AGNICO EAGLE

MEADOWBANK GOLD MINE

2015 WATER MANAGEMENT REPORT AND PLAN

OCTOBER 2015

VERSION 03

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 2014 that provides a revised site-wide water balance. The revised water balance will determine 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.

Recommendations and requirements concerning the water use and management, the water balance and the water quality modelling and outlined in the *document Water License: 2AM-MEA1525 Reasons for Decision Including Record of Proceedings* from the Nunavut Water Board will be included in the next version of the Meadowbank Water Management Plan Report which will be submitted with the Meadowbank Annual Report 2015 (March 31, 2016). The Water Management Plan will be updated on a yearly basis as required by the Nunavut Water Board Water Licence 2AM-MEA1525.This will include an updated Water Quality modelling forecast yearly. AEM conducts this modelling to determine if treatment prior to transfer of the South Cell reclaim water would require treatment, if treatment would be achievable in situ after transfer or if no treatment is necessary. Prior to transfer of main volume of South Cell water the model forecasts will be consulted and a decision will be made. However, it is important to note that AEM will not breach the dikes until the water quality meets CCME Guidelines for the Protection of Aquatic Life. Also,water quality concentrations for parameters of concern that are not included in the CCME guidelines will be similar to or within background concentrations of those parameters.

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	-	Updated items mentioned by NWB in the "Reasons for decision including record of proceedings" document.

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

Section 1.0 - 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 23rd, 2015.

This report presents an updated version of the Water Management Plan 2014 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.

The Vault data presented in this report is derived from the actual dewatering process that was undertaken in 2013 and 2014. Runoff values and pit inflows for the Vault area were determined from the SNC Lavalin Water Management Plan 2012 (SNC, 2013) until runoff values can be verified and revised with field observations.

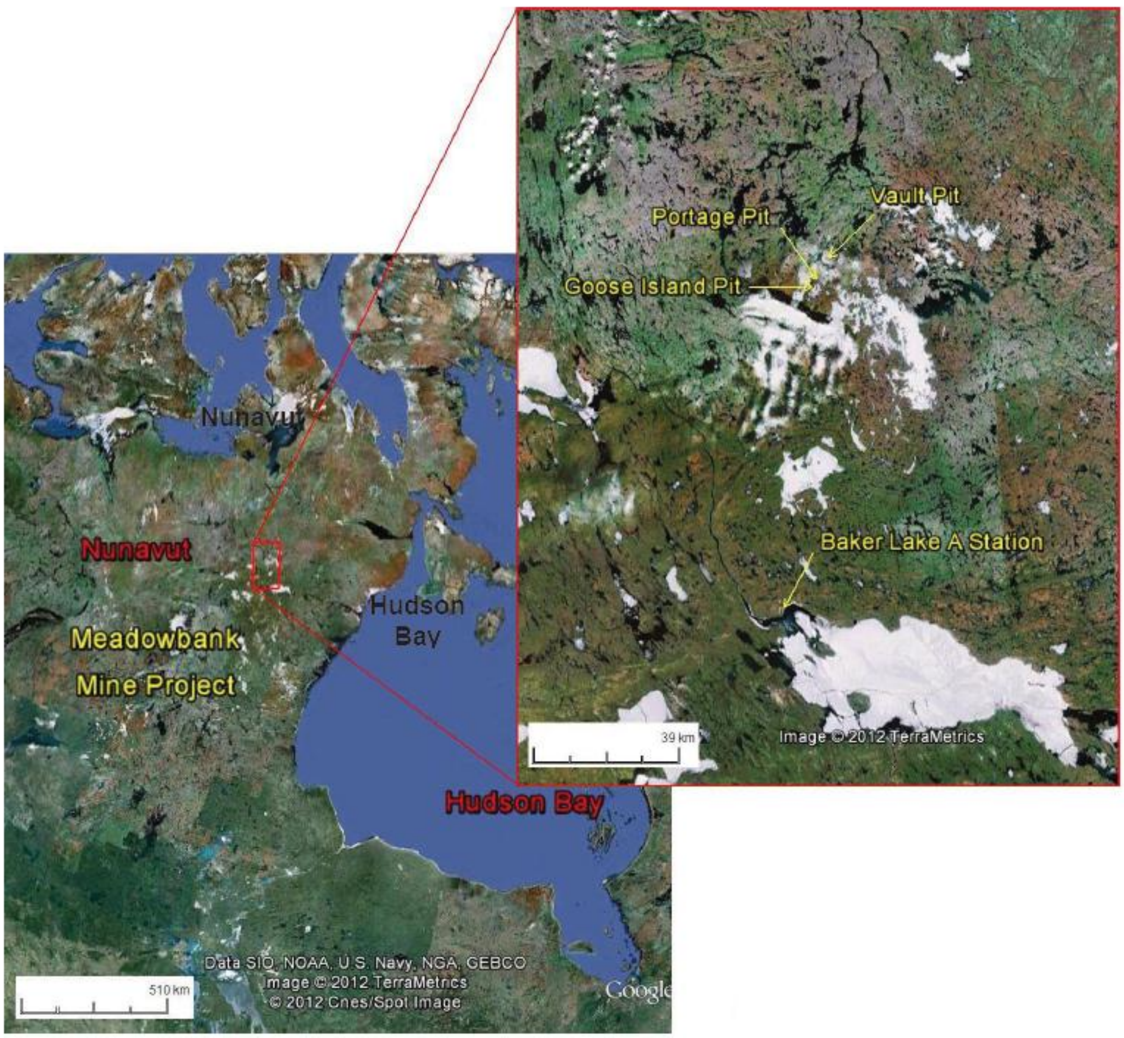
Recommendations and requirements concerning the water use and management, the water balance and the water quality modelling and outlined in the *document Water License: 2AM-MEA1525 Reasons for Decision Including Record of Proceedings* from the Nunavut Water Board will be included in the next version of the Meadowbank Water Management Plan Report which will be submitted with the Meadowbank Annual Report 2015 (March 31, 2016). The Water Management Plan will be updated on a yearly basis as required by the Nunavut Water Board Water Licence 2AM-MEA1525. This will include an updated Water Quality modelling forecast yearly. AEM conducts this modelling to determine if treatment prior to transfer of the South Cell reclaim water would require treatment, if treatment would be achievable in situ after transfer or if no treatment is necessary. Prior to transfer of main volume of South Cell water the model forecasts will be consulted and a decision will be made. However, it is important to note that AEM will not breach the dikes until the water quality meets CCME Guidelines for the Protection of Aquatic Life.

Section 2.0 - 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 ecoclimate 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.

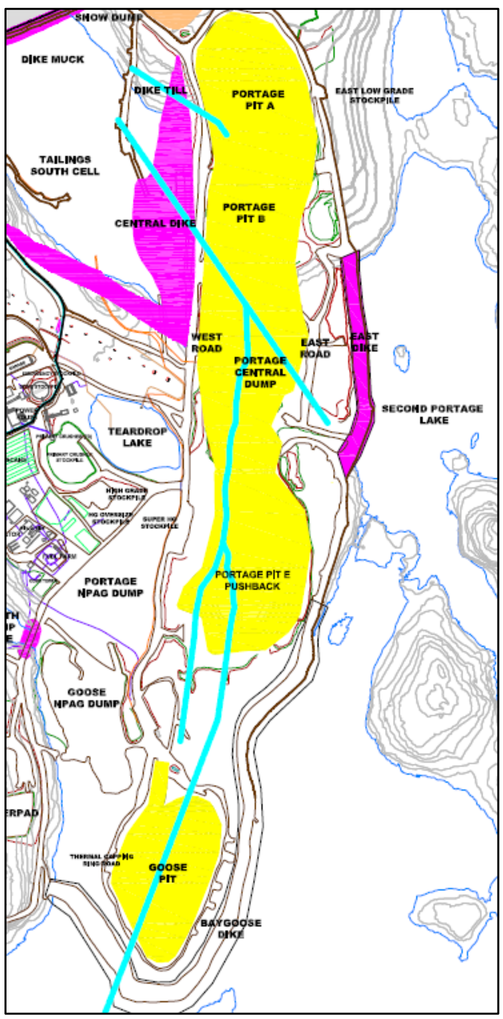
The prevailing winds at Meadowbank for both the winter and summer months are from the northwest. A maximum daily wind gust of 93 km/h was recorded on September 1, 2009. Light to moderate snowfall is accompanied by variable winds up to 70 km/h, creating large, deep drifts and occasional whiteout conditions.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

The 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 were 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 little seepage potential. To date Central Dike has been completed to elevation 132m.

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) are expected where water depth is 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 is 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.

A thermal monitoring plan, which meets the requirement of the Water Licence, is presented in Section 8 of this document.

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 probility distribution to determine the annual precipitation for different return periods. The results of this statistical analysis can be seen in Table 2.2.

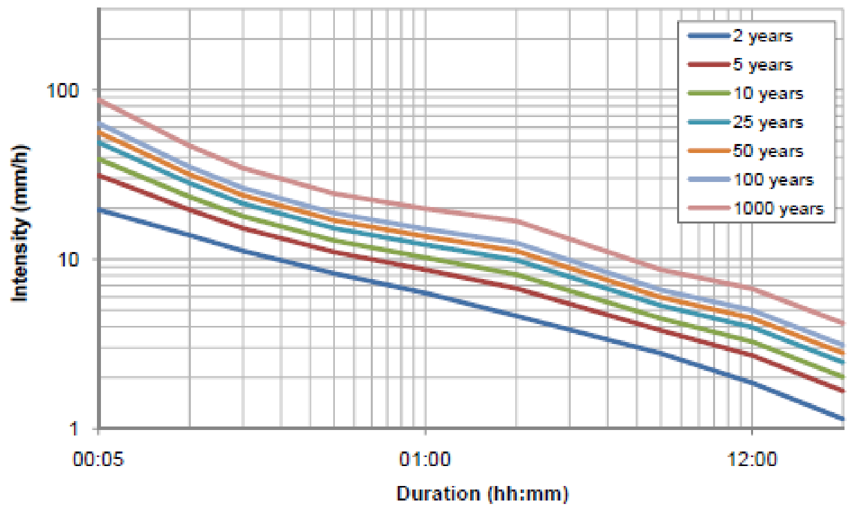
Table 2.2: Total annual precipitation for varying return periods

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

Source: SNC-Lavalin Water Management Plan 2012

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 2012

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), Portage (South, Center and North Portage deposits), and Goose.

The South Portage deposit is located on a peninsula, and extends northward under 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 is 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) are 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 and Stormwater Dikes, Saddle Dam 1 and Saddle Dam 2 were all constructed within the past 5 years. The dikes were and will be constructed primarily using materials produced on site.

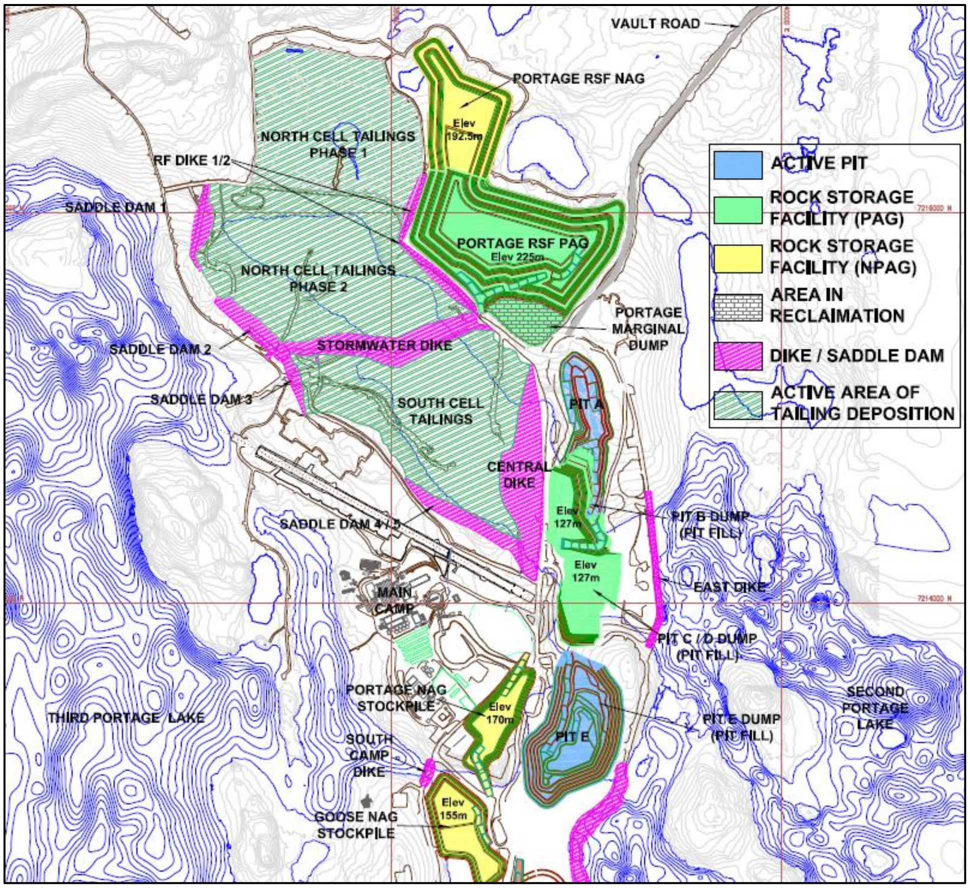
Mining of Portage pit began in early 2010 is conducted via truck-and-shovel open pit operation under the terms established by the Water License. Any modifications to the dewatering process, LOM, TSF and any other aspect associated to the water management must be followed with a yearly update of the Meadowbank Water Management plan and water balance.

2.2.1 Portage Pit Area

The Portage area located between the 3PL and 2PL contains most of the infrastructure of the Meadowbank mine site including but not limited to the Rock Storage Facility (RSF), North and South Tailings Storage Facilities (NC & SC TSF), mill 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 new nomenclature for each pit (A, B, C, D and E). Mining in Pits B, C, D are now completed and are currently subject to pit infilling operations. See Figure 2.4 below for the current Portage Pit and surrounding infrastructure.

In 2014 and likely continuing through 2015, the majority of the water entering Portage Pit has been observed to be coming from the East Dike wall, due to seepage through the East Dike from Second Portage Lake (2PL). This is controlled via two seepage collection points. From the collection points the water is pumped to a common pipe and discharged back into 2PL. 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 backfill toward Pit B and Pit E. If necessary the water is pumped to the South Cell Reclaim Pond. Another major 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 waters. AEM is currently monitoring this water quality in accordance with the Water License. Pits A, B and E are located in the permafrost and a minimal amount of water has been observed historically. All water pumped from the Portage Pits is directed to the now operational South Cell TSF (formerly the Portage Attenuation Pond). During closure the East Dike seepage and any water associated with Pit C and D will form part of the pit reflooding.

Figure 2.4: Portage Pit area map

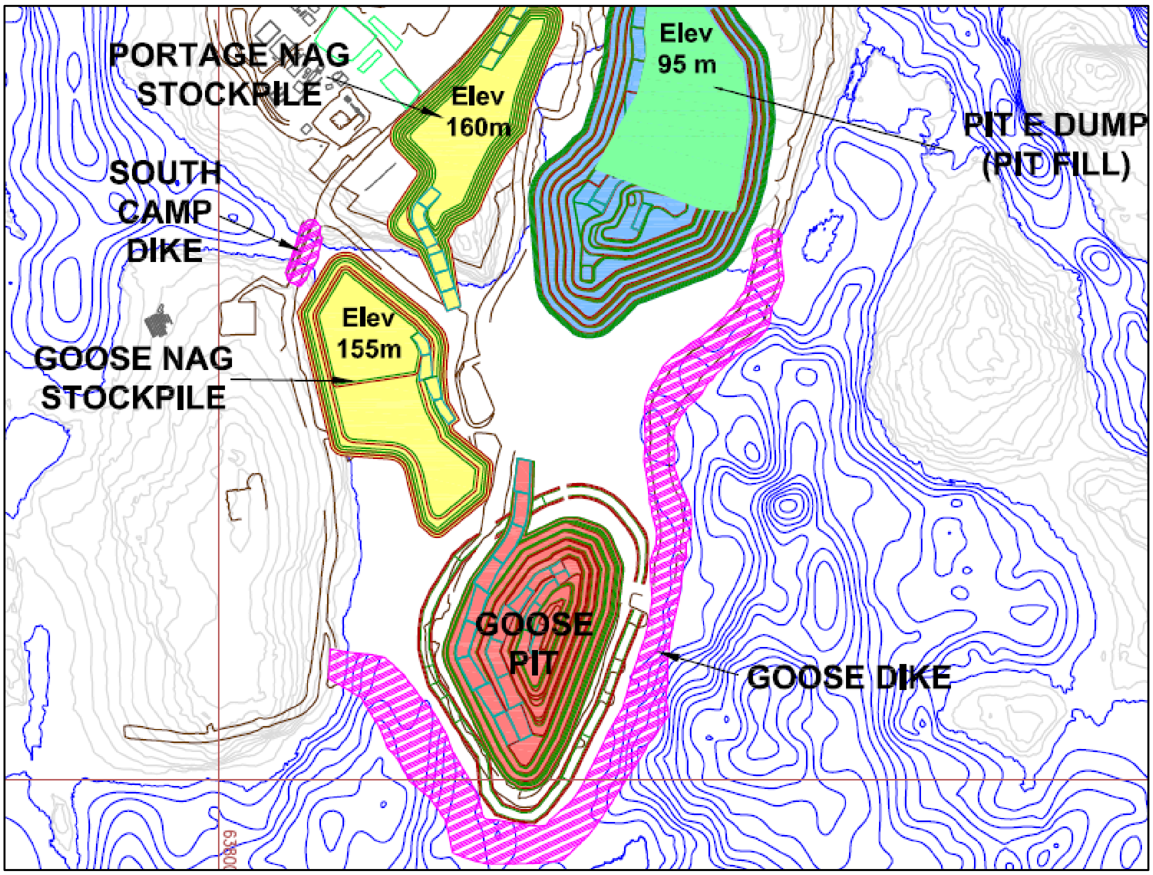


2.2.2 Goose Pit Area

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 is expected to be completed by the end of March 2015. After mining is complete Goose Pit will be an attenuation pond while it is being re-flooded as part of the final closure. The Goose Pit area and surrounding infrastructure are illustrated below in Figure 2.5.

The majority of the water entering Goose Pit has been observed coming from the South and West wall adjacent to the Goose dike due to natural inflow from the fractured quartzite rock formation. No major water inflow is observed on the Eastern wall associated with iron formation 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 explains the water in flow. Areas of the pit bottom are not in permafrost which infers a talik area. The water is 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 is directed to the South Cell Reclaim pond. Once mining is completed, the inflow will be allowed to collect in pit as part of the natural reflooding process. Field observations reveal that as the pit gets deeper, inflows are increasing due to a higher hydraulic gradient. AEM will utilize some of this inflow water in 2016 to supplement the South Cell TSF reclaim pond.

Figure 2.5: Goose Pit area map

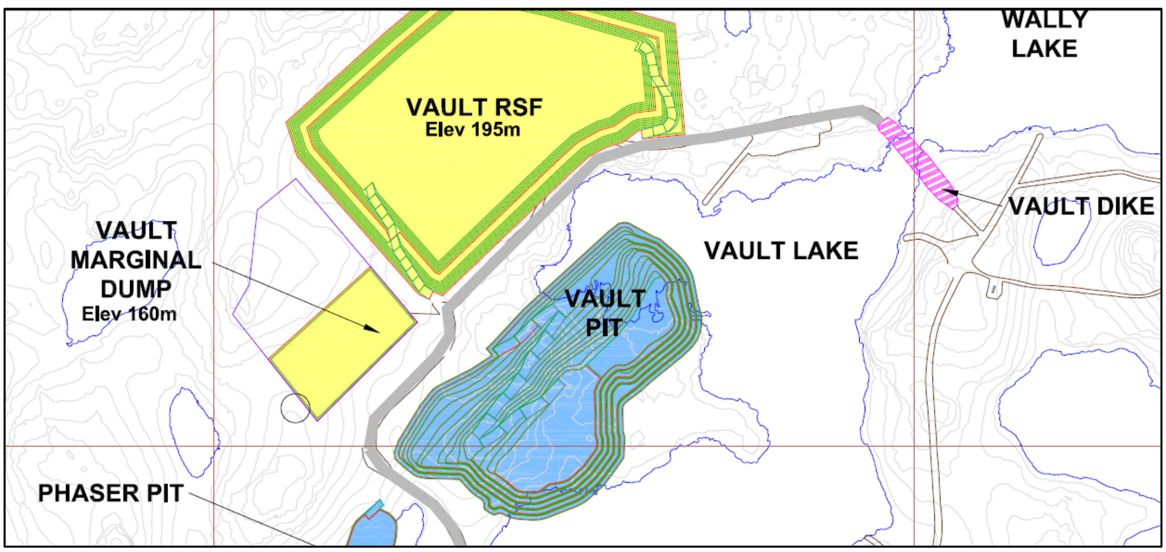


2.2.3 Vault Pit Area

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. 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 2017. Figure 2.6 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. No major water inflow has been observed to date originating from the pit walls. However, occurences of small pressurized isolated pockets of water are sometimes found while drilling. 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.

Figure 2.6: 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. An update to the pit designs has caused an expansion to Phase 3 of Portage Pit E. The specifics of the expected monthly milling tonnage is summarized in Table 2.3 seen below.

Table 2.3: Current official LOM figures – Processed ore tonnages

	2015	2016	2017
January	361 119	349 618	341 992
February	319 648	327 062	308 896
March	318 618	349 618	341 992
Q1	*999,385*	*1,026,298*	*992,880*
April	346 230	335 790	330 960
May	320 509	346 983	341 992
June	350 160	335 790	330 960
Q2	*1,016,899*	*1,018,563*	*1,003,912*
July	357 182	343 139	350 300
August	320 416	343 139	350 300
September	351 840	332 070	100 324
Q3	*1,029,438*	*1,018,348*	*800,924*
October	360 406	346 053	-
November	318 060	334 890	-
December	367 598	346 053	-
Q4	*1,046,064*	*1,026,996*	*-*
Total	***4,091,786***	***4,090,205***	***2,797,716***

2.3.1 Changes from the Water Management Plan 2013

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:

- Goose and Vault Pit modifications;
- Updated truck mining fleet;
- Updated stockpile status;
- Modification to the Central waste rock storage (pit) design and overall volume.

