L
9	25 kg or 25 L

Table identified in Section 8.1(1) of Part 8 of the Transportation of Dangerous Goods Regulation Class Quantity Emission Limit

APPENDIX 10

Emergency Risk Assessment

Site Emergency Response Plan should be based upon a risk assessment of all types of probable emergencies and regulatory impact (as found in NEXUS Std 9.1)

Location Date Analysis Completed Completed by:

Emergency Type	Scenario(s)	Safeguards	Historical Frequency	Future Risk Potential	Loss Severity Rate	Probable Emergency 8+ to be in plan	Regulatory Notifications	Actions / Remarks
Bomb Threat								
Chemical Spill/Release								
Security								
Explosion								
Fire								
Loss/Theft of Explosives								
Equipment								
Process Loss/Interruption								
Catastrophic Injury/Illness								
Trespassing/Vandalism								
Extreme Temperatures								
Earthquake								
Hurricane								
Tornado								
Severe Flooding								
OFF SITE								
Blast Site Incident								
Fire (Forest/Brush)								
Neighboring Facility Incident								
Transportation Vehicle Accident								
Transportation Fire/Explosion Incident								
Transportation Chemical Spill								
Transportation Vehicle Breakdown								

Emergency Assessment Score Information **- Use to evaluate Emergency Type level of risk**

Historical Frequency	Score	Future Risk Potential	Score	Loss Severity Rate	Score	Probability Total A & B (8+) to be in plan
Several Time per Year	5	Several Time per Year	5	Catastrophic	5	
One Time per Year	4	One Time per Year	4	Major/Critical	4	12 or higher
Once Every 3-5 Years	3	Once Every 3-5 Years	3	Serious	3	8-11
Less than Once Every 10 Yrs	2	Less than Once Every 10 Yrs	2	Negligible- No Loss	2	Less and 8
Very Unlikely to Happen Ever	1	Very Unlikely to Happen Ever	1	No Loss Occurrence	1	

APPENDIX 4

MSDS FOR BULK EMULATION AND PRESPLIT

1. MSDS – Dyno Gold Lite Bulk Emulsion

2. MSDS – Detagel Presplit

Material Safety Data Sheet

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1052
Date [redacted]

Supercedes
MSDS # 1052 03/21/05
Added Dyno® RG3

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):
DYNO GOLD® C, DYNOGOLD® C EXTRA
DYNO GOLD® C LITE, DYNO GOLD® C LITE SUPER
DYNO GOLD® CS LITE
DYNO GOLD®, DYNO GOLD® LITE
DYNO GOLD® B, DYNO GOLD® B LITE
HD
1116, 1126P, 1136P, 1146P
IREMEX 362, IREMEX 562, IREMEX 762, IREMEX 764
RJ5
RG1-A
RUG-1 (Canada Only)
DX 5007; DX 5010
DX 5013; DX 5013G; DX 5013 PB
TITAN®XL1000
TITAN® 1000, TITAN® 1000 G, TITAN® PB 1000
DYNO® RG3

Product Class: Bulk Emulsion

Product Appearance & Odor: Translucent to opaque, viscous liquid. May be silvery in color. May have fuel odor.

DOT Hazard Shipping Description:
As Transported:
Oxidizing Liquid, n.o.s. (Ammonium Nitrate) 5.1 UN3139 II
After Blending with Density Control Agent On-site:
Explosive, Blasting, Type E 1.5D UN0332 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients:	CAS#	% (Range)	ACGIH TLV-TWA
Ammonium Nitrate	6484-52-2	30-80	No Value Established
Sodium Nitrate[1*]	7631-99-4	0-15	No Value Established
Calcium Nitrate	10124-37-5	0-35	No Value Established
Fuel Oil	68476-34-6	0-10	100 ppm
Mineral Oil	64742-35-4	0-7	5 mg/m^3
Aluminum *	7429-90-5	0-5	10 mg/m^3

Material Safety Data Sheet

[1] Our source of Sodium Nitrate (Chilean) may contain perchlorate ion, which occurs naturally. Although Dyno Nobel does not analyze for the presence of perchlorate anion, based on published studies, the products listed above may contain between 0 and 300 ppm perchlorate.
* The hazardous ingredients marked with an asterisk are not found in the majority of listed products.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: (Air = 1) Not Applicable
Percent Volatile by Volume: <30