In 2014 the above mentioned modifications added two months to the tailings storage requirements as well as slightly affecting the pit flooding curves. In addition to the changes in the LOM, many other revisions/modifications were made to the water balance in 2014- 2015 that lead 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;
- 3PL elevation change affecting reflooding requirements;
- Dewatering of Phaser Lake – when approved by regulatory agencies;
- Updating the seepage section;
- Changes in tailings dry density as observed through 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.

Section 3.0 - WATER MANAGEMENT PLAN AND WATER BALANCE

3.1 GENERAL WATER MANAGEMENT STRATEGY

At Meadowbank, four major sources of inflow water are considered in the site water management system on site: freshwater pumped from Third Portage Lake, natural pit groundwater inflow, seepage inflow from the East Dike and freshet water. This water is utilized and removed from the inflow (outflow) by the following means: water treatment plant effluent from the attenuations ponds (former Portage ATP (now South Cell TSF – no longer an outflow source) and Vault Lake ATP), water trapped in the capillary voids of the tailings fraction at the TSF's, East Dike seepage discharge into Second Portage Lake and water trapped within the in-pit central waste rock storage area voids.

The complimentary water balance is subdivided into the following headings: Fresh Water from Third Portage, Reclaim Tailings Water to the Mill from the North and South Cell TSF's, Portage Pit, Goose Pit sumps Water Transfers, Model Parameters, East Dike Seepage pumped to Second Portage Lake, Vault Pit sumps water transfer to Vault ATP, Vault ATP discharge to Wally Lake and Phaser Lake (once approved). 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 recommendations and requirements concerning the water balance outlined in the document Water License: *2AM-MEA1525 Reasons for Decision Including Record of Proceedings* from the Nunavut Water Board as per the Water License 2AM-MEA1525 (Part E, Item 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. The updated water balance will be presented in the next version of the Meadowbank Water Management Plan Report to be presented with the Meadowbank Annual Report 2015 (Macrh 31, 2016).

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 91,531 m^3/month in 2014 (expected average 82,540m^3/month in 2015) and the camp that averaged 2890m^3/month in 2014.

The freshwater going to the mill is used in the milling process and will be discharged with the tailings as a slurry. Once in the TSF the total water volume is comprised of 40% free reclaim water (recycled back to the mill as process water) 30% entrapped within the capillary void space of the tailings and a further 30% is entrapped within the TSF as ice (60% total entrapped in TSF). The water entrapment within the TSF represents annual averages 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).

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 Portage pit during the reflooding operation.

The total expected fresh water utilization planned for 2015 to mine closure varies from 90-150m^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, does not include pit reflooding). The variation seen in the fresh water consumption during the mill operation is calculated to prevent a water deficit in our TSF and allows for adequate reclaim volumes. During the summer months, 90m^3/hr is targeted, meanwhile, during the winter months up to 150m^3/hr is required in order to maintain an adequate reclaim water volume in the TSF as seen in Table 3.1. The ice cover during the winter months on the reclaim pond will vary between 0.0-1.8m in thickness which may represent up to 80% of the total reclaim water volume. For this reason, the water balance is completed hand in hand with the tailings deposition plan.

In 2014 AEM used 1,098,373 m^3 of freshwater. Table 3.1 and 3.2 summarize and project the water consumption until the end of the mine life. More details are included in the water balance presented in Appendix 1.

Adjustments at the mill and in the water management strategies has led to adjusted fresh water consumption. As of 2018 when the mill is scheduled to cease production freshwater use will be limited to pit reflooding as per the Interim Closure Plan (Golder, 2014) and for camp use. Figure 3.1 presents the 2015 mill water consumption per month and yearly values are summarized in Table 3.2. Refer to Section 3.3 for the pit reflooding activities description and freshwater needs.

Table 3.1: 2015 Targeted water hourly consumption per month

Month	Fresh Water Flow (m^3/h)	Reclaim Water Flow (m^3/h)	Total Water Flow (m^3/h)
January	150	260	410
February	150	260	410
March	150	260	410
April	150	260	410
May	90	320	410
June	90	320	410
July	90	320	410
August	90	320	410
September	90	320	410
October	90	320	410
November	110	300	410
December	110	300	410
Average	**113**	**29**	**410**

Figure 3.1: Flow to the mill

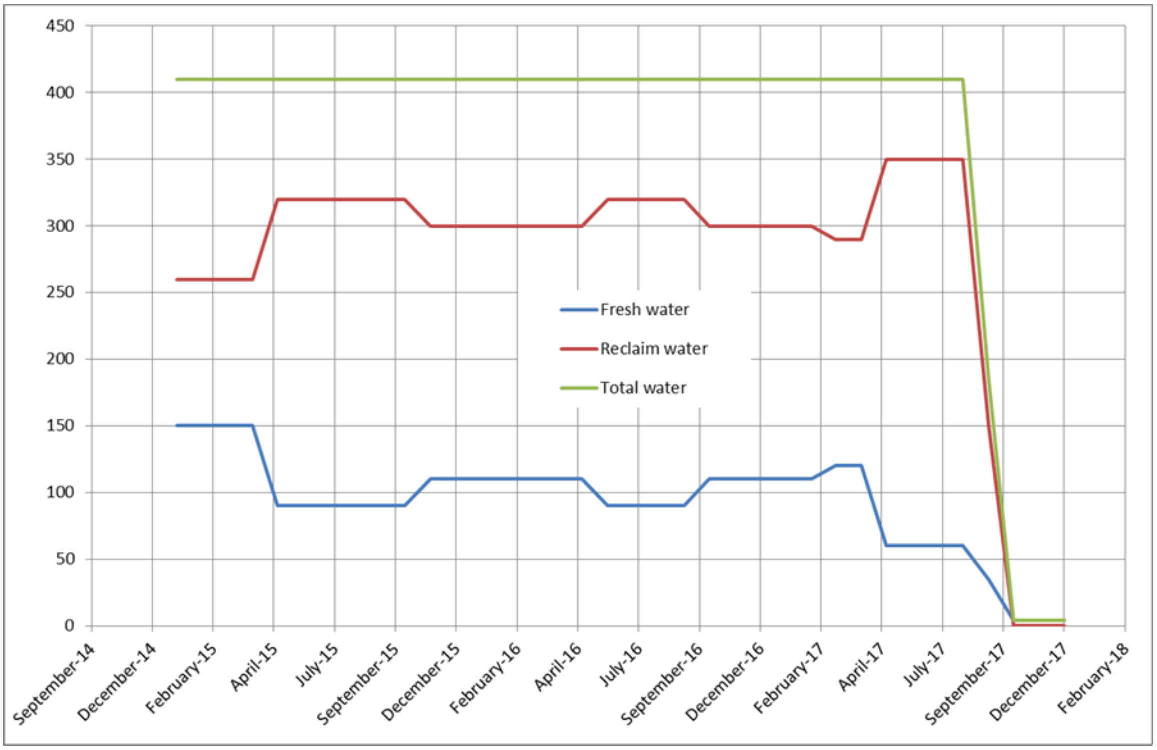


Table 3.2: Yearly water consumption summary

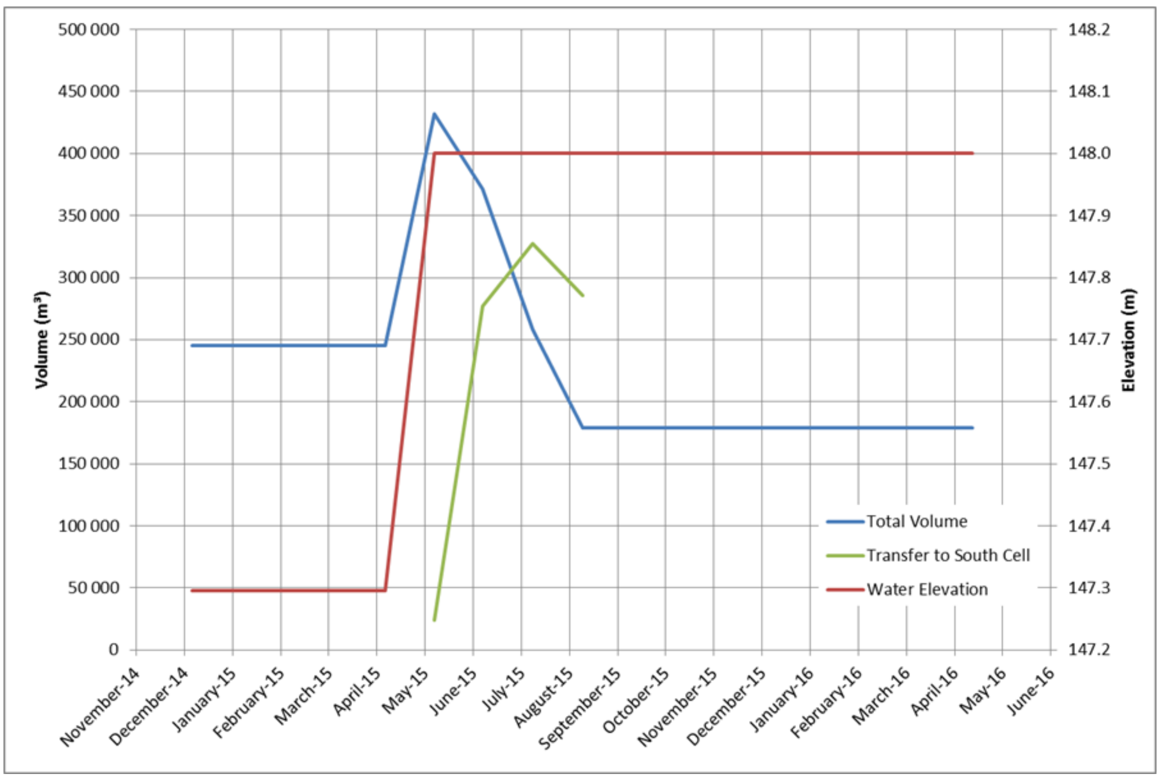
Year	Fresh Water Flow (m^3/h)	Total Fresh Water (m^3)	Reclaim Water Flow (m^3/h)	Total Reclaim Water (m^3)
2013	181	1,587,409	261	2,286,400
2014	125	1,098,373	279	2,447,002
2015	113	990,480	297	2,601,120
2016	103	907,680	307	2,693,760
2017	62	542,561	228	1,990,560
2018-2025	4	34,675	0	0

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 laid down on the ice sheet 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.

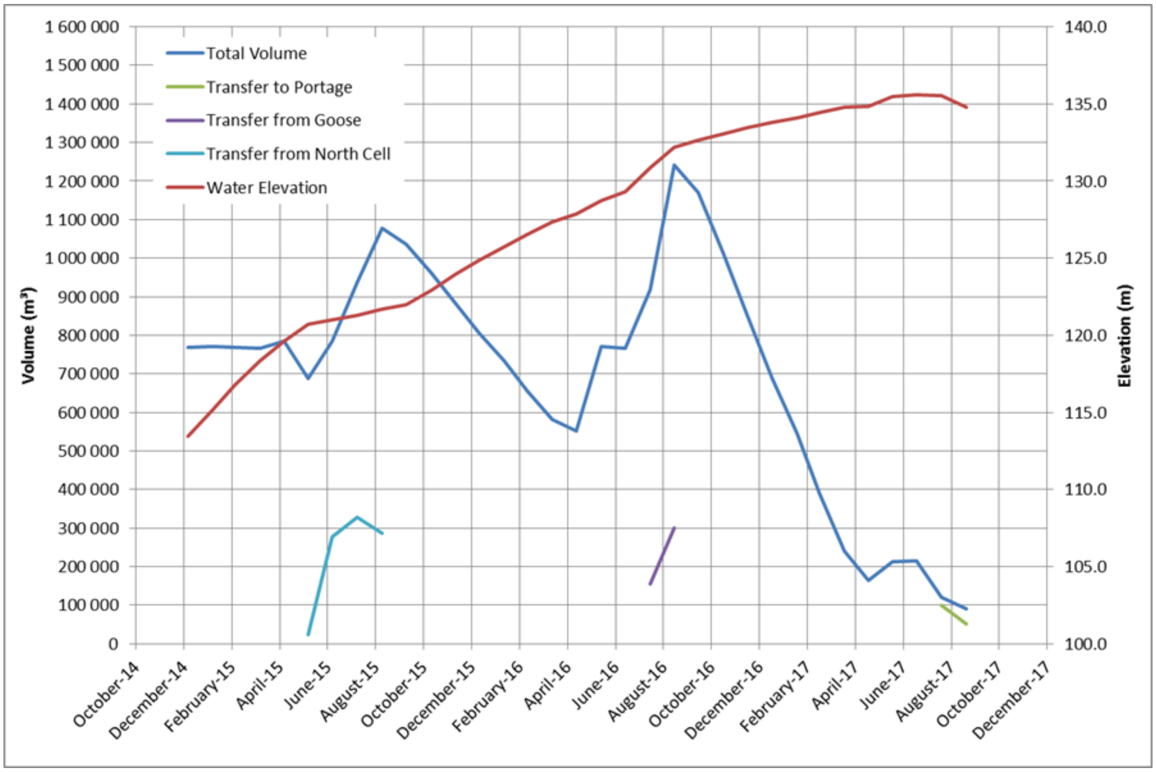
Figure 3.2 represents the water management in the North Cell TSF until the end of its operation. As seen in the water balance spreadsheet presented in appendix A, at this time, the reclaim water originates from the active South Cell TSF except from June to October 2015 when Tailings will be deposited in the North Cell for closure. During this time the associated water that accumulates due to the deposition will be transferred to the reclaim pond in the South Cell. The reclaim pumping system now installed in the South Cell will continue to supply the mill with reclaim water. The objective of this plan is to maintain 2.0 m of freeboard in the North Cell TSF and to continue providing the mill with the expected volume of reclaim water.

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 2.9 shows the projected water elevation and volume from Dec, 2014 through to mine closure in Q3, 2017. The freshet periods of 2015 and 2016 are represented by two peaks on the volume curve. After summer 2016, the reclaim water volume will decrease slowly until the deposition is completed. All water transfers 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 mill operation) to properly dewater the tailings pond for closure capping. This water is included in the reflooding process.

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



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 2015-2017 is the average of the measured volume of 2013 and 2014. The moisture content calculation is also an important factor used to calculate tailings storage capacities.

Table 3.3: Monthly average ore moisture content observed and forecasted at the mill

Month	Observed Average Ore Moisture Content (%)		
	2013	2014	2015-2017
January	1.25%	0.93%	0.98%
February	1.37%	0.80%	1.53%
March	1.48%	0.58%	0.92%
April	1.16%	0.77%	1.09%
May	0.95%	0.86%	1.08%
June	1.00%	0.88%	0.99%
July	0.74%	0.69%	1.30%
August	0.65%	0.91%	0.98%
September	1.05%	1.05%	0.89%
October	0.92%	1.40%	0.99%
November	0.82%	1.39%	0.72%
December	1.55%	1.30%	0.93%
Average	**1.08%**	**0.97%**	**1.03%**

3.1.4 North Cell

The North Cell TSF has been in operation since January 2010. Deposition ceased temporarily in November, 2014 and the South Cell TSF became operational. Tailings deposition will commence again from June, 2015 to October, 2015 as part of the closure of the North Cell (fill to final design elevation). Closure and capping of the North Cell TSF will occur progressively.This is anticipated to commence in 2015. As per the design specifications and regulatory requirements, the level of the North (and South) cell reclaim pond must maintain a two meter freeboard with the surrounding structures, which is 148.0m elevation for the North Cell.

As seen in the water balance presented in appendix A, no tailings will be deposited in the North Cell during the winter 2015 (October 2014 - June 2015) due to the difficulty of operating the TSF during the winter months. The thick ice cover that will occur at the current level (nearly full) will dramatically reduce the amount of free water which may render the pumping of the reclaim water to the South Cell impossible.

3.1.5 South Cell

The South Cell area was, prior to the November, 2014 commencement of tailings deposition, a 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 in accordance with the Water License and MMER. In the summer 2014, 190,882m^3 was treated for TSS removal via the Water Treatment Plant (WTP) and discharged in Third Portage Lake. This differs from the 1,041,000 m^3 initially planned as it was determined that a higher volume of water was required in the South Cell at the start of tailings deposition in November 2014 to ensure adequate reclaim volumes for the mill. No other discharge is planned via the Portage WTP through the mine life since all the water collected in the Goose and Portage pits will remain as part of the reflooding process or added to the reclaim pond if extra water is required for reclaiming. The South Cell TSF commenced operation in November 2014 and will be receiving tailings from the mill until October 2017. Closure and capping will be finalized during the closure process.

As seen in the water balance and the tailings deposition plan (AEM, 2014), no tailings will be deposited in the South Cell during the summer 2015 (June 2015 – October 2015) in order to finalize deposition in the North Cell. The water transfers, that will be discussed later, and water management strategies within the water balance reflect the latest tailings deposition plan.

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 and 2014. The majority of the inflow originates from the bottom benches of Pit C and D. Since these areas are now backfilled, a reduction of water inflow has occurred. It is anticipated that additional inflow could occur at the bottom of Pit A and E. Until pit reflooding operations commence in 2018, all water pumped from the Portage pit area is sent to the South Cell to supplement reclaim water. Once reflooding starts the pumping system will be decommissioned and replaced by the infrastructure required for the pit reflooding. Refer to Section 3.2 for the pit reflooding activities description.

3.1.7 Goose Pit

Mining in the Goose Pit is scheduled to be completed at the beginning of 2015 as per the current Mine Plan. The inflow values have been revised from the 2012 SNC Water Management Plan (SNC, 2013). Observations in 2014 indicate a difference in the data. Namely, it was observed that the pit inflow slows down during the winter due to the freezing of the pit walls. However a large amount of ice has been building on the walls and is subsequently removed on a recurring basis (for safety reasons). The volume of ice is significant and is not measured. The values for the 2015 Goose pit inflow have been adjusted based on the 2013-2014 pumping values. 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. The water pumped from Goose is sent to the South Cell during the mining process. Once mining of this pit has been completed, the inflow will be allowed to collect in the pit as part of the reflooding process. In 2016, around 454,237m^3 of this inflow water will be transferred to the South Cell for optimal tailing deposition and reclaim pond operation. AEM has determined that some inflow may be the result of a low volume seep from the 3PL through the Bay Goose Dike. This inflow was collected in 2014 by a sump system at an average total (including groundwater infiltration) monthly flow rate of 24,781m^3. The inflow is not a large volume and is expected to continue after mining ceases in April 2015 after which it will be part of the natural reflooding process of Goose Pit. It is understood that AEM will continue to monitor the flow rate during this natural reflooding process through the filling rate of the pit. Refer to Section 3.2 for the pit reflooding activities description.

3.1.8 Water Transfers

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

3.1.8.1 TSF Water Transfers

In order to optimize the tailings deposition sequence, maintaining an adequate reclaim pond (operating volume, dike structure protection and water quality) and closure of each cell, water transfers within the tailing storage facilities and pits are required throughout their operating life. As seen in Table 3.4, water transfers from the South Cell attenuation pond to the North Cell TSF was required in 2013. Also, additional water from the Stormwater Management Pond (SMP) was transferred to the North Cell TSF in 2014. Both transfers were undertaken in order to maintain adequate reclaim pond levels. Regular transfers from SMP take place twice yearly from 2015 and ending in 2017. These transfers ensure there is always capacity in the pond to contain freshet water as well as the on site Sewage Treatment Plant effluent. Once the TSF's are closed any additional transfers from SMP will be directed to the Portage pit until camp closure in 2024. In 2015 and 2016, water transfers from the North Cell towards the South Cell are required for adequate operation and closure of the North Cell. In 2016, 2017 and 2018, water transfers from the South Cell (SC) to the pits (Goose and Portage) are undertaken to close this TSF.

The diversion ditches located around the North Tailings Cell 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 the Third Portage Lake and to NP1 Lake. On the west end of the diversion ditches, an interception sump was constructed in March 2014 and will be completed in 2015. The interception sump has been put in place mainly to control the water quality, in term 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. Some of the water in the interception sump was also transferred to the North Cell TSF, in order to maintain an adequate water level in the sump. As-built drawings of the interception sump will be completed in 2015 when the structure will be fully finalized. The current volume is approximately 3000 m^3.

Table 3.4: TSF water transfers

Year	TSF Water Transfers							
	SC to NC (m^3)	NC to SC (m^3)	SC to WTP (m^3)	SWM to NC (m^3)	SWM to SC (m^3)	SWM to Portage (m^3)	SC to Portage (m^3)	Goose to SC (m^3)
2013	507,144	0	485,018	0	0	0	0	0
2014	0	0	190,882	36,584	0	0	0	0
2015	0	913,416	0	0	34,675	0	0	0
2016	0	178,994	0	0	34,770	0	0	454,237
2017	0	0	0	0	34,675	0	150,000	0
2018-2024	0	0	0	0	0	34,675	89,294	0
Total	**507,144**	**1,092,410**	**675,900**	**36,584**	**104,120**	**34,675**	**239,294**	**454,237**

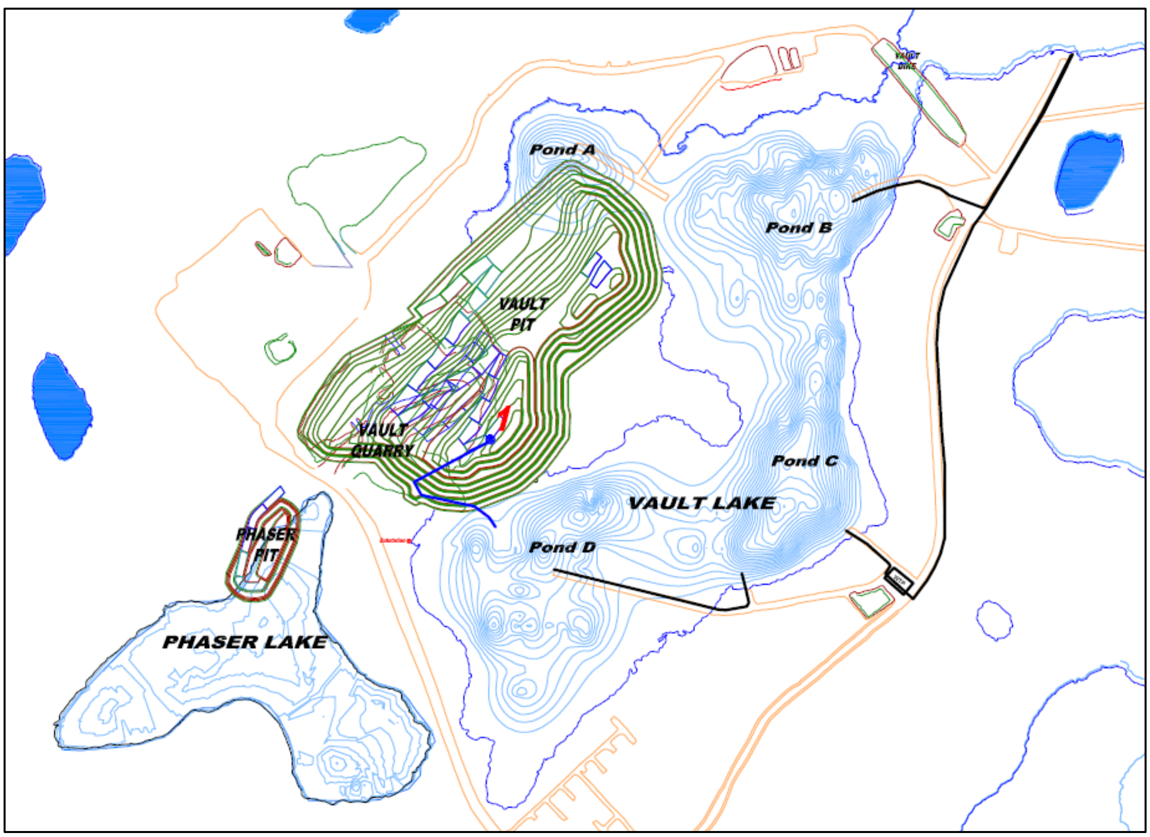
3.1.8.2 Portage Water Treatment Plant

In 2014, the Portage water treatment plant (WTP) was used to treat water from the Portage Attenuation Pond, before tailings were deposited in November 2014 (and then became the South Cell TSF), and discharged to Third Portage Lake. The necessity of this treatment is guided by the deposition plan of the South Cell which has optimized the starting volume of the pond. Treatment requirements were minimized in 2014; a total of 485,018 m^3 of water, instead of the 1,041,000m^3 planned, was discharged. There will be no further planned discharge from the WTP at this site to 2PL.

3.1.8.3 Vault Treatment Plant

In 2013, the dewatering of Vault Lake began. During 2013 a total of 2,315,483m^3 was discharged to Wally Lake. In 2014, an additional 329,101m^3 was discharged to Wally Lake. The Vault WTP was not required last year to remove TSS as the water met discharge criteria stated in the Water Licence as well as 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.

Figure 3.4: Vault Attenuation Pond



AEM currently is in the Type A Water License renewal process. As part of the process a proposal to dewater Phaser Lake and mine an area of this basin was submitted to the Nunavut Impact Review Board (NIRB) in 2014. Although the Water License Renewal is proceeding with the Nunavut Water Board the Phaser proposal is still being reviewed by NIRB. Once the NIRB process is complete AEM will apply to the NWB for an amendment to the renewed Type A Water License. The mining of the proposed Phaser pit is considered a small project by AEM and amounts to only an additional mining life of approximately 30 days. Nonetheless AEM has included estimated water volumes associated with the dewatering of Phaser Lake in this Plan. See Table 3.5 and Sec 3.1.8.3 below. Details of the proposed Phaser Lake dewatering are presented in this section.

Table 3. 5: Wally Lake annual discharge

Year	Vault Dewatering (m^3)	Phaser Dewatering (m^3)	Wally Lake Annual Discharge (m^3)
2013	2,315,483	0	2,315,483
2014	329,101	0	329,101
2015	446,426	0	446,426
2016	472,773	405,665	878,438
2017	435,839	0	435,839
Total	**4,407,376**	**405,665**	**4,407,376**

3.1.8.3 Phaser Lake dewatering (Proposed)

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 in 2017 near the end of the mine operations. Upon receiving approval from the NWB and other regulators (NIRB, DFO) AEM will proceed to dewater Phaser Lake to allow mining the Phaser pit. This is considered a small mining project as the mining activity is anticipated to last approximately 30 days. Fish out procedures would occur prior to dewatering in accordance with DFO requirements. As per Table 3.5 above a volume of 405,665 m^3 of water will be pumped to the adjacent Vault Lake ATP. This will then be discharged from the Vault ATP to Wally Lake via the WTP in accordance with the Water License and the MMER.

3.1.8.3 Stormwater Management Pond

The Stormwater Management Pond 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 being 34,675m^3. This represents less than 1% of the total inflow to the TSF.

3.1.9 Seepage Collection Systems

3.1.9.1 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 and monitoring, contaminants, namely cyanide and copper were identified. The source was leaking 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 from the trench beginning when freshet commences. The recovery well is pumped year round. No flow of water has been detected during winter months in the trench. (See Freshet Action Plan – Appendix D) Table 3.6 shows the pumped volumes for 2014. AEM anticipates that the flow to the trench will decrease in 2015 as the source area has been repaired and the recovery well will have been pumping during the 2015 winter season.

Figure 3.5: Mill Seepage Area

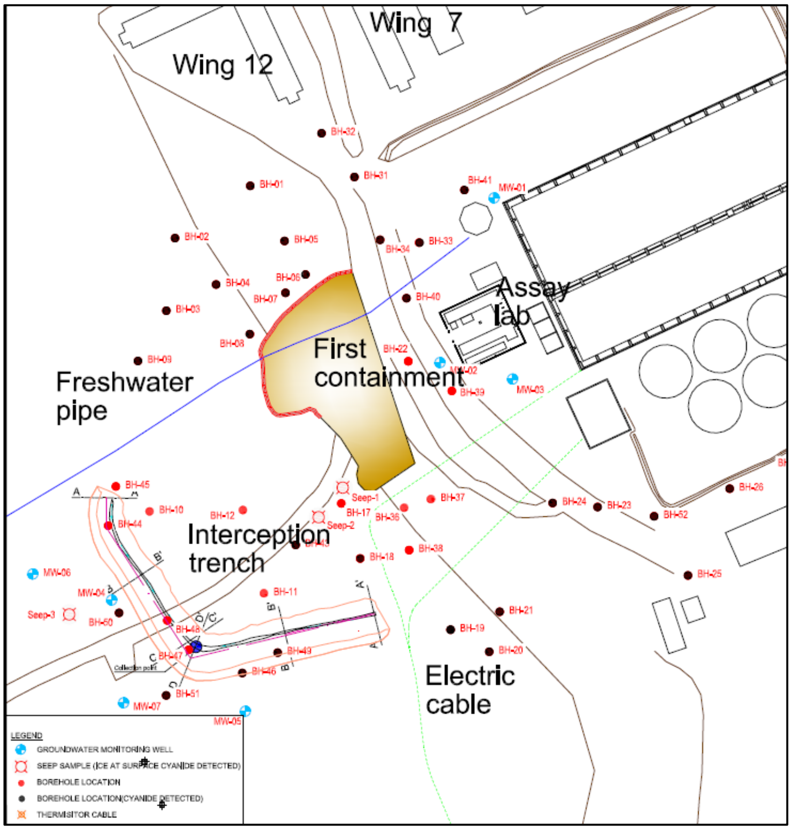


Table 3.6: Mill Seepage 2014 pumped volumes

Month	2014 Mill seepage pumped volumes back to the mill (m^3)
January	0
February	0
March	0
April	0
May	2,450
June	1,935
July	1,158
August	3,979
September	2,420
October	1,043
November	842
December	871
Total	**14,698**

3.1.9.2 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. A pumping system was installed and was operational during the 2014 freshet period and through the warmer months – May – Sept, 2014. Contaminated seepage was monitored in accordance with the Freshet Action Plan and was pumped back to the North Cell TSF. Other actions continued to prevent any reclaim water in the North Cell from migrating through the Portage Rock Storage Facility to the ST-16 location. These actions included the construction of a filter along RF-1 and RF-2 – see Table 3.7 for 2014 monthly flow volumes. AEM expects seepage flow to diminish yearly until closure as the reclaim water in the North Cell will have been transferred to the South Cell TSF in 2015. In addition capping of the North Cell is anticipated to commence in 2015. These actions will diminish the water source that contributes to the seepage. Finally, the thermal monitoring network shows that the tailings and RSF are continuing to freeze further restricting any seepage flow.

Table 3.7: ST-16 RFS Seepage 2014 pumped volumes

Month	2014 RSF seepage pumped volumes back to NC TSF (m^3)
January	0
February	0
March	0
April	0
May	14 591
June	9 294
July	3 810
August	3 386
September	1 088
October	0
November	0
December	0
Total	**32,169**

3.1.9.3 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). Once mining of South Portage pit area is completed, the East Dike seepage will remain in the Portage pit as part of the pit reflooding operations (closure plan). The monthly flow observed from the table 3.8 indicates the 2014 monthly volume discharged to 2PL. If water quality does not meet license or MMER criteria it is pumped to mine out areas of the Portage pit.The total volume returned to Second Portage Lake in 2014 was 143,636 m^3.

Table 3.8: Mill Seepage 2014 pumped volumes

Month	2014 RSF seepage pumped volumes back to NC TSF (m^3)
January	11 779
February	12 729
March	12 971
April	10 736
May	528
June	0
July	1 716
August	22 049
September	19 914
October	17 880
November	16 453
December	16 881
Total	**143,636**

3.1.9.4 Central Dike Seepage

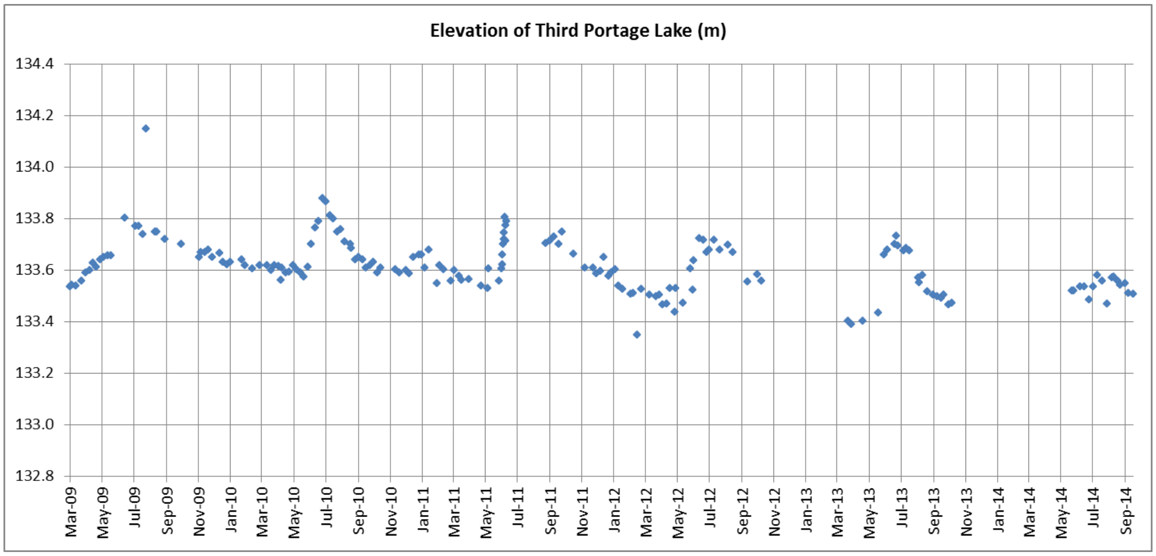
Once tailings deposition started in the South Cell – November 22th, 2014 – daily inspections of the downstream toe of Central Dike have been included in the geotechnical inspection program. A small volume of water against the downstream toe of Central Dike was noticed at that time. This water in contained between the West road and the Central Dike downstream toe. Piezometers, thermistors and a ground water well are used to monitor the dike integrity, the foundation temperatures and the piezometric levels witin the structures and its foundation.

The design of the central dike and the arrangement of instrumentation have taken into account the possibility of rock infiltration throught the talik or faults. The Central dike remains stable despite this minor infiltration. At this time it is difficult to conclude on the source of this seepage. AEM will continue to conduct regular inspection and sampling to monitor the flow and the water quality at this location during the open water months in 2015. It is anticipated at this time that a pumping station will be installed in 2015 to pump the water back to the South Cell TSF during summer season.

3.2 PIT REFLOODING

The volumes of water needed for pit reflooding, which is part of the overall closure plan, is dependent on the water elevation of TPL. The Goose dike can only be breached when the level of the reflooded pit reaches the same elevation as TPL. According to TPL elevation data from 2013 – 2014 this elevation would be 133.6 melv. Figures 2.7 indicates the elevation data recorded since 2009.

Figure 3.6: Distribution of TPL elevation surveyed data



The current flooding technique proposed for Portage and Goose Pits is to use a combination of Canadian dewatering pumps and syphons to achieve the pumping rates prescribed by the water balance and the Water Liscense. Details of the reflooding system will be available in the Final Reclamation and Closure Plan to be issued one year prior to closure. A total of 37.6Mm^3 will need to be transferred form 3rd Portage Lake to accomplish the required pit reflooding for Portage and Goose Pits. The current mining plan shows that the Goose pit mining will be completed in the first quarter of 2015 at which point Goose pit flooding may commence. Mining will cease in the Portage pit around the end of 2017. Pit reflooding of the Portage pit will start in 2018. At water elevation 131.0m both Portage and Goose pit will join to become one waterbody. Reflooding will continue to the natural Third Portage lake water elevation at approximately elevation 133.6. 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 Organisms (CCME) before the dike is breached. The entire flooding sequence should be completed by the beginning of 2025.

The operation of the TSF facilities will lead to the need to discharge 239,294m³ of reclaim water by the end of the mine life. The 2012 Water Management Plan (SNC, 2012) suggested that this reclaim water quantity be pumped in equal volumes to Goose and Portage pits which coincides with the reflooding operation (Goose 2015 – 2025, Portage 2018 – 2025). Due to operational constraints and date of availability for water storage, the current water management plan is to transfer the total amount of reclaim water (South Cell TSF - 239,294 m3) to the Portage pit in 2018. The treatment requirements of the reclaim water will be determined as per Meadowbank Water Quality Forecasting Update Technical Note rev. 00 completed by SNC (Feb, 2015 – See Appendix C). This document predicts that copper and selenium may require treatment to reach CCME criteria. Treatment may be conducted either as the water is discharged, by a water treatment unit, to the South Cell or after (Batch treatment). A final decision has not been made at this time, however AEM is committed to update this forecasted model on a yearly basis until, and possibly after, the closure 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 obtain a water elevation of 133.6m will require a total of 45Mm^3 of water. As previously stated, 37.6Mm^3 originates from 3rd Portage Lake, and the 7.3Mm^3 balance will be made up from the natural pit water inflow including runoff and precipitation combined with reclaim water. Please refer to Table 3.9 for the reflooding sequence per year for all pits.

Table 3.9: Pit flooding profile

Pit Flooding profile				
Year	Volumes pumped from 3rd Portage lakes		Volumes pumped from Wally lake	
	To Portage pit (m^3)	To Goose pit (m^3)	To Vault pit (m^3)	To Phaser pit (m^3)
2016	0	1,200,000	0	0
2017	0	4,520,000	0	0
2018	4,520,000	360,000	4,182,604	0
2019	4,520,000	360,000	4,182,604	0
2020	4,520,000	360,000	4,182,604	0
2021	4,520,000	0	4,182,604	0
2022	4,520,000	0	2,161,226	0
2023	4,520,000	0	0	571,007
2024	3,638,634	0	0	0
Total	**30,758,634**	**6,800,000**	**18,891,642**	**571,007**

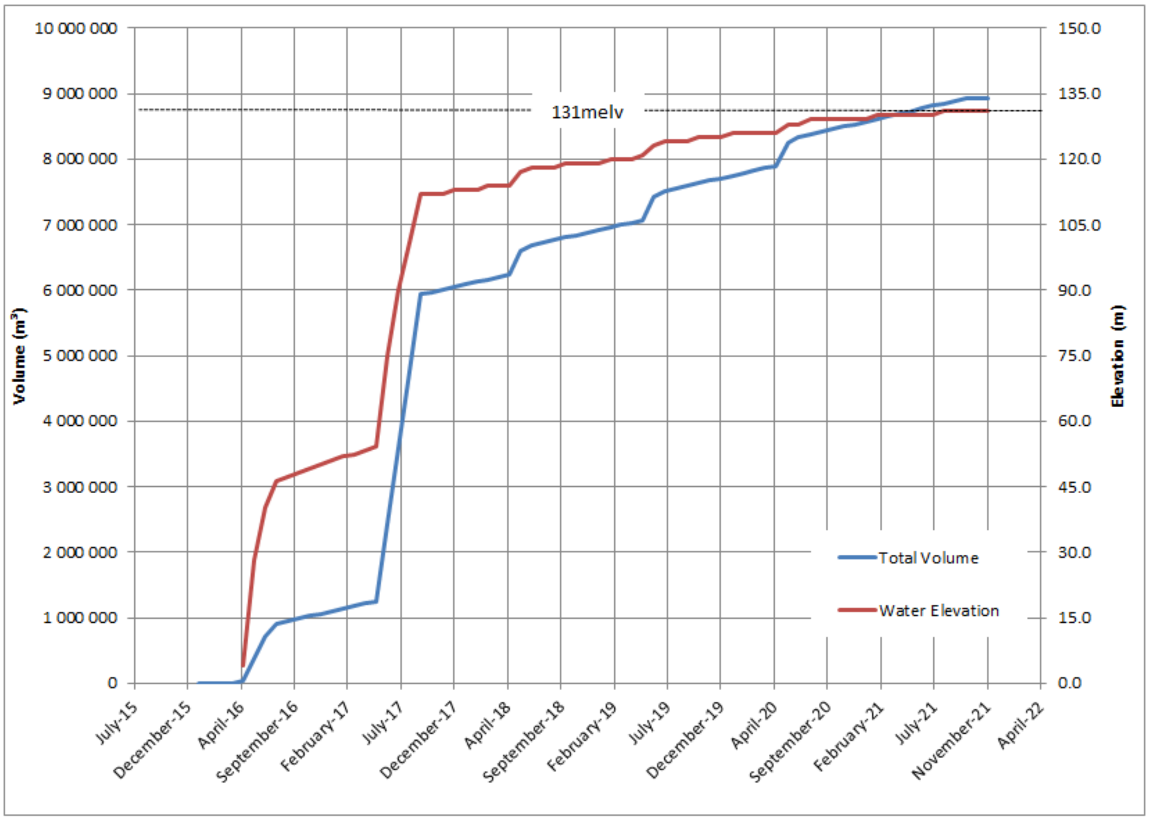
As mentioned in the *document Water License: 2AM-MEA1525 Reasons for Decision Including Record of Proceedings* from the Nunavut Water Board and as prescribed in the Nunavut Water Board Water Licence No. 2AM-MEA1525 issued on July 23rd, 2015 (Part E, Conditions 1 and 2), the use of water from Third Portage Lake, for all purposes, including reflooding of the pits, shall not exceed a total 2,350,000 m^3 per year from the Licence approval date to December 31 2017, followed by a maximum 4,935,000 m^3 starting in 2018 through to the expiry of the Licence 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 Licence 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 will include a pit reflooding strategy meeting the requirements outlined in the the Nunavut Water Board Water Licence No. 2AM-MEA1525. The updated pit reflooding strategy and yearly water usage will be presented in the in the next version of the Meadowbank Water Management Plan Report to be presented with the Meadowbank Annual Report 2015, to be issued in March 2016.

AEM will provide at least 30 day notice to the Nunavut Water Board and Inspector prior to starting the re-flooding of each pit.

3.2.1 Goose pit reflooding

Goose pit reflooding will take approximately 5 years and will start in 2015 by allowing the annual inflow volume (runoff, groundwater, precipitation and possible Bay Goose dike seepage) of 468,000m^3 to remain within the pit. In 2016, transfer from TPL to Goose pit will start until elevation 131.0m is reached in 2021. Once elevation 131.0m is reached the Goose water will join the Portage pit water to form one water body. Figure 3.6 represents the Goose pit flooding curve. Once Portage joins Goose's elevation early 2024, an additional 3,638,634Mm^3 will be added that summer to complete the reflooding process to elevation 133.6m. The Goose and South Camp dikes will then be breached provided water quality meets CCME criteria. Refer to Section 4 for the pit water quality forecast model.

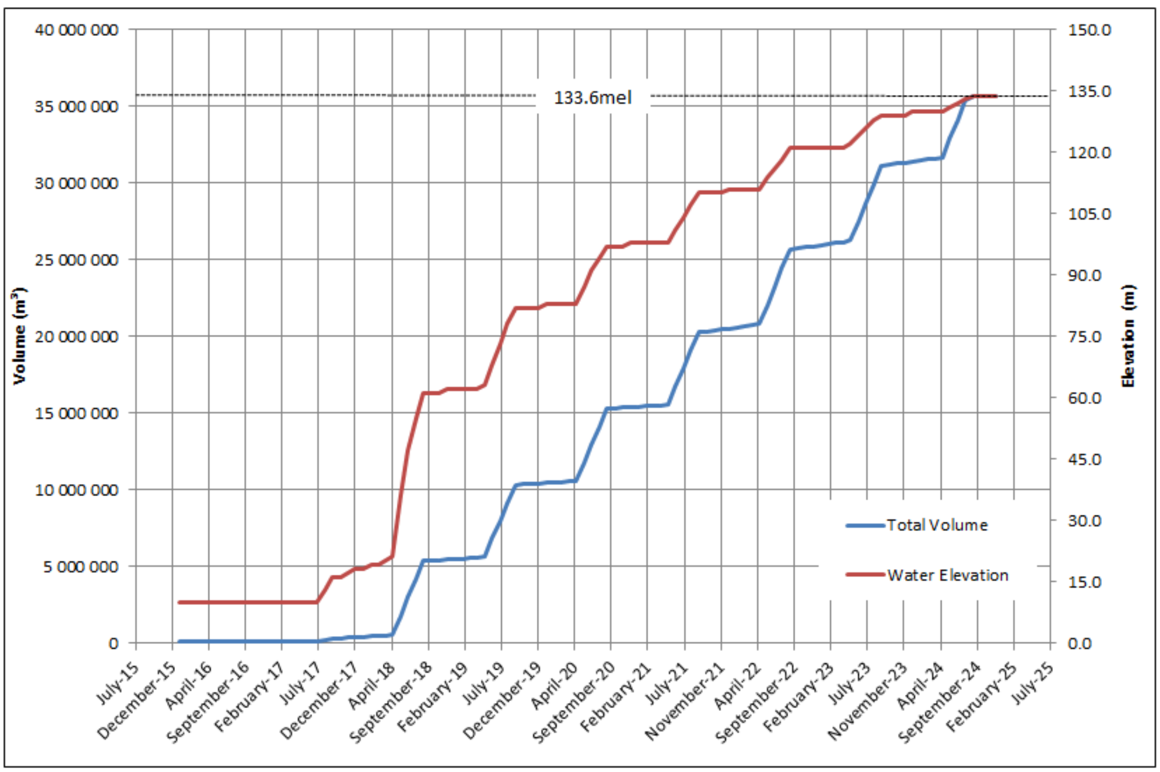
Figure 3.7: Goose pit flooding



3.2.2 Portage pit reflooding

Portage pit reflooding will begin in 2018 with an annual 4.52Mm³ transfer from 3rd Portage to the Portage pit until 2023. In 2024, an additional 3.6Mm^3 will be required to complete the total reflooding of both pits to elevation 133.6m. See Figure 3.7 to view the pump reflooding curve. Refer to Section 4 for the pit water quality forecast model.

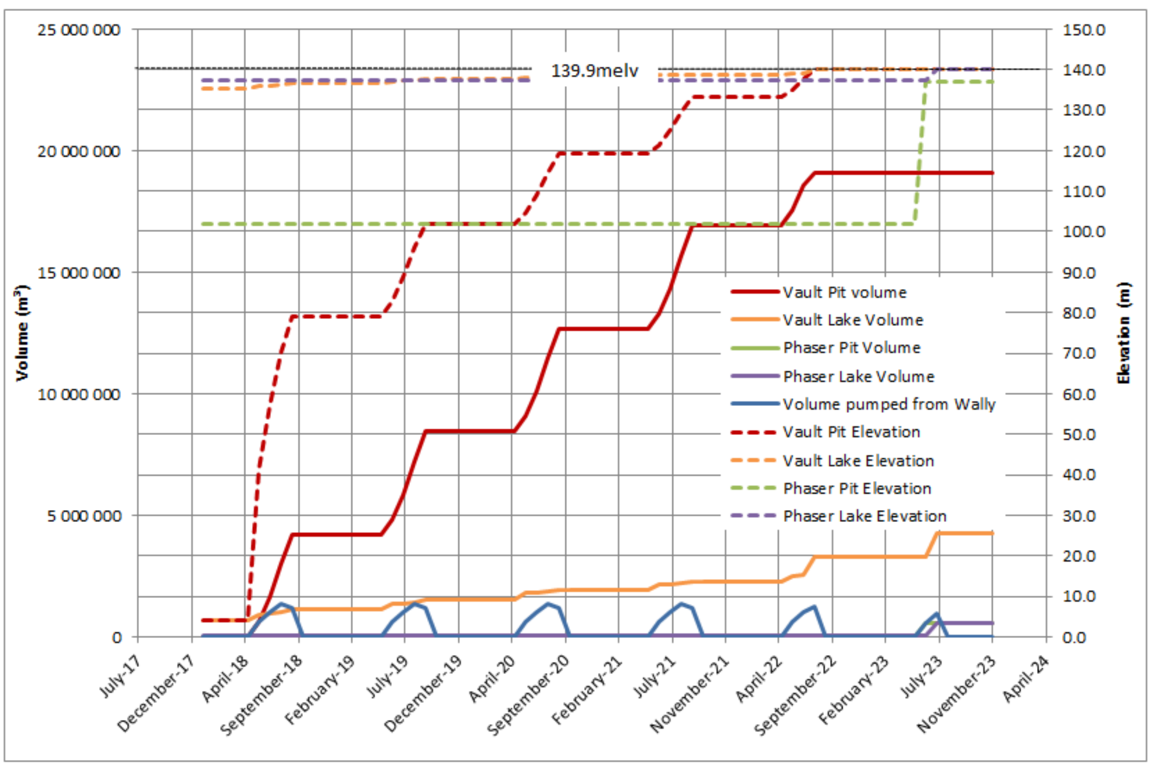
Figure 3.8: Portage pit flooding



3.2.3 Vault pit reflooding

The Vault pit area is composed of many basins in the former lake and different pit elevations that are all linked togheter. The reflooding of Vault and Phaser (once approved) is more complex and requires water transfers from basin to basin. Reflooding of the Vault area will commence in 2018 and will continue for 5 years to 2022. The flooding curves for the Vault area are represented in figure 3.9. The final elevation of the reflooding will be 139.9m (natural Wally Lake water level) for Phaser and Vault Lake. At this point the Vault dike will be breached provided the water meets CCME criteria. Refer to Table 3.9 for the yearly volumes required to complete the reflooding process. The reflooding includes app 480,246m³ yearly from inflow water (freshet, precipitation, groundwater inflow). Refer to Section 4 for the pit water quality forecast model.

Figure 3.9: Vault and Phase pits flooding



3.3 WATER MANAGEMENT STRUCTURES

As per the recommendations and requirements outlined in the document *Water License: 2AM-MEA1525 Reasons for Decision Including Record of Proceedings* from the Nunavut Water Board and as per the Water License 2AM-MEA1525 (Part E, condition 10), the next version of the Meadowbank Water Management Plan Report to be presented with the Meadowbank Annual Report 2015, in March 2016, will include records of inspections of all water management structures during periods of flow.

Section 4.0 - MEADOWBANK WATER QUALITY FORECASTING UPDATE

This report was prepared by SNC Lavallin (Feb, 2015). This is a continuation of a series of yearly water quality modelling forecast reports that commenced in 2012 and will continue until mine closure. The purpose is to identify contaminants of concern and determine if water treatment will be required on site during closure activities – primarily, but not limited to, the pit reflooding process. Each yearly update builds on the previous year as new monitoring data is added at the site. Two contaminants of concern were identified in the 2015 report, Copper and Selenium. These are identified as possibly requiring treatment for removal during or after the pit reflooding process.These contaminants are present in the TSF reclaim water. This report is attached as Appendix C and AEM is committed to implementing the recommendations provided in 2015 and beyond. These are:

- In addition to the current set of chemical analyses, regular (at least monthly) monitoring of all inflows and outflows of the North and South Cells TSF Reclaim Pond for cyanide, total and dissolved copper, total and dissolved iron, ammonia, nitrate chloride and selenium should be undertaken.
- Implement a water sampling and analysis program once reclamation of the North Cell TSF commences to confirm copper equilibrium concentrations, as well as other parameters, once no Mill Effluent is added into the TSF Reclaim Pond. This could be carried between the months of December 2014 to May 2015 while no tailings are being deposited in the North Cell TSF.
- Regular analysis are also required of the Mill Effluent water discharged to the TSF in order to better monitor the changes in cyanide, copper, iron, ammonia, nitrate, chloride and selenium concentrations. Samples should be taken at least once a quarter.
- Once transfer begins to the Portage Pit (August 2017), regular (at least monthly) monitoring of all outflows of the TSF Reclaim Pond for all parameters should be undertaken.

- Sample and analyze the North and South Cell TSF Reclaim Pond at different depths and locations to determine if there is a concentration gradient in the Reclaim Pond.
- Continued monitoring of the water in the South Cell TSF Reclaim Pond in 2015 on a regular basis to monitor the evolution of the parameters of concern listed in section 2.2.1. It is understood that this recommendation is required as per the water license.
- 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 pit is filled with water from South Cell TSF and/or Third Portage Lake. 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.

As per the recommendations and requirements outlined in the document *Water License: 2AM-MEA1525 Reasons for Decision Including Record of Proceedings* from the Nunavut Water Board and as per the Water License 2AM-MEA1525 (Part E, conditions 7, 8), the Water Management Plan will include an updated water quality model, updated yearly. On an annual basis, during operations and closure period, the predicted water quantity and quality within the pits will be compared to the measured water quantity and quality. The results of this comparaison will be included yearly in the Water Management Plan. The next version of the Meadowbank Water Management Plan Report will be submitted with the Meadowbank Annual Report 2015, in March 2016, and will include the updated water quality model and the comparaison of predicted and measured water quantity and quality.

The 2015 Water Management Plan Report will include an action plan to be implemented if predicted re-flooded pit water quality indicates that treatment is necessary. Reflooding volume will be revised during the process as runoff, underground water inflow and evapotranspiration could differ from what has been planned. Details on the water treatment options will be discussed in the report.

Section 5.0 - 2014 INTEGRATED DEPOSITION PLAN

A Tailings deposition plan prepared by AEM has been used to update last year's model. As stated in the water management strategies, the important milestone for 2014 is the North Cell closure planned in October, 2015. Water transfer will be required from the North Cell to the South Cell during summer 2015 to maintain the proper freeboard elevation. This deposition plan is presented in the Updated Mine Waste Rock and Tailings Management Plan 2015.

Section 6.0 - CONCLUSION

This report presents an updated/revised water management plan for the Meadowbank mine based on the AEM 2013 Water Management Plan submitted to the NWB as part of the AEM 2013 Annual Report. Validation and updates of the site parameters (i.e. runoff and pit inflows) was conducted in 2014. 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 and to minimize water treatment requirements. The water deficit encountered in the Tailings Storage Facilities, mainly the North near the end of operation (as the tailings volume limits the water volume) during the winter months due to the ice cover, is mitigated by an increase in freshwater consumption during the winter months. Water transfer from pits to tailings ponds aids in reducing the freshwater consumption as this increases reclaim volume.

Phaser lake dewatering (once approved by the NIRB and NWB) is planned in 2016 to allow mining of a small ore body (approximately 30 days mining). Approximately 405,665m^3 of water will need to be dewatered after fish out has been undertaken. The current strategy is to transfer this water from Phaser to Vault ATP and then discharge to Wally with the current dewatering infrastructure already in place.

Since December 2013, the East Dike seepage has been redirected to Second Portage Lake in order to reduce this water from entering the site wide system. This also reduced the in-pit pumping requirements (to the former Portage Attenuation Pond before it became the South Cell TSF in Oct 2014) and subsequently the water treatment required in 2014. This seepage collection system recovered around 40% of the estimated total volume in 2014. The other 60 % was allowed to flow into the Portage pit and was subsequently pumped to the Portage ATP before it became the South Cell TSF in November, 2014. . Once Portage Pit enters its reflooding stage, the East Dike seepage will flow freely into the Portage pit and form part of the reflooding water.

Pit reflooding volumes and sequencing (including Portage, Goose and Vault Pits) is presented in this report. Reflooding will commence in 2015 with Goose Pit once mining has been completed, and later in 2017 for both Portage and Vault Pits. The entire reflooding process will be completed by the beginning of 2024. Once water quality in the reflooded pits meet CCME Guidelines for the Protection of Aquatic Life, 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 (2024). It should be understood that the dikes will not be breached unless the water quality meets the CCME criteria.

A Water quality forecasting model was completed by SNC Lavallin (SNC, 2015) for the life of mine and included in this report. The mandate of this report is to analyse the water quality as we proceed through the operating life of the mine and the reflooding operation and to determine the need for potential treatment of contaminants of concern. The impact of transferring the TSF water to the pits during the reflooding 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 2014 water balance, the report identifies that copper and selenium may require removal treatment in order for the pit water quality to meet CCME criteria in 2024.

Section 7.0 - RECOMMENDATIONS

This section presents a series of recommendations in order to improve on the current water management strategies and water balance.

- Continue to monitor and include any new flow monitoring locations/devices for any additional or new inflows observed in 2015. 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.
- Conduct the water quality modelling analysis on a yearly basis based on updated water quality results and water balance through the life of mine.
- Develop a 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.

Section 8.0 - REFERENCES

1. SNC (2013) – Water Management Plan 2012. SNC Lavalin. March 2013.
2. Golder (2009) – Meadowbank Gold Project Updated Water Management Plan. Golder Associated 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 (2015) – Waste Management Plan 2014
5. SNC (2015) – Meadowbank Water Quality Forecasting Update Base on the 2014 Water Management Plan. February 2015.

APPENDIX A – WATER BALANCE

	Year 2014												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	364 275	314 877	303 462	355 557	339 395	356 065	361 983	341 168	354 171	308 014	349 780	371 417	**4 120 164**
Cummulative Tailings (tonnes):	10 687 190	11 080 786	11 460 114	11 815 671	12 098 500	12 352 832	12 533 823	12 696 284	12 873 370	13 093 380	13 443 160	13 814 577	-
Cummulative Tailings (tonnes) - North Cell	10 687 190	11 080 786	11 460 114	11 815 671	12 098 500	12 352 832	12 533 823	12 696 284	12 873 370	13 093 380	13 303 248	13 303 248	-
Cummulative Tailings (tonnes) - South Cell	0	0	0	0	0	0	0	0	0	0	90 684	434 588	-
North Cell (TSF)													
Starting Pond Volume (m^3)	993 297	745 449	587 681	466 283	370 045	374 251	390 742	430 319	410 992	418 139	310 973	246 466	-
Water from tailings slurry (m^3)	0	26 172	29 024	29 517	122 608	204 845	208 115	195 420	205 220	68 417	46 117	0	**1 135 457**
Runoff (m^3)	0	0	0	0	0	36 426	79 362	17 684	44 122	0	0	0	**177 594**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	20 175	6 067	0	3 417	6 925	0	0	0	**36 584**
Total Inflow (m^3)	0	26 172	29 024	29 517	142 783	247 338	287 477	216 521	256 267	68 417	46 117	0	**1 349 635**
Transfer to South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water to the mill (m^3)	247 849	183 940	150 422	125 755	138 577	230 846	247 901	235 848	249 120	175 584	110 624	0	**2 096 466**
Total Outflow (m^3)	247 849	183 940	150 422	125 755	138 577	230 846	247 901	235 848	249 120	175 584	110 624	0	**2 096 466**
Net Inflow (m^3)	-247 849	-157 768	-121 398	-96 238	4 206	16 491	39 576	-19 327	7 147	-107 167	-64 506	0	**-746 831**
End-of-Month Volume (m^3)	745 449	587 681	466 283	370 045	374 251	390 742	430 319	410 992	418 139	310 973	246 466	246 466	-
South Cell (TSF)													
Starting Pond Volume (m^3)	380 883	0	0	0	0	0	190 882	0	0	0	0	93 856	-
Pumped From Goose Pit (m^3)	26 304	31 040	17 601	16 210	31 906	31 158	23 072	36 083	34 163	21 596	12 989	25 647	**307 769**
Pumped From Portage Pit (m^3)	0	0	0	0	0	0	0	13 212	47 195	4 396	0	0	**64 803**
Runoff (m^3)	86 000	60 000	16 000	40 000	46 900	30 000	34 972	50 705	9 800	0	0	0	**374 377**
Transfer from North Cell (m^3)	0	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	17 935	168 348	**186 283**
Total Inflow (m^3)	112 304	91 040	33 601	56 210	78 806	61 158	58 044	100 000	91 158	25 992	30 924	193 995	**933 232**
Decant - TSS to Third Portage (m^3)	0	0	0	0	0	190 882	0	0	0	0	0	0	**190 882**
Reclaim water to the mill (m^3)	0	0	0	0	0	0	0	0	0	0	93 856	256 680	**350 536**
Transfer to Goose Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	0	0	0	0	0	190 882	0	0	0	0	93 856	256 680	**541 418**
Net Inflow (m^3)	112 304	91 040	33 601	56 210	78 806	-129 724	58 044	100 000	91 158	25 992	-62 933	-62 685	**391 813**
End-of-Month Volume (m^3)	493 187	584 227	617 828	674 038	752 844	623 120	681 164	781 164	872 322	898 314	835 381	772 696	-
Mill/Camp													
Ore water (m^3)	3 381	2 533	1 763	2 723	2 908	3 151	2 504	3 117	3 702	4 310	4 870	4 841	**39 803**
Reclaim water (m^3)	247 849	183 940	150 422	125 755	138 577	230 846	247 901	235 848	249 120	175 584	204 480	256 680	**2 447 002**
Freshwater from Third Portage Lake (m^3)	55 651	77 905	141 003	169 546	167 980	61 488	49 848	43 152	43 200	96 720	113 760	78 120	**1 098 373**
Total Inflow (m^3)	306 881	264 378	293 188	298 024	309 466	295 485	300 253	282 117	296 022	276 614	323 110	339 641	**3 585 178**
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)	303 936	261 718	290 243	295 174	306 521	292 635	297 308	279 172	293 172	273 669	320 260	336 696	**3 550 503**
Total Outflow (m^3)	306 881	264 378	293 188	298 024	309 466	295 485	300 253	282 117	296 022	276 614	323 110	339 641	**3 585 178**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	333	274	202	175	186	321	333	317	346	236	284	345	-
Freshwater pumping rate (m^3/hr)	75	116	190	235	226	85	67	58	60	130	158	105	-
TSF Water Balance													
Slurry water (m^3)	303 936	261 718	290 243	295 174	306 521	292 635	297 308	279 172	293 172	273 669	320 260	336 696	**3 550 503**
Tailings water/ice entrampment (%)	100%	90%	90%	90%	60%	30%	30%	30%	30%	75%	80%	50%	**63%**
Void and ice entrapment losses (m^3)	303 936	235 546	261 219	265 656	183 912	87 791	89 192	83 752	87 952	205 252	256 208	168 348	**2 228 763**
Slurry water returned to the pond (m^3)	0	26 172	29 024	29 517	122 608	204 845	208 115	195 420	205 220	68 417	64 052	168 348	**1 321 740**

	Year 2014												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	26 304	31 040	17 601	16 210	31 906	31 158	23 072	36 083	34 163	21 596	12 989	25 647	**307 769**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	26 304	31 040	17 601	16 210	31 906	31 158	23 072	36 083	34 163	21 596	12 989	25 647	**307 769**
Pumped to Attenuation Pond (m^3)	26 304	31 040	17 601	16 210	31 906	31 158	23 072	36 083	34 163	21 596	12 989	25 647	**307 769**
Total Outflow (m^3)	26 304	31 040	17 601	16 210	31 906	31 158	23 072	36 083	34 163	21 596	12 989	25 647	**307 769**
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	-
Portage Pit													
Runoff (m^3)	0	0	0	0	22 000	40 393	38 681	13 212	47 195	4 396	0	0	**165 877**
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	22 000	40 393	38 681	13 212	47 195	4 396	0	0	**165 877**
Pumped to Attenuation Pond (m^3)	0	0	0	0	0	0	0	13 212	47 195	4 396	0	0	**64 803**
Total Outflow (m^3)	0	0	0	0	0	0	0	13 212	47 195	4 396	0	0	**64 803**
Net Inflow (m^3)	0	0	0	0	22 000	40 393	38 681	0	0	0	0	0	**101 074**
End-of-Month Volume (m^3)	0	0	0	0	22 000	62 393	101 074	101 074	101 074	101 074	101 074	101 074	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	0	0	0	123 925	0	0	0	**123 925**
Pumped From Vault Pit (m^3)	0	0	0	0	0	0	9 146	53 542	26 539	11 250	1 140	0	**101 617**
Total Inflow (m^3)	0	0	0	0	0	0	9 146	53 542	150 464	11 250	1 140	0	**225 542**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	132 400	0	23 363	0	0	0	0	**155 763**
Total Outflow (m^3)	0	0	0	0	0	132 400	0	23 363	0	0	0	0	**155 763**
Net Inflow (m^3)	0	0	0	0	0	-132 400	9 146	30 180	150 464	11 250	1 140	0	**69 780**
End-of-Month Volume (m^3)	618 533	618 533	618 533	618 533	618 533	618 533	486 133	495 279	645 743	656 993	658 133	658 133	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	0	9 146	53 542	26 539	11 250	1 140	0	**101 617**
Total Inflow (m^3)	0	0	0	0	0	0	9 146	53 542	26 539	11 250	1 140	0	**101 617**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	9 146	53 542	26 539	11 250	1 140	0	**101 617**
Total Outflow (m^3)	0	0	0	0	0	0	9 146	53 542	26 539	11 250	1 140	0	**101 617**
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	-
Phase Open Pit													

	Year 2015												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	361 119	319 648	318 618	346 230	320 509	350 160	357 182	320 416	351 840	360 406	318 060	367 598	**4 091 786**
Cummulative Tailings (tonnes):	13 814 577	14 134 225	14 452 843	14 799 073	15 119 582	15 469 742	15 826 924	16 147 340	16 499 180	16 859 586	17 177 646	17 545 244	-
Cummulative Tailings (tonnes) - North Cell	13 549 714	13 549 714	13 549 714	13 549 714	13 549 714	13 899 874	14 257 056	14 577 472	14 929 312	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	768 958	1 064 928	1 359 945	1 680 528	1 923 338	1 923 338	1 923 338	1 923 338	1 923 338	2 196 373	2 490 873	2 831 241	-
North Cell (TSF)													
Starting Pond Volume (m^3)	246 466	246 466	246 466	246 466	246 466	246 466	432 761	372 300	258 919	180 069	180 069	180 069	-
Water from tailings slurry (m^3)	0	0	0	0	0	207 072	214 717	213 665	206 837	0	0	0	**842 290**
Runoff (m^3)	0	0	0	0	0	2 767	1 962	0	0	0	0	0	**4 729**
Total Inflow (m^3)	0	0	0	0	0	209 839	216 679	213 665	206 837	0	0	0	**847 019**
Transfer to South Cell (m^3)	0	0	0	0	0	23 544	277 140	327 045	285 687	0	0	0	**913 416**
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	23 544	277 140	327 045	285 687	0	0	0	**913 416**
Net Inflow (m^3)	0	0	0	0	0	186 295	-60 461	-113 380	-78 850	0	0	0	**-66 397**
End-of-Month Volume (m^3)	246 466	246 466	246 466	246 466	246 466	432 761	372 300	258 919	180 069	180 069	180 069	180 069	-
South Cell (TSF)													
Pumped From Goose Pit (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Pumped From Portage Pit (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Runoff (m^3)	0	0	0	0	0	46 107	10 726	13 954	25 856	0	0	0	**96 643**
Transfer from North Cell (m^3)	0	0	0	0	0	23 544	277 140	327 045	285 687	0	0	0	**913 416**
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)	152 817	138 875	152 513	148 062	183 334	0	0	0	0	158 945	103 124	106 930	**1 144 600**
Total Inflow (m^3)	190 817	176 875	190 513	186 062	254 419	134 651	335 866	388 999	371 133	196 945	141 124	144 930	**2 712 334**
Reclaim water to the mill (m^3)	193 440	174 720	193 440	187 200	238 080	230 400	238 080	238 080	230 400	238 080	216 000	223 200	**2 601 120**
Transfer to Goose Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	193 440	174 720	193 440	187 200	238 080	230 400	238 080	238 080	230 400	238 080	216 000	223 200	**2 601 120**
Net Inflow (m^3)	-2 623	2 155	-2 927	-1 138	16 339	-95 749	97 786	150 919	140 733	-41 135	-74 876	-78 270	**111 214**
End-of-Month Volume (m^3)	770 073	772 229	769 302	768 164	784 503	688 754	786 540	937 459	1 078 192	1 037 056	962 180	883 910	-
Mill/Camp													
Ore water (m^3)	3 539	4 891	2 931	3 774	3 461	3 467	4 643	3 140	3 131	3 568	2 290	3 419	**42 254**
Reclaim water (m^3)	193 440	174 720	193 440	187 200	238 080	230 400	238 080	238 080	230 400	238 080	216 000	223 200	**2 601 120**
Freshwater from Third Portage Lake (m^3)	111 600	100 800	111 600	108 000	66 960	64 800	66 960	66 960	64 800	66 960	79 200	81 840	**990 480**
Total Inflow (m^3)	308 579	280 411	307 971	298 974	308 501	298 667	309 683	308 180	298 331	308 608	297 490	308 459	**3 633 854**
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)	305 634	277 751	305 026	296 124	305 556	295 817	306 738	305 235	295 481	305 663	294 640	305 514	**3 599 179**
Total Outflow (m^3)	308 579	280 411	307 971	298 974	308 501	298 667	309 683	308 180	298 331	308 608	297 490	308 459	**3 633 854**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	260	260	260	260	320	320	320	320	320	320	300	300	-
Freshwater pumping rate (m^3/hr)	150	150	150	150	90	90	90	90	90	90	110	110	-
TSF Water Balance													
Slurry water (m^3)	305 634	277 751	305 026	296 124	305 556	295 817	306 738	305 235	295 481	305 663	294 640	305 514	**3 599 179**
Tailings water/ice entrampment (%)	50%	50%	50%	50%	40%	30%	30%	30%	30%	48%	65%	65%	
Void and ice entrapment losses (m^3)	152 817	138 875	152 513	148 062	122 223	88 745	92 022	91 571	88 644	146 718	191 516	198 584	**1 612 290**
Slurry water returned to the pond (m^3)	152 817	138 875	152 513	148 062	183 334	207 072	214 717	213 665	206 837	158 945	103 124	106 930	**1 986 890**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANNUAL TOTAL
	Year 2015												
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Pumped to Attenuation Pond (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Total Outflow (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
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	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
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	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Pumped to Attenuation Pond (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Total Outflow (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
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	0	244 048	31 457	46 996	123 925	0	0	0	**446 426**
Pumped From Vault Pit (m^3)	0	0	0	0	0	7 934	5 769	6 352	6 068	0	0	0	**26 123**
Total Inflow (m^3)	0	0	0	0	0	251 982	37 226	53 348	129 993	0	0	0	**472 549**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	120 000	120 000	106 426	100 000	0	0	0	**446 426**
Total Outflow (m^3)	0	0	0	0	0	120 000	120 000	106 426	100 000	0	0	0	**446 426**
Net Inflow (m^3)	0	0	0	0	0	131 982	-82 774	-53 078	29 993	0	0	0	**26 123**
End-of-Month Volume (m^3)	658 133	658 133	658 133	658 133	658 133	790 115	707 341	654 263	684 256	684 256	684 256	684 256	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	7 934	5 769	6 352	6 068	0	0	0	**26 123**
Total Inflow (m^3)	0	0	0	0	0	7 934	5 769	6 352	6 068	0	0	0	**26 123**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	7 934	5 769	6 352	6 068	0	0	0	**26 123**
Total Outflow (m^3)	0	0	0	0	0	7 934	5 769	6 352	6 068	0	0	0	**26 123**
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	-
Phase Open Pit													

	Year 2016												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**366**
Tailings (tonnes):	349 618	327 062	349 618	335 790	346 983	335 790	343 139	343 139	332 070	346 053	334 890	346 053	**4 090 205**
Cummulative Tailings (tonnes):	17 894 862	18 221 924	18 571 542	18 907 332	19 254 315	19 590 105	19 933 244	20 276 383	20 608 453	20 954 506	21 289 396	21 635 449	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	3 180 859	3 507 921	3 857 539	4 193 329	4 540 312	4 876 102	5 219 241	5 562 380	5 894 450	6 240 503	6 575 393	6 921 446	-
North Cell (TSF)													
Starting Pond Volume (m^3)	180 069	180 069	180 069	180 069	180 069	180 069	1 075	1 075	1 075	1 075	1 075	1 075	-
Total Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Transfer to South Cell (m^3)	0	0	0	0	0	178 994	0	0	0	0	0	0	**178 994**
Total Outflow (m^3)	0	0	0	0	0	178 994	0	0	0	0	0	0	**178 994**
Net Inflow (m^3)	0	0	0	0	0	-178 994	0	0	0	0	0	0	**-178 994**
End-of-Month Volume (m^3)	180 069	180 069	180 069	180 069	180 069	1 075	1 075	1 075	1 075	1 075	1 075	1 075	-
South Cell (TSF)													
Pumped From Goose Pit (m^3)	38 000	38 000	38 000	38 000	0	0	0	154 237	300 000	0	0	0	**606 237**
Pumped From Portage Pit (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	30 000	30 000	30 000	**145 000**
Runoff (m^3)	0	0	0	0	0	48 766	9 120	12 021	25 135	0	0	0	**95 042**
Transfer from North Cell (m^3)	0	0	0	0	0	178 994	0	0	0	0	0	0	**178 994**
Sewage water from Tear Drop Lake (m^3)	0	0	0	0	23 180	0	0	0	11 590	0	0	0	**34 770**
Water from tailings slurry (m^3)	106 932	100 663	107 006	103 604	159 038	206 972	214 589	213 820	206 714	122 208	29 476	30 531	**1 601 554**
Total Inflow (m^3)	144 932	138 663	145 006	141 604	192 218	449 732	233 709	390 078	553 439	152 208	59 476	60 531	**2 661 597**
Reclaim water to the mill (m^3)	223 200	208 800	223 200	216 000	223 200	230 400	238 080	238 080	230 400	223 200	216 000	223 200	**2 693 760**
Transfer to Portage Pit (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Outflow (m^3)	223 200	208 800	223 200	216 000	223 200	230 400	238 080	238 080	230 400	223 200	216 000	223 200	**2 693 760**
Net Inflow (m^3)	-78 268	-70 137	-78 194	-74 396	-30 982	219 332	-4 371	151 998	323 039	-70 992	-156 524	-162 669	**-32 163**
End-of-Month Volume (m^3)	805 643	735 506	657 312	582 915	551 933	771 265	766 894	918 893	1 241 931	1 170 940	1 014 416	851 747	-
Mill/Camp													
Ore water (m^3)	3 426	5 004	3 636	3 660	3 747	3 324	4 461	3 363	2 955	3 426	2 411	3 218	**42 633**
Reclaim water (m^3)	223 200	208 800	223 200	216 000	223 200	230 400	238 080	238 080	230 400	223 200	216 000	223 200	**2 693 760**
Freshwater from Third Portage Lake (m^3)	81 840	76 560	81 840	79 200	81 840	64 800	66 960	66 960	64 800	81 840	79 200	81 840	**907 680**
Total Inflow (m^3)	308 466	290 364	308 676	298 860	308 787	298 524	309 501	308 403	298 155	308 466	297 611	308 258	**3 644 073**
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)	305 521	287 609	305 731	296 010	305 842	295 674	306 556	305 458	295 305	305 521	294 761	305 313	**3 609 303**
Total Outflow (m^3)	308 466	290 364	308 676	298 860	308 787	298 524	309 501	308 403	298 155	308 466	297 611	308 258	**3 644 073**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	300	300	300	300	300	320	320	320	320	300	300	300	-
Freshwater pumping rate (m^3/hr)	110	110	110	110	110	90	90	90	90	110	110	110	-
TSF Water Balance													
Slurry water (m^3)	305 521	287 609	305 731	296 010	305 842	295 674	306 556	305 458	295 305	305 521	294 761	305 313	**3 609 303**
Tailings water/ice entrampment (%)	65%	65%	65%	65%	48%	30%	30%	30%	30%	60%	90%	90%	
Void and ice entrapment losses (m^3)	198 589	186 946	198 725	192 407	146 804	88 702	91 967	91 637	88 592	183 313	265 285	274 782	**2 007 748**
Slurry water returned to the pond (m^3)	106 932	100 663	107 006	103 604	159 038	206 972	214 589	213 820	206 714	122 208	29 476	30 531	**1 601 554**

	Year 2016												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Pumpped from Third Portage Lake (m^3)	0	0	0	0	0	300 000	300 000	300 000	300 000	0	0	0	**1 200 000**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	338 000	338 000	338 000	38 000	38 000	38 000	**1 668 000**
Pumped to Attenuation Pond (m^3)	38 000	38 000	38 000	38 000	0	0	0	154 237	300 000	0	0	0	**606 237**
Total Outflow (m^3)	38 000	38 000	38 000	38 000	0	0	0	154 237	300 000	0	0	0	**606 237**
Net Inflow (m^3)	0	0	0	0	38 000	350 000	338 000	183 763	38 000	38 000	38 000	38 000	**1 061 763**
End-of-Month Volume (m^3)	0	0	0	0	38 000	388 000	726 000	909 763	947 763	985 763	1 023 763	1 061 763	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
East Dike Seepage (m^3)	0	0	0	0	0	0	0	0	0	30 000	30 000	30 000	**90 000**
Total Inflow (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	30 000	30 000	30 000	**145 000**
Pumped to Attenuation Pond (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	30 000	30 000	30 000	**145 000**
Total Outflow (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	30 000	30 000	30 000	**145 000**
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	0	243 879	31 435	46 964	123 839	0	0	0	**446 117**
Pumped From Vault Pit (m^3)	0	0	0	0	0	8 096	5 887	6 481	6 192	0	0	0	**26 656**
Pumped From Phaser Pit (m^3)	0	0	0	0	0	0	200 000	200 000	5 665	0	0	0	**405 665**
Total Inflow (m^3)	0	0	0	0	0	251 975	237 322	253 445	135 696	0	0	0	**878 438**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	200 000	400 000	200 000	78 438	0	0	0	**878 438**
Total Outflow (m^3)	0	0	0	0	0	200 000	400 000	200 000	78 438	0	0	0	**878 438**
Net Inflow (m^3)	0	0	0	0	0	51 975	-162 678	53 445	57 258	0	0	0	**0**
End-of-Month Volume (m^3)	684 256	684 256	684 256	684 256	684 256	736 231	573 553	626 998	684 256	684 256	684 256	684 256	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	8 096	5 887	6 481	6 192	0	0	0	**26 656**
Total Inflow (m^3)	0	0	0	0	0	8 096	5 887	6 481	6 192	0	0	0	**26 656**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	8 096	5 887	6 481	6 192	0	0	0	**26 656**
Total Outflow (m^3)	0	0	0	0	0	8 096	5 887	6 481	6 192	0	0	0	**26 656**
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	-
Phase Open Pit													
Phaser Lake dewatering (m^3)	0	0	0	0	0	0	200 000	200 000	5 665	0	0	0	**405 665**
Total Inflow (m^3)	0	0	0	0	0	0	200000	200000	5665	0	0	0	405 665
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	0	200 000	200 000	5 665	0	0	0	**405 665**
Total Outflow (m^3)	0	0	0	0	0	0	200 000	200 000	5 665	0	0	0	405 665
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 2017												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	341 992	308 896	341 992	330 960	341 992	330 960	350 300	350 300	100 324	0	0	0	**2 797 716**
Cummulative Tailings (tonnes):	21 977 441	22 286 337	22 628 329	22 959 289	23 301 281	23 632 241	23 982 541	24 332 841	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	7 263 438	7 572 334	7 914 326	8 245 286	8 587 278	8 918 238	9 268 538	9 618 838	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Pumped From Portage Pit (m^3)	30 000	30 000	30 000	30 000	40 000	45 000	40 000	40 000	0	0	0	0	**285 000**
Runoff (m^3)	0	0	0	0	0	48 589	7 474	10 494	24 588	0	0	0	**91 145**
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)	30 545	27 759	30 565	29 596	122 315	206 939	214 654	213 870	91 870	0	0	0	**968 112**
Total Inflow (m^3)	60 545	57 759	60 565	59 596	185 400	300 528	262 128	264 364	128 048	0	0	0	**1 378 932**
Reclaim water to the mill (m^3)	223 200	201 600	215 760	208 800	260 400	252 000	260 400	260 400	108 000	0	0	0	**1 990 560**
Transfer to Portage Pit (m^3)	0	0	0	0	0	0	0	100 000	50 000	0	0	0	**150 000**
Total Outflow (m^3)	223 200	201 600	215 760	208 800	260 400	252 000	260 400	360 400	158 000	0	0	0	**2 140 560**
Net Inflow (m^3)	-162 655	-143 841	-155 195	-149 204	-75 000	48 528	1 728	-96 036	-29 952	0	0	0	**-761 628**
End-of-Month Volume (m^3)	689 092	545 251	390 056	240 851	165 852	214 379	216 108	120 071	90 119	90 119	90 119	90 119	-
Mill/Camp													
Ore water (m^3)	3 352	4 726	3 557	3 607	3 694	3 277	4 554	3 433	893	0	0	0	**31 092**
Reclaim water (m^3)	223 200	201 600	215 760	208 800	260 400	252 000	260 400	260 400	108 000	0	0	0	**1 990 560**
Freshwater from Third Portage Lake (m^3)	81 840	73 920	89 280	86 400	44 640	43 200	44 640	44 640	25 200	2 976	2 880	2 945	**542 561**
Total Inflow (m^3)	308 392	280 246	308 597	298 807	308 734	298 477	309 594	308 473	134 093	2 976	2 880	2 945	**2 564 213**
Freshwater for camp purposes (m^3)	2 945	2 660	2 945	2 850	2 945	2 850	2 945	2 945	2 850	2 976	2 880	2 945	**34 736**
Slurry water (m^3)	305 447	277 586	305 652	295 957	305 789	295 627	306 649	305 528	131 243	0	0	0	**2 529 477**
Total Outflow (m^3)	308 392	280 246	308 597	298 807	308 734	298 477	309 594	308 473	134 093	2 976	2 880	2 945	**2 564 213**
Net Inflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Reclaim water pumping rate (m^3/hr)	300	300	290	290	350	350	350	350	150	0	0	0	-
Freshwater pumping rate (m^3/hr)	110	110	120	120	60	60	60	60	35	4	4	4	-
TSF Water Balance													
Slurry water (m^3)	305 447	277 586	305 652	295 957	305 789	295 627	306 649	305 528	131 243	0	0	0	**2 529 477**
Tailings water/ice entrampment (%)	90%	90%	90%	90%	60%	30%	30%	30%	30%	0%	0%	0%	
Void and ice entrapment losses (m^3)	274 902	249 827	275 087	266 362	183 473	88 688	91 995	91 658	39 373	0	0	0	**1 561 365**
Slurry water returned to the pond (m^3)	30 545	27 759	30 565	29 596	122 315	206 939	214 654	213 870	91 870	0	0	0	**968 112**

	Year 2017												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	1 180 000	1 168 000	1 168 000	1 168 000	38 000	38 000	38 000	**4 988 000**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	1 180 000	1 168 000	1 168 000	1 168 000	38 000	38 000	38 000	**4 988 000**
End-of-Month Volume (m^3)	1 099 763	1 137 763	1 175 763	1 213 763	1 251 763	2 431 763	3 599 763	4 767 763	5 935 763	5 973 763	6 011 763	6 049 763	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Transfer from South Cell (m^3)	0	0	0	0	0	0	0	100 000	50 000	0	0	0	**150 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	30 000	30 000	30 000	30 000	40 000	45 000	40 000	140 000	90 000	30 000	30 000	30 000	**565 000**
Pumped to Attenuation Pond (m^3)	30 000	30 000	30 000	30 000	40 000	45 000	40 000	40 000	0	0	0	0	**285 000**
Total Outflow (m^3)	30 000	30 000	30 000	30 000	40 000	45 000	40 000	40 000	0	0	0	0	**285 000**
Net Inflow (m^3)	0	0	0	0	0	0	0	100 000	90 000	30 000	30 000	30 000	**280 000**
End-of-Month Volume (m^3)	101 074	101 074	101 074	101 074	101 074	101 074	101 074	201 074	291 074	321 074	351 074	381 074	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	238 260	30 711	45 882	120 986	0	0	0	**435 839**
Pumped From Vault Pit (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
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	251 753	40 522	56 684	131 305	0	0	0	**480 264**
Decant - TSS to Wally Lake (m^3)	0	0	0	0	0	120 000	110 000	105 839	144 425	0	0	0	**480 264**
Total Outflow (m^3)	0	0	0	0	0	120 000	110 000	105 839	144 425	0	0	0	**480 264**
Net Inflow (m^3)	0	0	0	0	0	131 753	-69 478	-49 155	-13 120	0	0	0	**0**
End-of-Month Volume (m^3)	684 256	684 256	684 256	684 256	684 256	816 009	746 531	697 376	684 256	684 256	684 256	684 256	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Total Inflow (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Pumped to Vault Attenuation Pond (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Total Outflow (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
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	-
Phase Open Pit													
Total Inflow (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	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 2018												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
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):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Total Inflow (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	0	0	89 294	0	0	0	0	0	**89 294**
Total Outflow (m^3)	0	0	0	0	0	0	89 294	0	0	0	0	0	**89 294**
Net Inflow (m^3)	0	0	0	0	0	0	-89 294	0	0	0	0	0	**-89 294**
End-of-Month Volume (m^3)	90 119	90 119	90 119	90 119	90 119	90 119	825	825	825	825	825	825	-
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Inflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Freshwater for camp purposes (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Outflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
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	300 000	60 000	0	0	0	0	0	**0**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	98 000	38 000	38 000	38 000	38 000	38 000	**828 000**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	98 000	38 000	38 000	38 000	38 000	38 000	**828 000**
End-of-Month Volume (m^3)	6 087 763	6 125 763	6 163 763	6 201 763	6 239 763	6 589 763	6 687 763	6 725 763	6 763 763	6 801 763	6 839 763	6 877 763	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Transfer from South Cell (m^3)	0	0	0	0	0	0	89 294	0	0	0	0	0	**89 294**
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	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 259 294	1 170 000	1 181 590	30 000	30 000	30 000	**5 058 969**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 259 294	1 170 000	1 181 590	30 000	30 000	30 000	**5 058 969**
End-of-Month Volume (m^3)	411 074	441 074	471 074	501 074	564 159	1 739 159	2 998 453	4 168 453	5 350 043	5 380 043	5 410 043	5 440 043	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	238 260	30 711	45 882	120 986	0	0	0	**435 839**
Total Inflow (m^3)	0	0	0	0	0	238 260	30 711	45 882	120 986	0	0	0	**435 839**
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	238 260	30 711	45 882	120 986	0	0	0	**435 839**
End-of-Month Volume (m^3)	684 256	684 256	684 256	684 256	684 256	922 516	953 227	999 109	1 120 095	1 120 095	1 120 095	1 120 095	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Pumped from Wally Lake (m^3)	0	0	0	0	0	603 783	1 006 306	1 360 338	1 212 177	0	0	0	**4 182 604**
Total Inflow (m^3)	0	0	0	0	0	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
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	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
End-of-Month Volume (m^3)	0	0	0	0	0	617 276	1 633 393	3 004 533	4 227 029	4 227 029	4 227 029	4 227 029	-
Phase Open Pit													
Total Inflow (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	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
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
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):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Inflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Freshwater for camp purposes (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Outflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	300 000	60 000	0	0	0	0	0	**0**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	98 000	38 000	38 000	38 000	38 000	38 000	**828 000**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	98 000	38 000	38 000	38 000	38 000	38 000	**828 000**
End-of-Month Volume (m^3)	6 915 763	6 953 763	6 991 763	7 029 763	7 067 763	7 417 763	7 515 763	7 553 763	7 591 763	7 629 763	7 667 763	7 705 763	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
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	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 170 000	1 170 000	1 181 590	30 000	30 000	30 000	**4 969 675**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 170 000	1 170 000	1 181 590	30 000	30 000	30 000	**4 969 675**
End-of-Month Volume (m^3)	5 470 043	5 500 043	5 530 043	5 560 043	5 623 128	6 798 128	7 968 128	9 138 128	10 319 718	10 349 718	10 379 718	10 409 718	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	238 260	30 711	45 882	120 986	0	0	0	**435 839**
Total Inflow (m^3)	0	0	0	0	0	238 260	30 711	45 882	120 986	0	0	0	**435 839**
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	238 260	30 711	45 882	120 986	0	0	0	**435 839**
End-of-Month Volume (m^3)	1 120 095	1 120 095	1 120 095	1 120 095	1 120 095	1 358 355	1 389 066	1 434 948	1 555 934	1 555 934	1 555 934	1 555 934	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Pumped from Wally Lake (m^3)	0	0	0	0	0	603 783	1 006 306	1 360 338	1 212 177	0	0	0	**4 182 604**
Total Inflow (m^3)	0	0	0	0	0	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
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	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
End-of-Month Volume (m^3)	4 227 029	4 227 029	4 227 029	4 227 029	4 227 029	4 844 305	5 860 422	7 231 562	8 454 058	8 454 058	8 454 058	8 454 058	-
Phase Open Pit													
Total Inflow (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	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 2020												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
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):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Total Inflow (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Freshwater for camp purposes (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Total Outflow (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
Pumped from Third Portage Lake (m^3)	0	0	0	0	0	300 000	60 000	0	0	0	0	0	**0**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	98 000	38 000	38 000	38 000	38 000	38 000	**828 000**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	350 000	98 000	38 000	38 000	38 000	38 000	38 000	**828 000**
End-of-Month Volume (m^3)	7 743 763	7 781 763	7 819 763	7 857 763	7 895 763	8 245 763	8 343 763	8 381 763	8 419 763	8 457 763	8 495 763	8 533 763	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
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	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 170 000	1 170 000	1 181 590	30 000	30 000	30 000	**4 969 675**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 170 000	1 170 000	1 181 590	30 000	30 000	30 000	**4 969 675**
End-of-Month Volume (m^3)	10 439 718	10 469 718	10 499 718	10 529 718	10 592 803	11 767 803	12 937 803	14 107 803	15 289 393	15 319 393	15 349 393	15 379 393	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	238 260	30 711	45 882	41 184	0	0	0	**356 037**
Total Inflow (m^3)	0	0	0	0	0	238 260	30 711	45 882	41 184	0	0	0	**356 037**
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	238 260	30 711	45 882	41 184	0	0	0	**356 037**
End-of-Month Volume (m^3)	1 555 934	1 555 934	1 555 934	1 555 934	1 555 934	1 794 194	1 824 905	1 870 787	1 911 971	1 911 971	1 911 971	1 911 971	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Pumped from Wally Lake (m^3)	0	0	0	0	0	603 783	1 006 306	1 360 338	1 212 177	0	0	0	**4 182 604**
Total Inflow (m^3)	0	0	0	0	0	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
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	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
End-of-Month Volume (m^3)	8 454 058	8 454 058	8 454 058	8 454 058	8 454 058	9 071 334	10 087 451	11 458 591	12 681 087	12 681 087	12 681 087	12 681 087	-
Phase Open Pit													
Total Inflow (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	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 2021												ANNUAL
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
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):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Inflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Freshwater for camp purposes (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Outflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Runoff (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	29 703	0	0	**383 703**
Total Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	29 703	0	0	**383 703**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	29 703	0	0	**383 703**
End-of-Month Volume (m^3)	8 571 763	8 609 763	8 647 763	8 685 763	8 723 763	8 773 763	8 811 763	8 849 763	8 887 763	8 917 466	8 917 466	8 917 466	-
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Transfer from Goose (m^3)	0	0	0	0	0	0	0	0	0	8 297	38 000	38 000	**84 297**
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	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 170 000	1 170 000	1 181 590	38 297	68 000	68 000	**5 053 972**
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)	30 000	30 000	30 000	30 000	63 085	1 175 000	1 170 000	1 170 000	1 181 590	38 297	68 000	68 000	**5 053 972**
End-of-Month Volume (m^3)	15 409 393	15 439 393	15 469 393	15 499 393	15 562 478	16 737 478	17 907 478	19 077 478	20 259 068	20 297 365	20 365 365	20 433 365	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	238 260	30 711	45 882	41 184	0	0	0	**356 037**
Total Inflow (m^3)	0	0	0	0	0	238 260	30 711	45 882	41 184	0	0	0	**356 037**
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	238 260	30 711	45 882	41 184	0	0	0	**356 037**
End-of-Month Volume (m^3)	1 911 971	1 911 971	1 911 971	1 911 971	1 911 971	2 150 231	2 180 942	2 226 824	2 268 008	2 268 008	2 268 008	2 268 008	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	13 493	9 811	10 802	10 319	0	0	0	**44 425**
Pumped from Wally Lake (m^3)	0	0	0	0	0	603 783	1 006 306	1 360 338	1 212 177	0	0	0	**4 182 604**
Total Inflow (m^3)	0	0	0	0	0	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
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	617 276	1 016 117	1 371 140	1 222 496	0	0	0	**4 227 029**
End-of-Month Volume (m^3)	12 681 087	12 681 087	12 681 087	12 681 087	12 681 087	13 298 363	14 314 480	15 685 620	16 908 116	16 908 116	16 908 116	16 908 116	-
Phase Open Pit													
Total Inflow (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	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	-

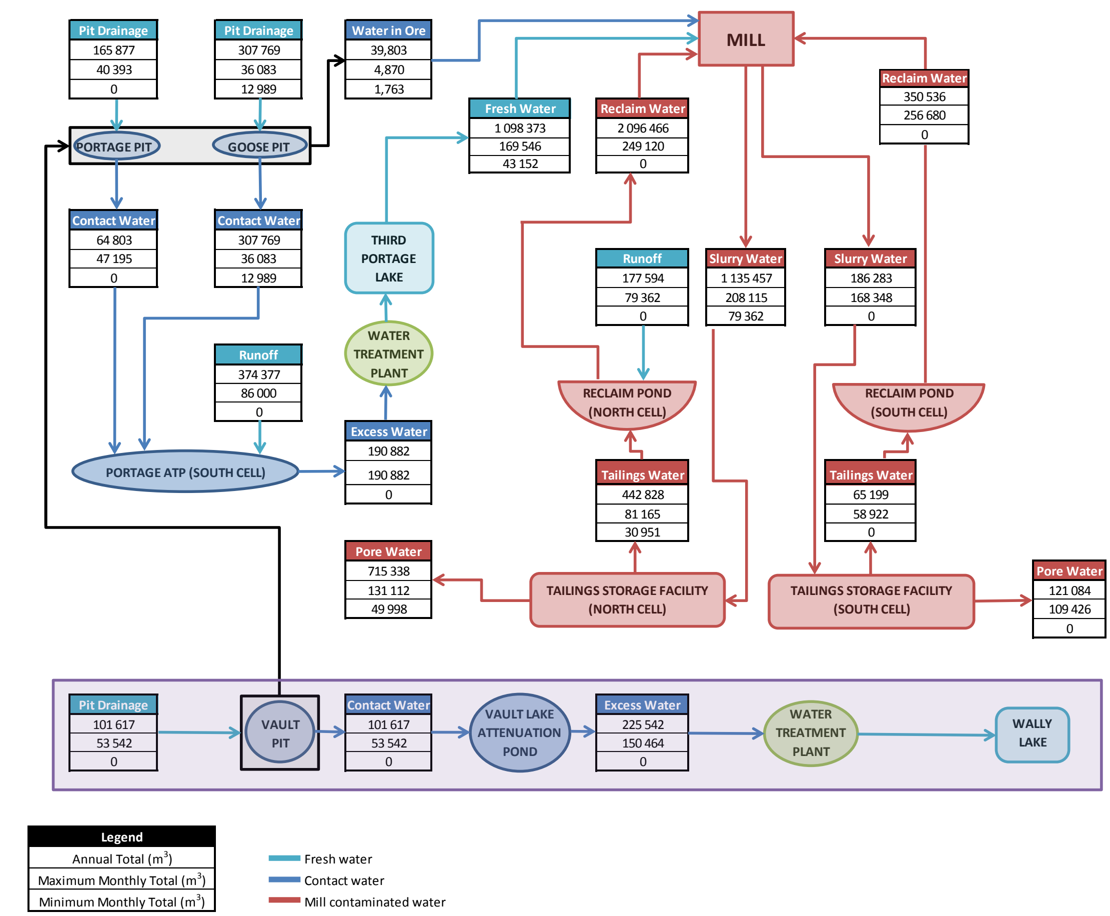
	Year 2022												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
No. of days	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	**365**
Tailings (tonnes):	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cummulative Tailings (tonnes):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Inflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Freshwater for camp purposes (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Outflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Transfer from Goose (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
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	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	68 000	68 000	68 000	68 000	101 085	1 225 000	1 208 000	1 208 000	1 219 590	68 000	68 000	68 000	**5 437 675**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	68 000	68 000	68 000	68 000	101 085	1 225 000	1 208 000	1 208 000	1 219 590	68 000	68 000	68 000	**5 437 675**
End-of-Month Volume (m^3)	20 501 365	20 569 365	20 637 365	20 705 365	20 806 450	22 031 450	23 239 450	24 447 450	25 667 040	25 735 040	25 803 040	25 871 040	-
Vault Attenuation Pond													
Runoff (m^3)	0	0	0	0	0	238 260	30 711	45 882	0	0	0	0	**314 853**
Pumped from Wally Lake (m^3)	0	0	0	0	0	0	0	708 102	0	0	0	0	**708 102**
Total Inflow (m^3)	0	0	0	0	0	238 260	30 711	753 984	0	0	0	0	**1 022 955**
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	238 260	30 711	753 984	0	0	0	0	**1 022 955**
End-of-Month Volume (m^3)	2 268 008	2 268 008	2 268 008	2 268 008	2 268 008	2 506 268	2 536 979	3 290 963	3 290 963	3 290 963	3 290 963	3 290 963	-
Vault Open Pit													
Runoff (m^3)	0	0	0	0	0	13 493	9 811	10 802	0	0	0	0	**34 106**
Pumped from Wally Lake (m^3)	0	0	0	0	0	603 783	1 006 306	551 137	0	0	0	0	**2 161 226**
Total Inflow (m^3)	0	0	0	0	0	617 276	1 016 117	561 939	0	0	0	0	**2 195 332**
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	617 276	1 016 117	561 939	0	0	0	0	**2 195 332**
End-of-Month Volume (m^3)	16 908 116	16 908 116	16 908 116	16 908 116	16 908 116	17 525 392	18 541 509	19 103 448	19 103 448	19 103 448	19 103 448	19 103 448	-
Phase Open Pit (including Phaser Lake)													
Pumped from Wally Lake (m3)	0	0	0	0	0	571 007	478 420	0	0	0	0	0	**1 049 427**
Total Inflow (m^3)	0	0	0	0	0	571007	478420	0	0	0	0	0	1 049 427
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	571 007	478 420	0	0	0	0	0	**1 049 427**
End-of-Month Volume (m^3)	0	0	0	0	0	571 007	1 049 427	1 049 427	1 049 427	1 049 427	1 049 427	1 049 427	-

	Year 2023												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
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):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Inflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Freshwater for camp purposes (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Total Outflow (m^3)	2 976	2 688	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 040**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Transfer from Goose (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	38 000	38 000	38 000	**468 000**
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	1 130 000	1 130 000	1 130 000	1 130 000	0	0	0	**4 520 000**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	**360 000**
Total Inflow (m^3)	68 000	68 000	68 000	68 000	101 085	1 225 000	1 208 000	1 208 000	1 219 590	68 000	68 000	68 000	**5 437 675**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	68 000	68 000	68 000	68 000	101 085	1 225 000	1 208 000	1 208 000	1 219 590	68 000	68 000	68 000	**5 437 675**
End-of-Month Volume (m^3)	25 939 040	26 007 040	26 075 040	26 143 040	26 244 125	27 469 125	28 677 125	29 885 125	31 104 715	31 172 715	31 240 715	31 308 715	-
Vault Attenuation Pond													
Vault Open Pit													
Phase Open Pit (including Phaser Lake)													

	Year 2024												ANNUAL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
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):	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	24 433 165	-
Cummulative Tailings (tonnes) - North Cell	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	15 289 718	-
Cummulative Tailings (tonnes) - South Cell	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	9 719 162	-
North Cell (TSF)													
South Cell (TSF)													
Mill/Camp													
Freshwater from Third Portage Lake (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Total Inflow (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Freshwater for camp purposes (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Total Outflow (m^3)	2 976	2 784	2 976	2 880	2 976	2 880	2 976	2 976	2 880	2 976	2 880	2 976	**35 136**
Net Inflow (m^3)	0	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													
Goose Pit (ATP)													
Portage Pit													
Runoff (m^3)	0	0	0	0	10 000	15 000	10 000	10 000	10 000	0	0	0	**55 000**
Transfer from Goose (m^3)	38 000	38 000	38 000	38 000	38 000	50 000	38 000	38 000	38 000	0	0	0	**354 000**
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	1 130 000	1 130 000	1 130 000	248 634	0	0	0	**3 638 634**
East Dike Seepage (m^3)	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	30 000	0	0	0	**270 000**
Total Inflow (m^3)	68 000	68 000	68 000	68 000	101 085	1 225 000	1 208 000	1 208 000	338 224	0	0	0	**4 352 309**
Total Outflow (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Net Inflow (m^3)	68 000	68 000	68 000	68 000	101 085	1 225 000	1 208 000	1 208 000	338 224	0	0	0	**4 352 309**
End-of-Month Volume (m^3)	31 376 715	31 444 715	31 512 715	31 580 715	31 681 800	32 906 800	34 114 800	35 322 800	35 661 024	35 661 024	35 661 024	35 661 024	-
Vault Attenuation Pond													
Vault Open Pit													
Phase Open Pit (including Phaser Lake)													

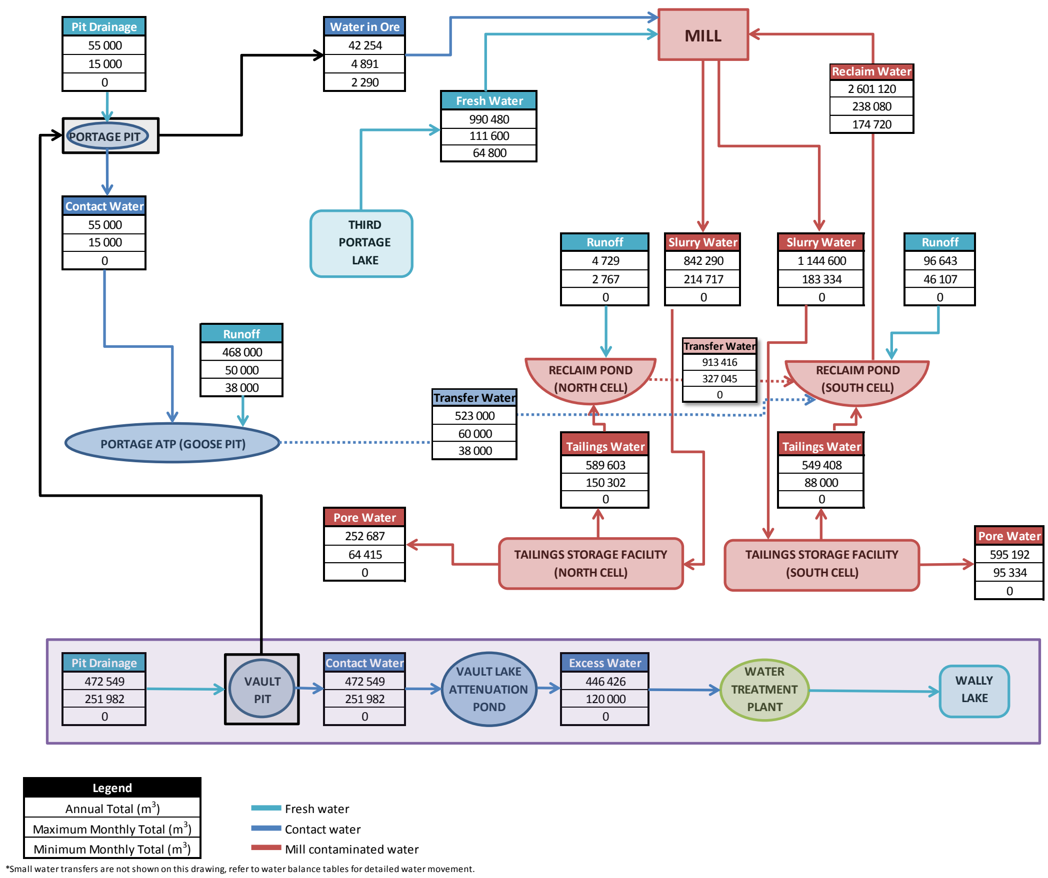
APPENDIX B – GENERAL WATER MOVEMENT

GENERAL WATER MOVEMENT – 2014

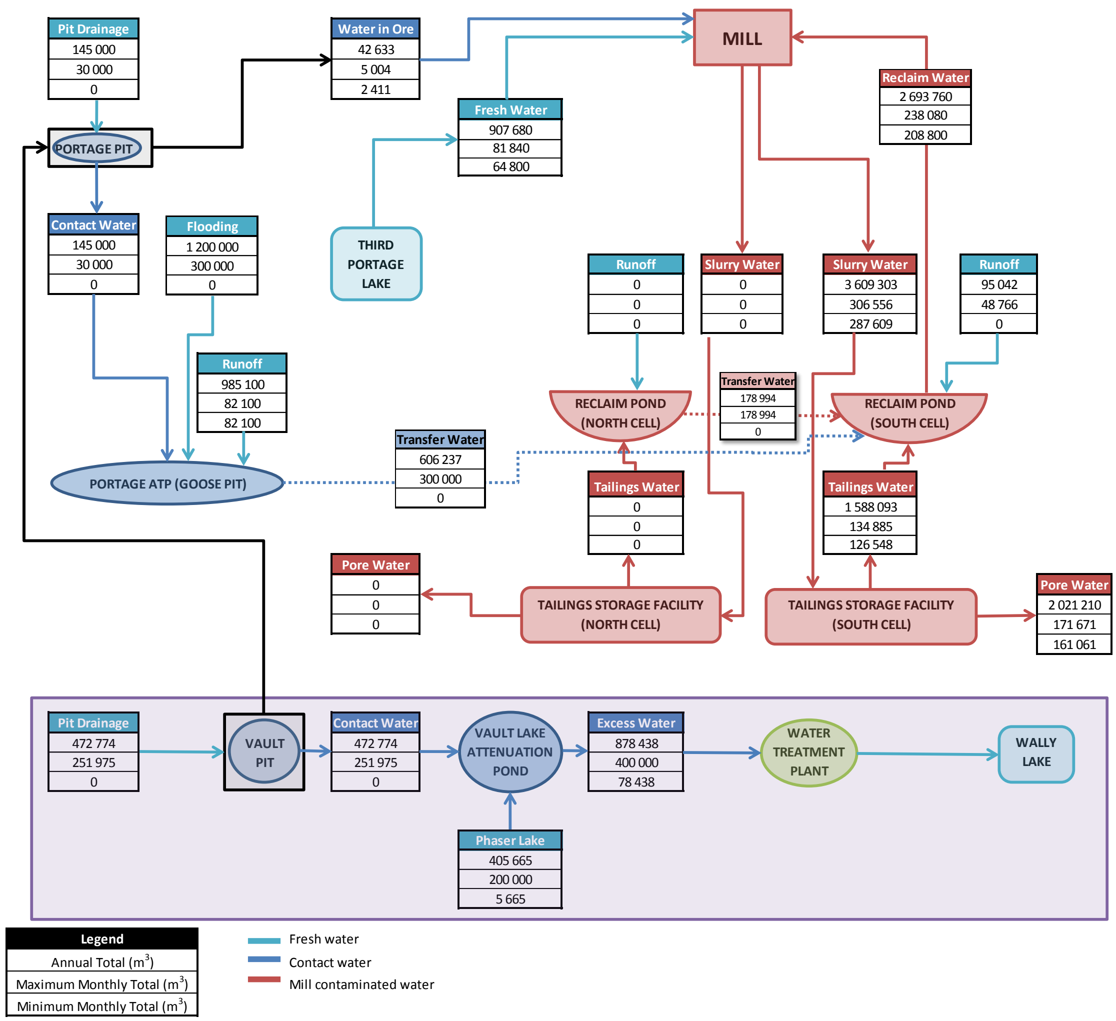


*Small water transfers are not shown on this drawing, refer to water balance tables for detailed water movement.

GENERAL WATER MOVEMENT – 2015

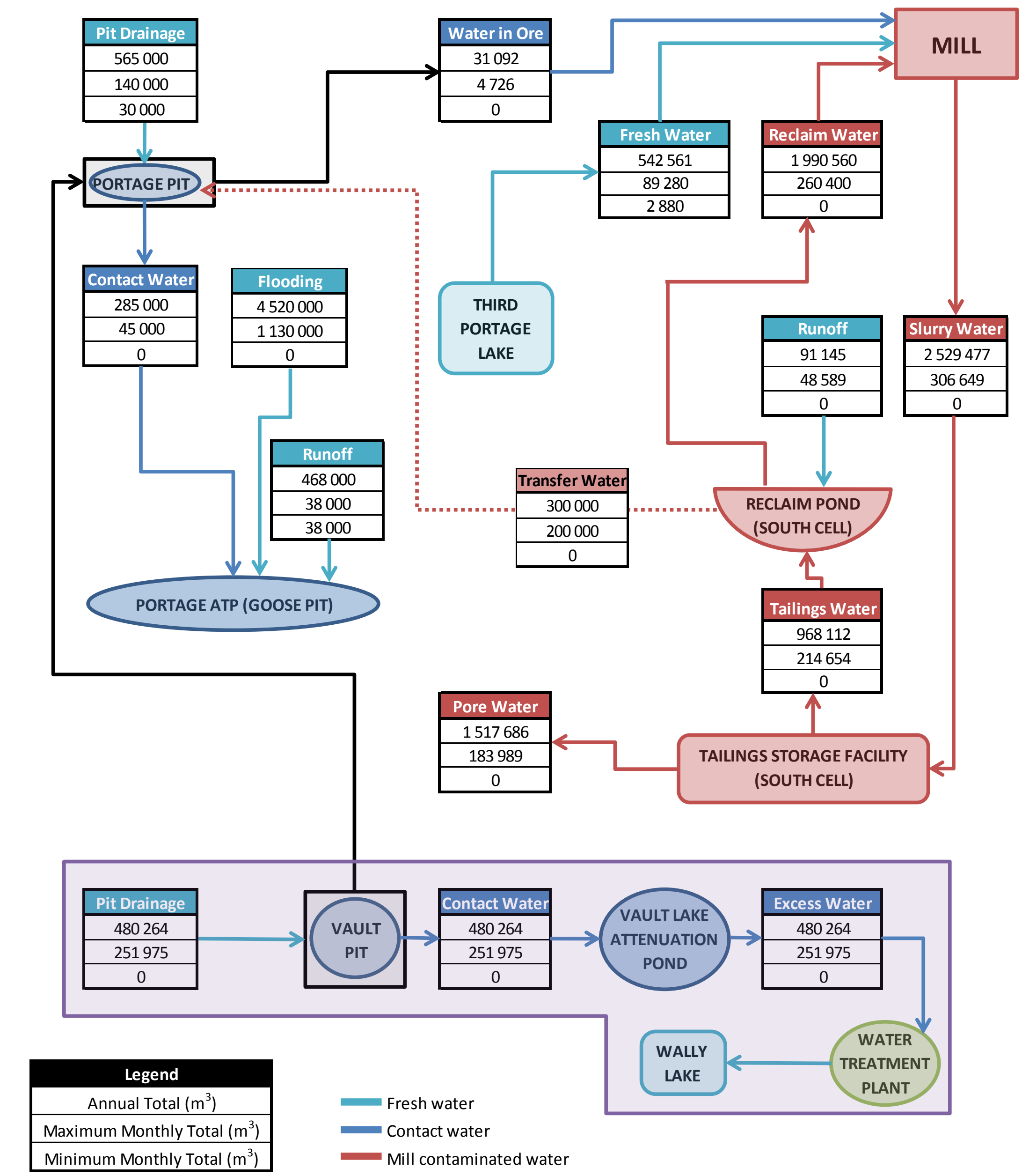


GENERAL WATER MOVEMENT – 2016



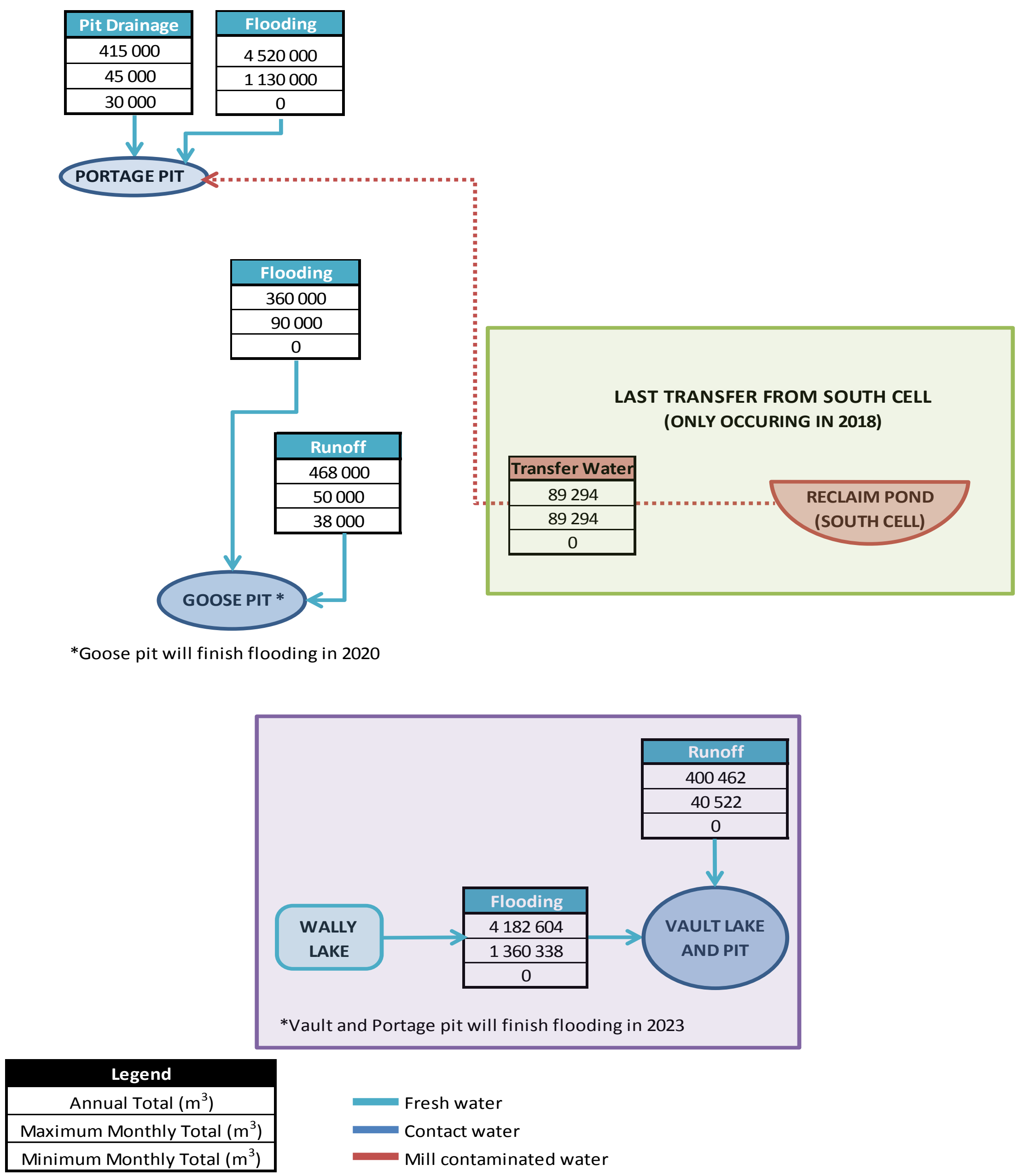
*Small water transfers are not shown on this drawing, refer to water balance tables for detailed water movement.

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: PIT FLOODING – 2018-2024



APPENDIX C – 2014 MEADOWBANK WATER QUALITY FORECASTING UPDATE

SNC • LAVALIN

SUSTAINABLE MINE DEVELOPMENT

AGNICO-EAGLE MINES

TECHNICAL NOTE

Meadowbank Water Quality Forecasting Update Based on the 2014 Water Management Plan

Our file: 625618-0000-40ER-0001

February 2015

Certified ISO 9001

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SNC·LAVALIN	TECHNICAL NOTE **Meadowbank Water Quality Forecasting Update Based on the 2014 Water Management Plan**	Prepared by: G. Beaudoin-Lebeuf Reviewed by: A.-L. Nguyen		
		Rev.	Date	Page
	625618-0000-40ER-0001	00	February 17th, 2015	i

Title of document: **Meadowbank Water Quality Forecasting Update Based on the 2014 Water Management Plan**

Client : **AGNICO-EAGLE MINES**

Project : **Meadowbank Gold Project**

Prepared by: Geneviève Beaudoin-Lebeuf, ing. Geneviève BL ing. #5026532 2015-02-17

Reviewed by: Anh-Long Nguyen, ing., M.Sc. Anh Long Nguyen ing. #122858 2015-02-17

REVISION INDEX

Revision				Pages Revised	Remarks
#	Prep.	App.	Date		
PA	GBL	ALN	2014-01-19	All	For internal review
PB	GBL	ALN	2014-01-20	All	For client's review
00	GBL	ALN	2014-02-17	All	
	2015-02-17	2015-02-17			

NOTICE TO READER

This document contains the expression of the professional opinion of SNC-Lavalin Inc. ("SLI") as to the matters set out herein, using its professional judgment and reasonable care. It is to be read in the context of the agreement dated * (the "Agreement") between SLI and Agnico Eagle Mine (the "Client") and the methodology, procedures and techniques used, SLI's assumptions, and the circumstances and constraints under which its mandate was performed. This document is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of the Client, whose remedies are limited to those set out in the Agreement. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context.

SLI has, in preparing estimates, as the case may be, followed accepted methodology and procedures, and exercised due care consistent with the intended level of accuracy, using its professional judgment and reasonable care, and is thus of the opinion that there is a high probability that actual values will be consistent with the estimate(s). Unless expressly stated otherwise, assumptions, data and information supplied by, or gathered from other sources (including the Client, other consultants, testing laboratories and equipment suppliers, etc.) upon which SLI's opinion as set out herein are based have not been verified by SLI; SLI makes no representation as to its accuracy and disclaims all liability with respect thereto.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 MANDATE

SNC-Lavalin (SLI) was mandated by Agnico-Eagle Mines (AEM) to review and update the water quality forecasting model developed in 2013 using the Water Management Plan 2014 established by AEM.

1.2 STUDY OBJECTIVES AND CONTENT

This Technical Note will present the update of the water quality forecast model for the Meadowbank Gold Project. The update developed in this study is based on the Water Management Plan 2014 of AEM that was developed according to the updated Life of Mine (LOM) (version 2014 V2C - Q3 2017) and the mine development sequence provided by AEM and summarized in Table 1-1. The updated water quality forecast model applies to the North and South Cell TSF Reclaim Ponds, and the Portage and Goose Pits.

The objective of this Technical Note is to forecast the concentration of selected parameters of concern within the North and South Cell TSF Reclaim Ponds, and the Portage and Goose Pits from 2014 until closure, verify last year's assumptions and results, update the model if required, develop recommendations and determine whether water treatment will be required.

For the Vault pit, no treatment would be required 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 – 2018. Active mining of the Vault pit began in January 2014.

1.3 WATER MANAGEMENT PLAN

The Water Management Plan (2014) and water balance was developed by AEM. AEM evaluated the monthly flows and volumes in the Portage and Vault areas, including the maximum storage volumes required for the water management infrastructures during the active life of mine, pit re-flooding activities and post closure, all under average hydrologic conditions.

The Water Management Plan (2014) was based on the revised mining schedule presented in Table 1-1 below.

Table 1-1: Water Management Phases (based on LOM ver. 2014 V2C)

ACTIVITY	UPDATED START DATE[1]	UPDATED END DATE[1]	WMP 2012 START DATE	WMP 2012 END DATE
Pits Mining				
Portage Pit	January 2010	September 2017	January 2010	December 2016
North	January 2010	September 2017	January 2010	December 2015
Central	January 2010	April 2013	January 2010	December 2013
South	January 2010	September 2016	January 2010	December 2016
Goose Island Pit	April 2012	January 2015	April 2012	June 2015
Vault Pit	January 2014	September 2017	January 2014	February 2018
Tailings Storage Facility Operations				
North Cell	January 2010	October 2015	January 2010	March 2015
South Cell	October 2014	September 2017	April 2015	February 2018
Rock Storage Facility (RSF) Operations				
Portage RSF	January 2009	June 2018	January 2009	December 2016
Vault RSF	January 2014	September 2017	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 2017	January 2014	February 2018
Mill Operations	January 2010	September 2017	January 2010	February 2018
Other Key Activities				
Dewatering of Vault Lake	June 2013	July 2014	September 2013	November 2013
Dewatering of Phaser Lake	July 2016	September 2016	September 2016	October 2016
Flooding of Portage Pit	August 2017	January 2025	March 2017	September 2023
Flooding of Goose Island Pit	May 2015	January 2025	July 2015	September 2023
Flooding of Vault Pit	March 2018	October 2023	March 2018	October 2023
Mine Closure completed	n/a	January 2025	n/a	January 2024

Note :
[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.

2.0 REVIEW OF MEADOWBANK WATER QUALITY DATA FOR 2014

2.1 DOCUMENTS REVIEWED

A review of the available water quality data measured in 2014 was undertaken by SLI. This included a review of the following documents:

- Chemical analysis results for the Portage Area for 2014. 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 2010 to 2014.
  - Attenuation Pond (future South Cell TSF Reclaim Pond) (ST-18) from November 2011 to October 2014.
  - Mill effluent metal and cyanide concentrations from April 2012 to December 2014.
  - Grab sample of Mill Effluent taken in October 2014.

It should be noted that the Mill Effluent is currently being discharged to the South Cell TSF (November 2014). It was discharged previously in the North Cell TSF. The South Cell TSF Reclaim Pond thus collects water from the Mill Effluent and additional runoff water from surrounding areas. This mode of operation is planned to continue until May 2015. Afterwards, the Mill Effluent will be sent to the North Cell TSF from June to September 2015, then back into the South Cell TSF until September 2017.

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.

2.1.1 Updates to the Water Management Plan

In the 2012 Water Management Plan, 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 2013 Water Management Plan, 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 2014 Water Management Plan (WMP), based on the volume of Reclaim Water anticipated in the North Cell TSF and South Cell TSF, South Cell Reclaim Water will be transferred to Portage pit starting August 2017. Based on the updated water balance model, no Reclaim Water will be transferred to Goose Pit.

Furthermore, the percentage of tailings water/ice entrapment was also updated in the 2014 WMP to better reflect what is currently observed on site.

2.2 REVIEW OF MEADOWBANK WATER QUALITY DATA

Based on the flows in the Portage Area, it was determined that the most important contributor to the water quality in the TSF Reclaim Pond was the Mill Effluent, since the other inflows consist of snow and ice melt, precipitation, and runoff from nearby areas.

2.2.1 North Cell TSF Reclaim Pond (ST-21)

A review of the chemical analysis for water samples collected in the North Cell TSF Reclaim Pond (station ST-21) was undertaken by SLI in order to identify contaminants that were either above discharge criteria (as stipulated in the MMER, CCME and/or 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 Pond since no effluent is discharged from this area to the environment. However, the MMER, CCME and Water License criteria were used as a guide, to identify potential parameters that may become a problem should they be discharged to the environment without treatment.

It should also 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 report that may represent a potential long term contamination risk are the following:

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

Table 2-1 presents the MMER, Water License and CCME discharge criteria for the 2014 parameters 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 the 2014 parameters measured in the North Cell TSF Pond from 2010 until 2014. Also shown in this figure are the forecasted concentrations from the 2013 Water Management Plan.

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	4 µg/L[4] (1987)
Iron (Fe)	*no criteria*	*no criteria*	0.3 mg/L (1987)
Ammonia (NH_3)	*no criteria*	16 mg N/L	0.86 mg N/L[5] (2001)
Nitrate (NO_3)	*no criteria*	20 mg N/L	2.94 mg N/L (2012)
Chloride (Cl)	*no criteria*	1,000 mg/L	120 mg/L[6] (2011)

Notes:

(1) MMER criteria corresponding to the maximum average monthly concentration
(2) Water License (Part F) criteria 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. 2014.
(4) The copper discharge criterion depends on hardness. For water hardness between 200 to 1000 mg/L of $CaCO_3$ (average hardness levels in the North Cell TSF Reclaim Pond and in Third Portage Lake) the copper limit is 4 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, 1.04 mg/L of NH_3, or 0.855 mg N/L was determined assuming a temperature of 10°C and a pH of 8.0.
(6) This is the long-term chloride concentration limit. The short term concentration limit is 640 mg/L.

Figure 2-1: Concentration in the North Cell TSF Reclaim Pond

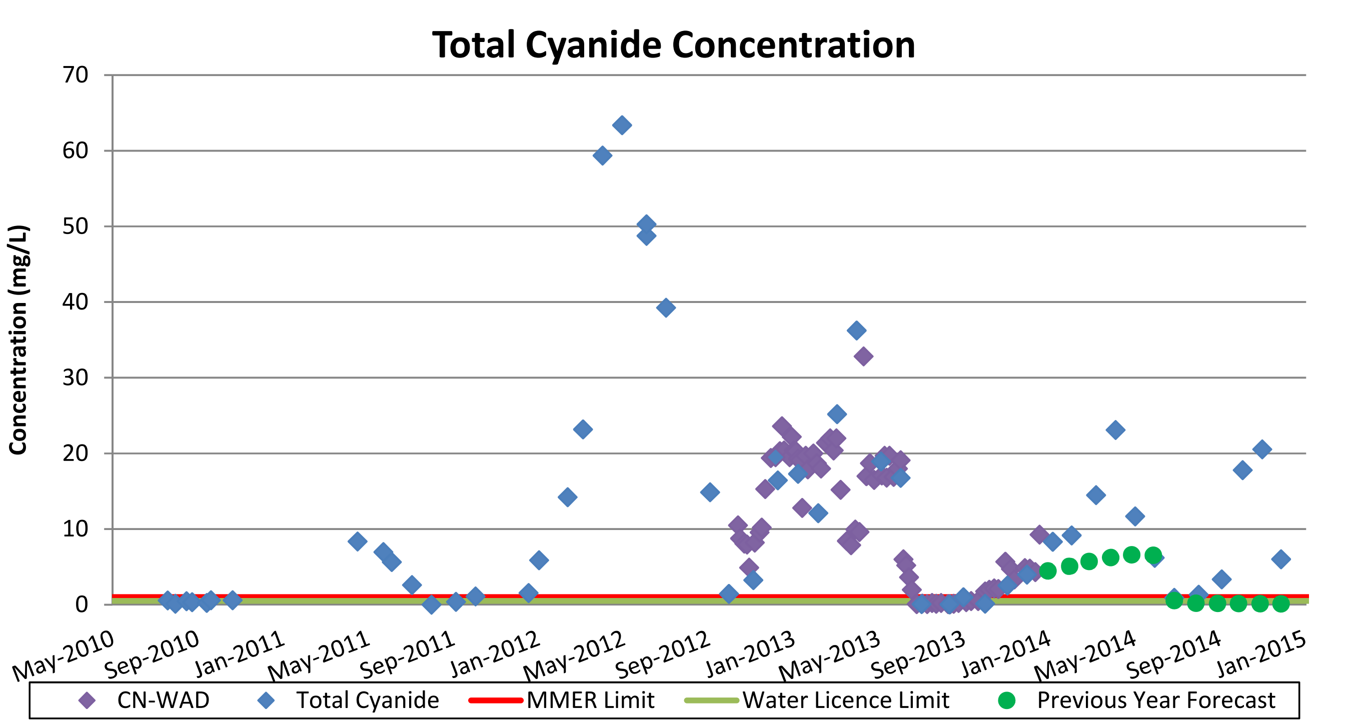
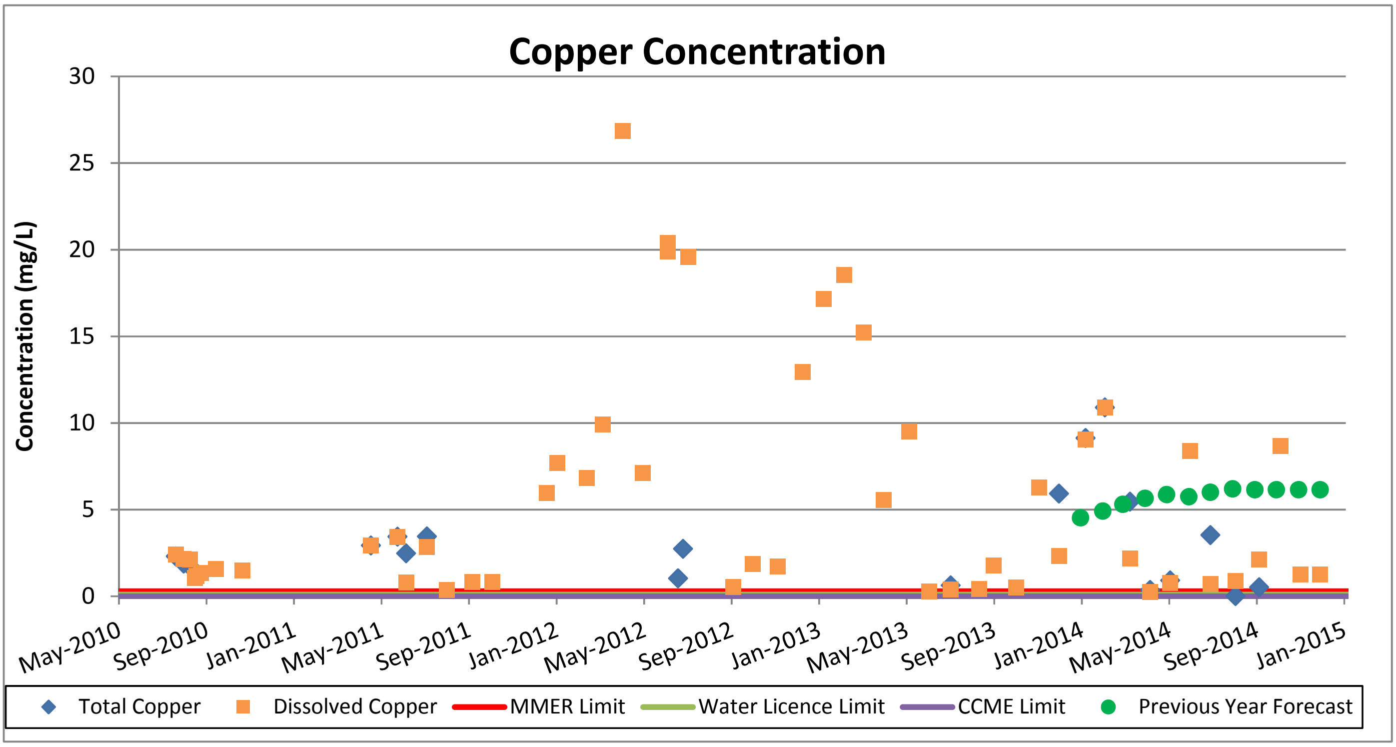


Figure 2-1: (continued) Concentration in the North Cell TSF Reclaim Pond



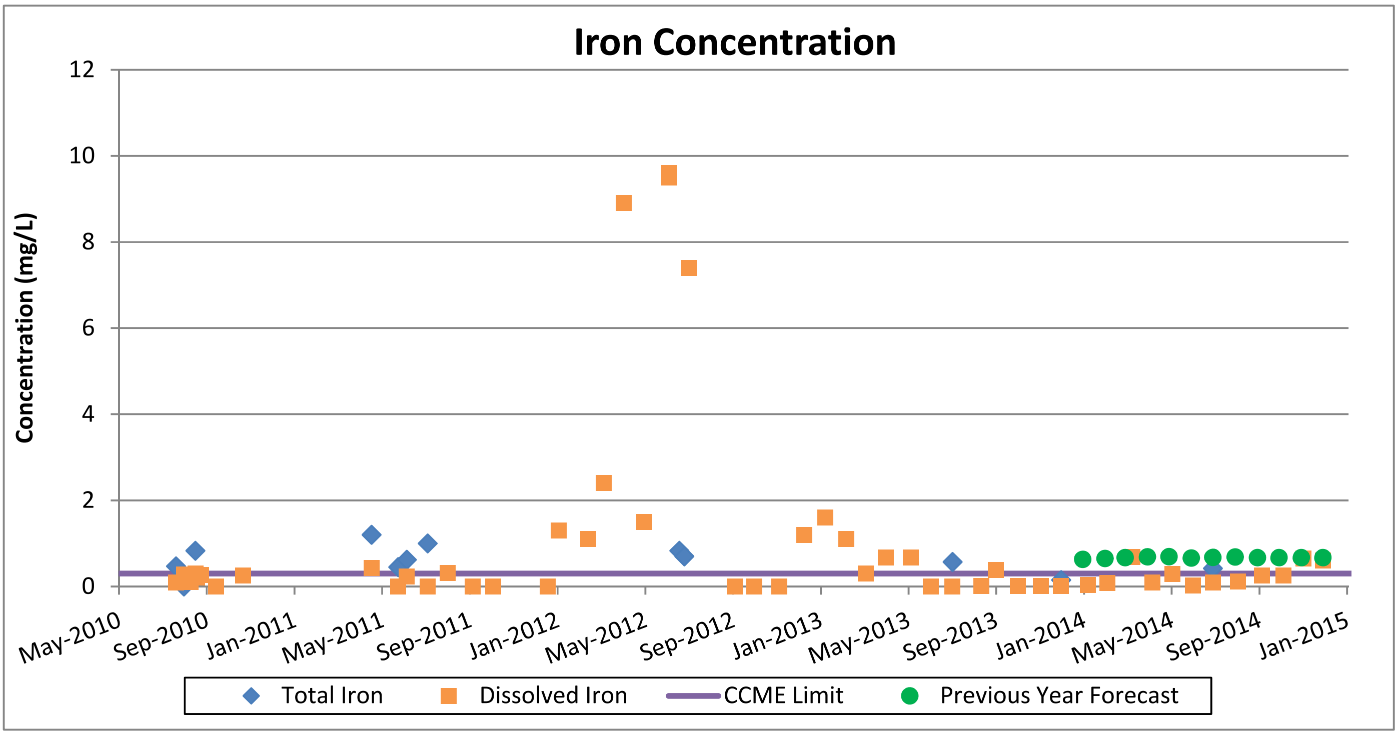
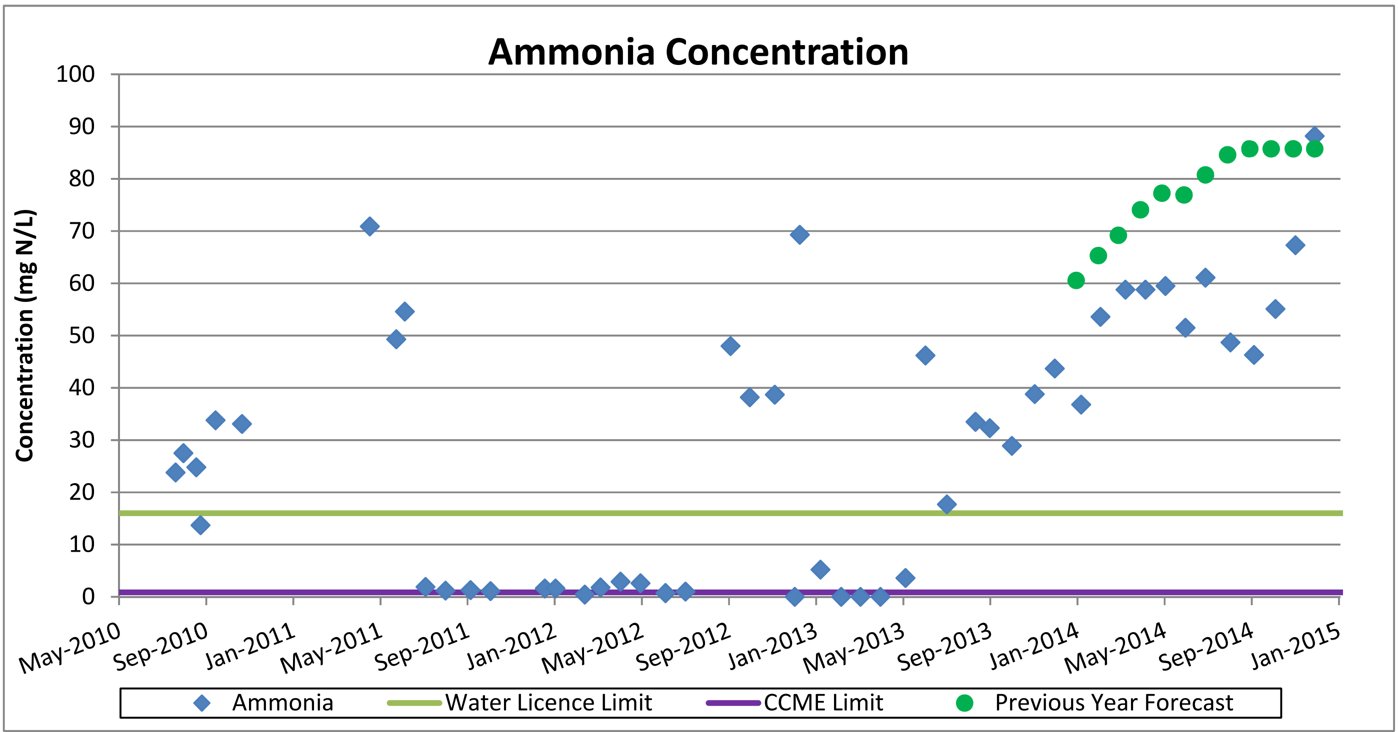


Figure 2-1: (continued) Concentration in the North Cell TSF Reclaim Pond



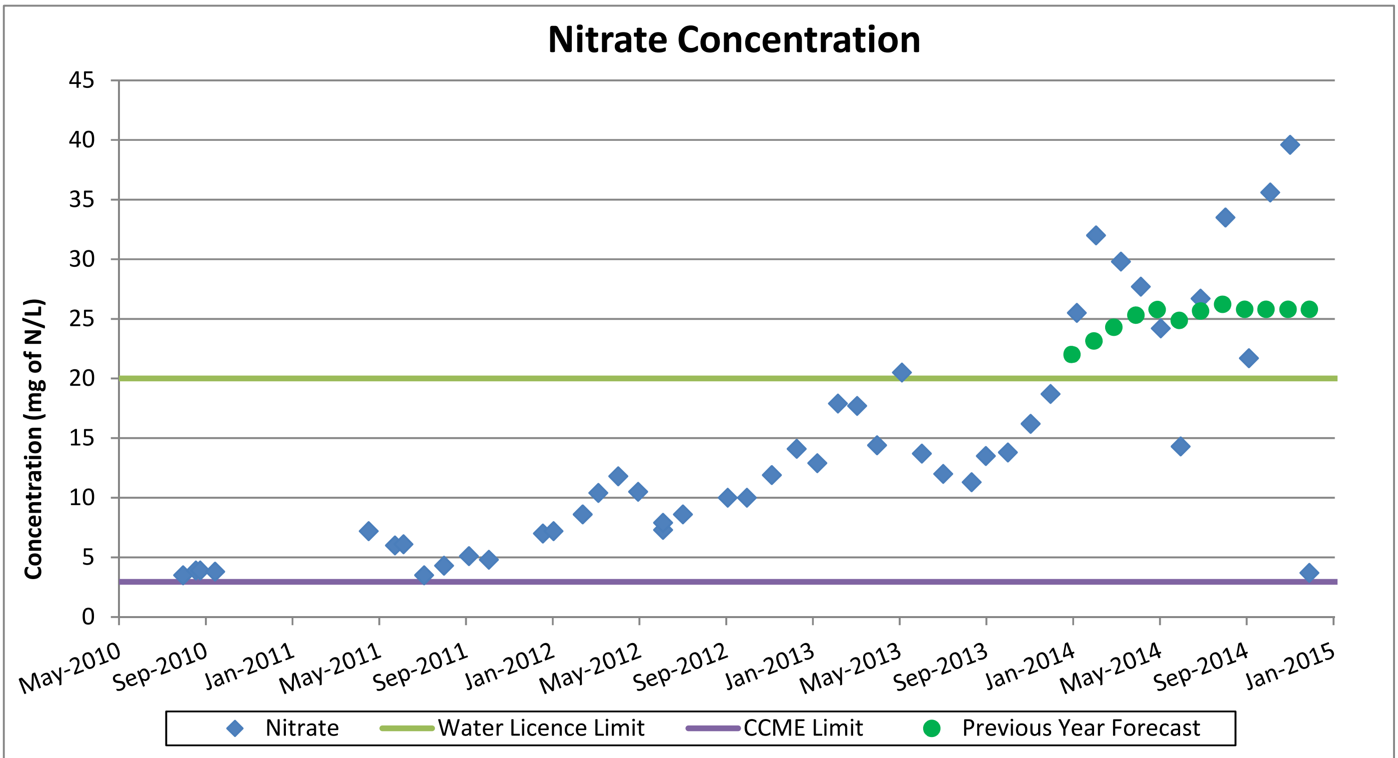
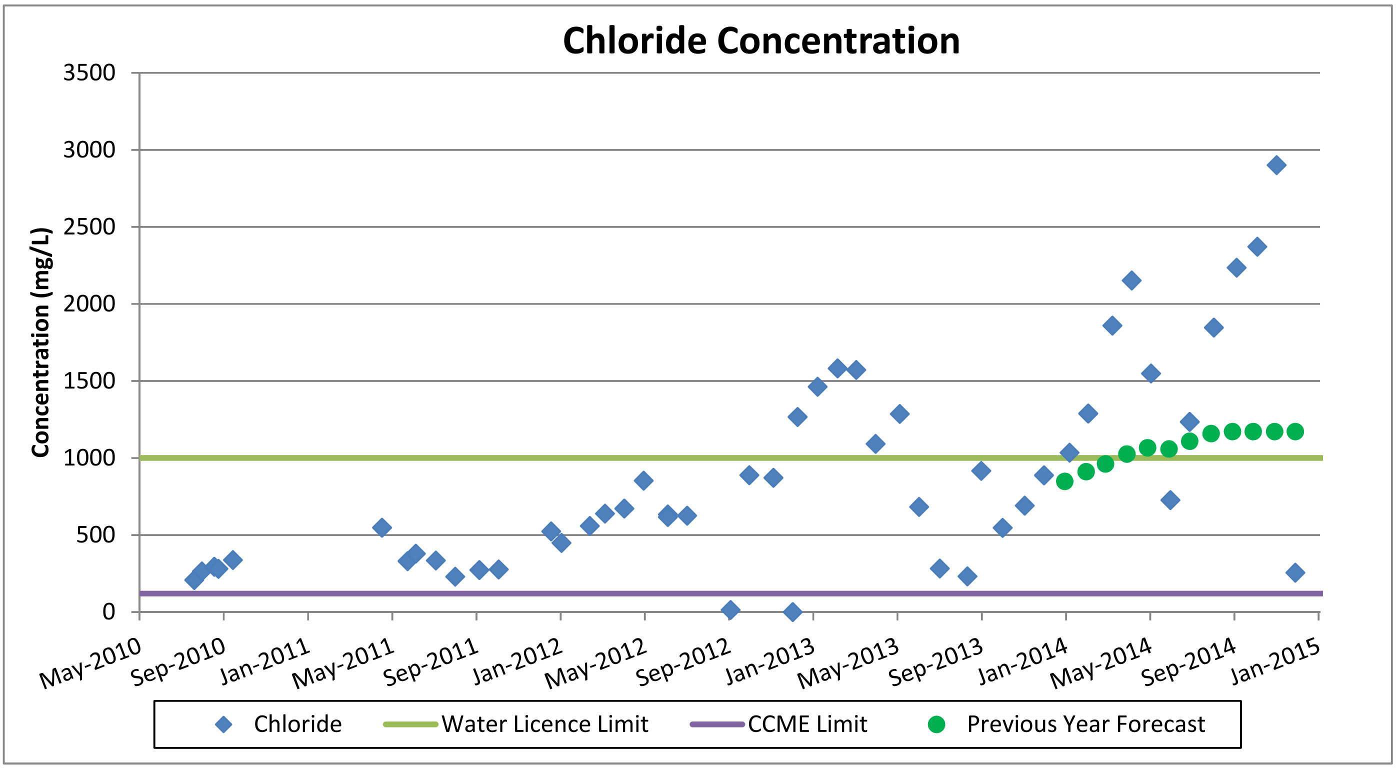


Figure 2-1: (continued) Concentration in the North Cell TSF Reclaim Pond



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

i. Total cyanide concentration in the North Cell TSF Reclaim Pond was variable during 2014. There were no major issues reported with the cyanide destruction at the mill during that period. As usual, the concentrations were lower in the summer and were higher in the winter and fall. The values peaked in April and November at 23 mg/L and 21 mg/L respectively.

ii. Copper concentrations followed approximately the same trend as cyanide in 2014. The similar trend indicates that the treatment performance of the cyanide destruction system has an influence on the residual copper and cyanide concentration in the TSF Reclaim pond. Most measurements are lower than the concentrations measured in 2013.

iii. Most of the dissolved iron concentrations measured in 2014 were under the CCME limits. There is no criterion for iron in the Water License (Part F) or in the MMER. Note that total iron concentration was only measured once in 2014 (July) and the value is slightly above the CCME limit.

iv. Ammonia concentrations decreased slightly during the summer, but increased during the fall to reach a peak of 88 mg N/L in December. 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.

v. Nitrate concentrations also steadily increased in 2014. The highest concentration is 39 mg N/L and was measured in November. The concentration dropped significantly in December to reach 3.7 mg N/L, just above the CCME limit. This parameter will be monitored during 2015 to confirm if the concentration of nitrate will decrease over time.

vi. Chloride concentrations also increased in 2014. The primary source of chloride found in the TSF Reclaim Pond is due to the use of calcium chloride as an anti-freeze solution. There is a reduction in its use during the summer months, which could explain the drop seen in the summer months.

The graphs in Figure 2-1 also present the forecasted values for 2014 versus the actual measured values. A couple of points to note:

i. The forecasted concentrations for cyanide were very similar as the actual measured values during June, July and August. However, during the winter months, the forecasted values were too low. The data suggest that very little natural cyanide degradation occurs during the winter months.

ii. Forecasted concentrations for copper and iron are generally higher when compared to the actual measurements. 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. For this reasons, the forecasted concentrations for these metals will be more conservative.

iii. Forecasted concentrations for ammonia followed the trend of actual 2014 values, while not being as low as the real concentrations. The model took into consideration the hydrolysis of cyanate (CNO-) to ammonia (NH_3). The forecasted concentrations are conservative.

iv. Forecasted nitrate concentrations were very similar to the measured values for the first half of the year. However, during the fall, three measured values were higher than the forecasted concentrations. The model will be adjusted depending on the evolution of nitrate in 2015.

v. Forecasted chloride concentrations were lower compared to the measured value, even if the model was updated previously to take into account an additional load of chloride into the system. Another review will be undertaken and the model will be updated with the proper concentrations.

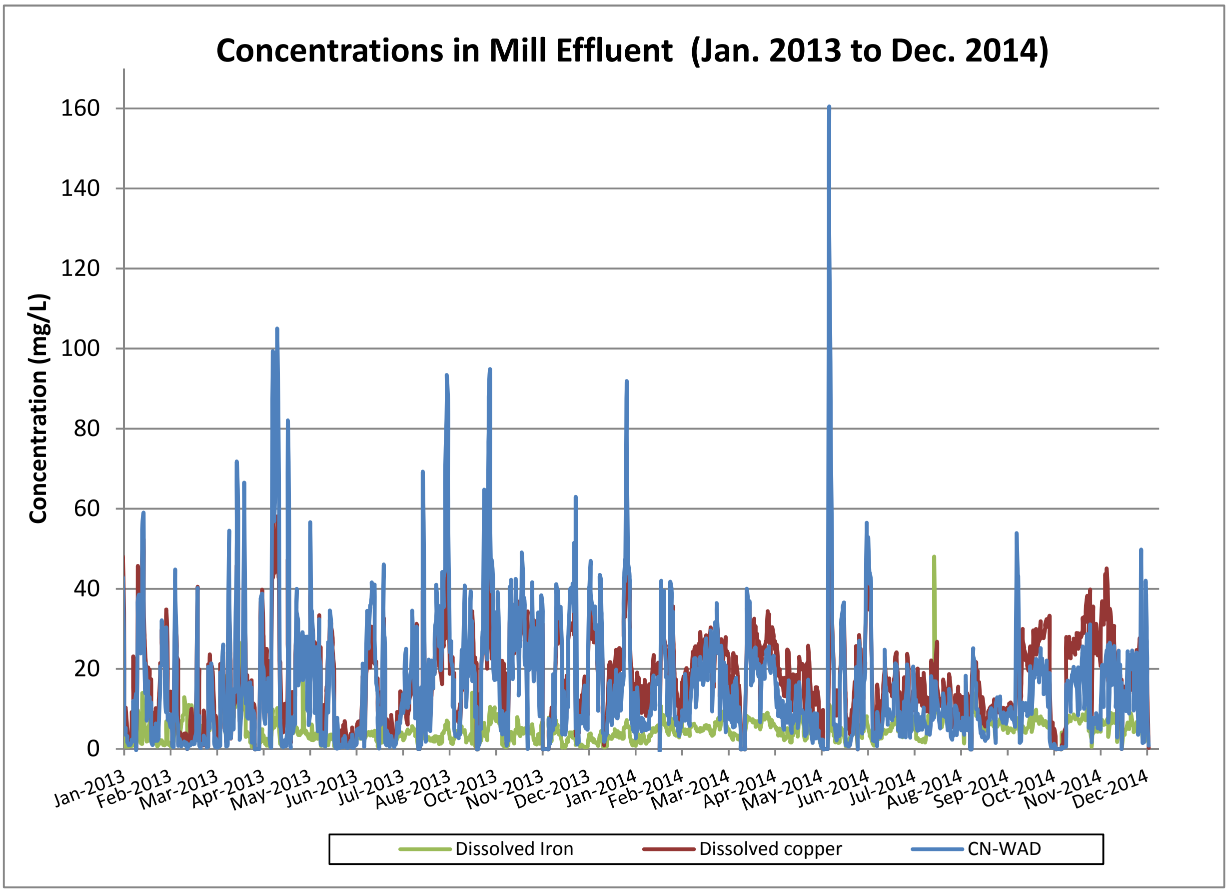
2.2.2 Mill Effluent

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 Cell TSF Reclaim Pond. 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 2014 and the results are presented in Appendix A.

Figure 2-2 shows the daily average dissolved metal concentrations and cyanide (CN-WAD) in the Mill Effluent. 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 iron, copper and cyanide concentrations at the Mill Effluent. This is clearly represented in Figure 2-2, where all three (3) trends behaved similarly in 2013 and 2014. A low concentration of CN-WAD is generally accompanied with lower iron and copper concentration. There is only one sample where the concentration of dissolved iron peaked at 48 mg/L without a higher concentration for copper and cyanide.
- Besides an important peak of 157 mg/L in May 2014, the concentration of cyanide (CN-WAD) was lower and varied less in general in 2014 than in 2013. In 2014, the cyanide (CN-WAD) concentrations in the Mill Effluent often met the 15 mg/l discharge criterion, but a few times, the concentrations were higher than 40 mg/L.

Figure 2-2: Dissolved Metal Concentrations and Cyanide (CN-WAD) in the Mill Effluent from January 2013 to December 2014



2.2.3 Additional Mill Effluent Water Quality Results

AEM analyzed a sample 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 Cell. The sample was collected on October 26th, 2014. It is understood that this data point represent a very limited sampling campaign that may not be representative of the Mill Effluent water quality of the entire year.

The chemical analysis results of the additional Mill Effluent sample are presented in Appendix A and are summarized in Table 2-2. The analytical results from sample taken in 2012 and earlier in 2014 are also shown for comparison.

Table 2-2: Mill Effluent Concentrations Sampled On October 26th, 2014, January 29, 2014 & October 10 and 11, 2012

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)			
	October 26, 2014	January 29, 2014	October 10, 2012	October 11, 2012
Total Cyanide (CN)	111	18.80	4.7	10.13
Copper (Cu)	7.9	25	10.08	9.02
Dissolved Copper	6.7	7.8	9.53	7.07
Iron (Fe)	55.8	6.7	1.8	2.2
Dissolved Iron	0.14	0.8	0.83	0.83
Ammonia (NH_3)	16.7 (mg N/L)	71.5 (mg N/L)	N/A	N/A
Nitrate (NO_3)	27.9 (mg N/L)	31.6 (mg N/L)	13.2 (mg N/L)	10.8 (mg N/L)
Chloride (Cl)	2199	2129	1288	1375

Table 2-2 shows that concentrations of cyanide, total iron and chloride in the Mill Effluent are higher than those observed in the North Cell TSF Reclaim Pond and concentration of copper, dissolved copper, dissolved iron and nitrate are in the average of the North Cell TSF Reclaim Pond values. These results indicate that the main parameters of concern identified in the North Cell TSF Reclaim Pond can be traced to the Mill Effluent.

However, the concentration of ammonia is lower in the Mill Effluent than in the Reclaim Pond, demonstrating that cyanate is further hydrolyzed to ammonia in the Reclaim Pond. Since the concentration of ammonia in the Reclaim Pond is higher than in the Mill Effluent, the cyanate destruction system seems to operate efficiently.

2.2.4 Attenuation Pond

Table 2-3 presents the average concentrations (November 2011 to November 2012, for 2013, and for 2014) observed in the Attenuation Pond.

Table 2-3: Average (2014, 2013 and November 2011 to November 2012) Concentrations in the Attenuation Pond

PARAMETER	AVERAGE CONCENTRATIONS IN THE ATTENUATION POND (mg/L)		
	2014 (Jan. to Oct.)	2013	Nov 2011 to Nov 2012
Total Cyanide (CN)	0.35	0.15	0.114 [1]
Copper (Cu)	0.006	0.02	0.005
Iron (Fe)[2]	1.26	1.26	1.26
Ammonia (NH_3)	0.17 (mg N/L)	0.20 (mg N/L)	0,15 (mg N/L)
Nitrate (NO_3)	1.25 (mg N/L)	4.20	8,6
Chloride (Cl)	98.20	75.70	39.5

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 June 2013 in order to keep in-line with the previous model. The end date of the model is set at the mine closure in 2025 .This mass balance model was based on the following:

- Flows and volumes provided in the water balance developed in the Water Management Plan 2014 (AEM, 2014);
- Assumptions presented below in section 3.2;
- Chemical analyses for ST-21 (North Cell TSF Reclaim Pond) (2010-2014);
- Chemical analyses for Third Portage Lake (2014);
- Chemical analyses for ST-18 (Attenuation Pond) (2011-2014);
- Chemical analyses for the Mill Effluent (2014 and sample taken in October 2014).

3.2 ASSUMPTIONS

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

[1] This is a one-time CN-WAD measurement that took place in April 2012.
[2] No values for 2013 and 2014. Average of Nov. 2011 to Nov.2012 was used.

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, ammonia (i.e via the hydrolysis of cyanate), iron, nitrate, and chloride in the TSF Reclaim Pond is the Mill Effluent. All other inflow contaminant concentrations (Third Portage Lake[1], precipitation, runoff, etc.) are assumed to be negligible.

iii. The water quality of the Mill Effluent is assumed to be constant over time for all parameters, except for ammonia and chloride. 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 on the site.

iv. The pH in the TSF Reclaim Pond is on average at 7.6 during the summer months, and on average 7.8 for the year (2014).

v. 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.

vi. For cyanide, it is assumed that the Mill Effluent meets AEM's CN-WAD operational target of 15 mg/L at all times.

vii. 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 AEM, most of 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.

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

ix. The initial concentration of all parameters in the Portage and Goose are assumed to be the average of 2013, and average of 2013-2014 respectively.

[1] 2013 water quality data continue to show that the concentrations observed in Third Portage Lake were on average 95% 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.

x. The initial concentration of all parameters in the North Cell TSF Reclaim Pond is the concentration obtained in June 2013 for station ST-21.

xi. The initial concentration of all parameters in the South Cell TSF Reclaim Pond is assumed to be the average concentration obtained in 2014 (or average of 