Evaporation Rate (Butyl Acetate = 1): <1

Vapor Pressure: Not Applicable
Density: 0.8 - 1.5 g/cc
Solubility in Water: Nitrate salts are completely soluble, but emulsion dissolution is very slow.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable
Flammable Limits: Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures Section)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials or emulsion explosive precursors. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: May explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: Can cause irritation, redness and tearing.
Skin: Prolonged contact may cause irritation.
Ingestion: Large amounts may be harmful if swallowed.
Inhalation: May cause dizziness, nausea or intestinal upset.
Systemic or Other Effects: *Perchlorate*: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Remove contaminated clothing. Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Remove to fresh air. If irritation persists, seek medical attention.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions. May explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and strong bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Gloves and work clothing that reduce skin contact are suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Keep away from heat, flame, ignition sources and strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications.

SECTION X - SPECIAL INFORMATION

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listings of the previously referenced regulation should be reviewed.

Material Safety Data Sheet

Disclaimer

Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

Detagel Presplit

Material Safety Data Sheet

5700 N. Portland, Suite 301 / Oklahoma City, OK 73112 / Phone: (405) 947-0765 / Fax: (405) 947-0768

SECTION 1 - PRODUCT INFORMATION

TRADE NAME:	Presplit
SYNONYM:	NA
CHEMICAL FAMILY:	Watergel Slurry High Explosive
FORMULA:	Mixture
CAS NUMBER:	None
UN/NA NUMBER:	UN0241
DOT HAZARD CLASS:	Explosive, Blasting, Type E, Class 1.1 D

SECTION 2 - HEALTH ALERT

DANGER - If misused or disposed of improperly, material could explode and cause death or serious injury.
DO NOT HANDLE WHEN IN DOUBT!!
See section VIII - Personal Protection
CHEM-TEL, INC. (800) 255-3924.

SECTION 3 - HEALTH HAZARD INFORMATION

EYE: May cause moderate irritation.
SKIN: May cause moderate irritation characterized my redness and/or rash.
INHALATION: Inhalation of decomposed products may irritate the respiratory tract. Prolonged exposure to these fumes may result in respiratory difficulties (shortness of breath, etc.) and possibly more severe toxic effects.
INGESTION: Swallowing large quantities may cause toxicity characterized by dizziness, bluish skin coloration, methemoglobinemia, unconsciousness, abdominal spasms, nausea, and pain.

SECTION 4 - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: Flush with large amounts of water. Seek medical aid.
SKIN CONTACT :Remove contaminated clothing. Wash skin thoroughly with soap and water.
INHALATION: Remove from exposure. If breathing stops or is difficult, administer artificial respiration or oxygen. Seek medical aid.
INGESTION: Give 8-16 oz. of milk or water. Induce vomiting. Seek medical aid.

SECTION 5 - RECOMMENDED OCCUPATIONAL EXPOSURE LIMIT/ HAZARDOUS INGREDIENTS

EXPOSURE LIMIT (PRODUCT): None required for product. *React to form Hexaminedinitrate

HAZARDOUS INGREDIENTS:	PERCENT	EXPOSURE LIMIT	PPM	MG/M3
Ammonium Nitrate	<65%	NONE		
Sodium Nitrate	<20%	NONE		
Sodium Perchlorate	<7%	NONE		
Nitric Acid*	<5%	ACGIH - TLV	2	5
Hexamine*	<15%	NONE		
Aluminum	<7%	ACGIH - TLV		
Pentaerythritol Tetranitrate	<2%	NONE		

NOTE: All ingredients are present in a gelled slurry matrix and individual hazard may not be present in this formulation.

SECTION 6 - REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Heat (confinement); Stacking (burning).
INCOMPATIBILITY: Can react violently or explode, with reducing agents and organic materials. Avoid amines, strong alkalies & acids. ***HAZARDOUS REACTION / DECOMPOSITION PRODUCTS:*** At high temperatures, especially >374 F, may emit severe toxic fumes of nitrogen oxides. ***CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION:*** Not applicable.

SECTION 7 - FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT & METHOD: NA ***AUTO IGNITION TEMPERATURE:*** Explodes ***FLAMMABLE LIMITS (% BY VOLUME/AIR): LOWER:*** NA ***UPPER:*** NA ***EXTINGUISHING MEDIA:*** Water ***FIRE-FIGHTING PROCEDURES:*** When explosive is burning, ***EVACUATE AREA.*** Avoid breathing vapor. Don't disturb fire, as dusty cloud containing aluminum may form explosive mixture with air. ***FIRE & EXPLOSION HAZARDS:*** Dangerous when exposed to heat or flame. Can support combustion of other materials involved in a fire and is capable of undergoing detonation if heated to high temperatures, especially under confinement including being piled on itself in a burning fire. When heated to decomposition, highly toxic fumes may be emitted. Do not return to area of explosion until smoke and fumes have dissipated. Dry alkali or amine salts are explosive.

Detagel Presplit

Material Safety Data Sheet

SECTION 7 - FIRE AND EXPLOSION HAZARD INFORMATION (con't.)

Internally, product contains detonating cord, consisting of flexible cord with and explosive core of PETN (pentaerythritol tetranitrate) within a textile casing covered by a seamless polyethylene jacket. This portion, if removed from the cartridge, may explode when subjected to fire or shock. PETN crystals, if separated or spilled, are substantially more sensitive to initiation by impact and friction than other components of the product, and care should be taken to avoid shock, friction, and excessive heat.

SECTION 8 - PERSONAL PROTECTION INFORMATION

EYE PROTECTION: Safety goggles approved for the handling of explosives materials.
SKIN PROTECTION: Neoprene, natural rubber, polyethylene or polyvinyl chloride gloves. Use barrier creams, hand protection and protective clothing. ***RESPIRATORY PROTECTION:*** Not normally required. Mechanical filter or supplied air type respirator as required for concentrations exceeding the occupational exposure limit.
VENTILATION: Maintain adequate ventilation. Use local exhaust if needed.

SECTION 9 - PERSONAL HANDLING INSTRUCTIONS

HANDLING: Explosives should not be abandoned at any location for any reason. Do not handle during electrical storms.
STORAGE: Store in a cool, dry, well-ventilated area remote from operations. Storage area should be of non-combustible construction and in accordance with appropriate BATF regulations. Organic materials, flammable substances and finely divided metals should be stored separately. Flames, smoking and unauthorized personnel are prohibited where this product is used or stored. Protect against physical damage, static electricity and lightning.
WARNING: Use of this product by persons lacking adequate training, experience and supervision may result in death or serious injury. Obey all Federal, State, and local laws / regulations applicable to transportation, storage, handling, and use of explosives.
DISTANCE: Always stay from area of explosion or disposal sites. Stay behind suitable barriers.

SECTION 10 - SPILL & LEAK PROCEDURES

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED (IN ADDITION, SEE SECTION 8): Isolate area. Eliminate ALL sources of ignition. Avoid skin contact. Scrape up. Remove soiled clothing.
WASTE DISPOSAL - USE APPROPRIATE METHOD(S): Disposal of unexploded or deteriorated explosives material can be hazardous. Expert assistance is positively recommended in destroying explosives. Accidents can be prevented by thorough planning and handling in accordance with approved methods. Consult your supervisor, or the nearest SEC Regional Office for assistance. If improperly disposed of, material could explode and cause death or serious injury.

In all cases, follow facility emergency response procedures. Contact Facility Environmental Manager for assistance. Report any discharge of oil or hazardous substance that may enter surface waters to the National Response Center (800) 424 - 8802.

Observe all applicable local, state, and federal environmental spill and water quality regulations.

SECTION 11 - PHYSICAL DATA

BOILING POINT: NA ***BULK DENSITY:*** 1.25 g/cc ***MELTING POINT:*** NA ***%VOLATILE BY VOLUME:*** NA
VAPOR PRESSURE: NA ***EVAPORATION RATE (ETHER=1):*** NA ***SOLUBILITY IN WATER:*** Negligible with short term exposure
APPEARANCE/ ODOR: Odorless ,gray/white gel packaged in polyethylene cartridges ***DECOMPOSITION POINT:*** 200 C

SECTION 12 - COMMENTS

This product is classified as a Class 1.1D High Explosive and must be stored in a high explosive magazine. Storage should be in a well constructed, well ventilated, dry structure located to conform with local, state, and federal regulations. The area surrounding an explosive magazine must be kept clear of combustible materials for a distance of 50 feet. Magazine floors and containers must be properly cleaned. Normal operating conditions are assumed unless otherwise stated. If any given information is not clear or does not apply to your situation, STOP, store the material suitably, and seek correct help from your supervisors, Institute of Makers of Explosives or Slurry Explosive Corporation.

Disposal sites must be clear of people at the time of disposal.

NOTICE: The data and recommendations presented herein are based upon data which are considered to be accurate. However, SEC makes no guarantee or warranty, either expressed or implied, of the accuracy or completeness of these data and recommendations. For more detailed information on the hazards of this product, contact the Regulatory Compliance Department at the address below:

Slurry Explosive Corporation
P. O. Box 348
Columbus, Kansas 66725
(620) 597-2552

Revised 6-2001

APPENDIX 5

EMULSION PLAN / BLAST AREA INSPECTION SHEET

Environmental Inspection Report for the Emulsion Plant Area and the Loading of Blast Holes

Date: **Inspected By:**

Location: Emulsion Plant

Weekly Inspection

In Compliance with	Subject	Conform	Non-conform	N/A	Comments
NWB Part B Item 15	Sign posted to inform of a waste disposal facility				
NWB Part D Item 29 MBK SCP NIRB Condition 26	Are there any visual spills?				
NWB Part F Item 19	All Hazardous Waste disposal is located 30m from the ordinary high water mark.				
NWB Part H Item 3	Resources in place to prevent any chemicals, petroleum products, or unauthorized Wastes from entering a water body.				
NWB Part H Item 4 Ammonia Management Plan	Is secondary containment for chemical storage provided.				
NWB Part I Item 9	Monitoring signs are posted in English, French, and Inuktitut.				
MBK SCP	Spill Kits Present				
NIRB Condition 26	Ensure that spills, if any, are cleaned up immediately and that the site is kept clean of debris, including wind-blown debris.				
NIRB Condition 25	Management and control waste in a manner that reduces or eliminates the attraction to carnivores and/or raptors.				

NIRB Condition 27 Ammonia Management Plan	Ensure the hazardous material are contained using environmentally protective methods based on practical best management practices				
	Are storage containers clearly labelled to identify Hazardous substance?				
Ammonia Management Plan	Are storage containers in good condition? Is there any visible damage or leaks? Can the doors be sealed shut?				
Ammonia Management Plan	Where necessary – Are containers with product stored in an upright position?				
Ammonia Management Plan	Do you see any potential environmental hazards posed by these HAZARDOUS containers/materials?				
BMP	Are there any additional environmental hazards/potential impacts that require attention?				
MINE ACT	Are there any Health and Safety issues that should be addressed to prevent injury to workers?				

Pit Location: **Blast Pattern#**

In Compliance with	Subject	Conform	Non-conform	N/A	Comments
NWB Part D Item 29 MBK SCP NIRB Condition 26	Are there any visual spills, including emulsion?				
Ammonia Management Plan	Is there presence of Emulsion outside of the holes that are being loaded?				
NWB Part F Item 19	All Hazardous Waste disposal is located 30m from the ordinary high water mark.				

NWB Part H Item 3	Resources in place to prevent any chemicals, petroleum products, or unauthorized Wastes from entering a water body.				
NWB Part H Item 4 Ammonia Management Plan	Is secondary containment for chemical storage provided?				
NIRB Condition 27 Ammonia Management Plan	Ensure the hazardous material are contained using environmentally protective methods based on practical best management practices				

Comments/Recommendations:

Environmental Personnel Name:

Signature: ______________________________

Actions Corrected:

____

____

____

____

____

Site Service Supervisor Name: ______________________________

Signature: ______________________________

Picture 1:

Picture 2:

Picture 3: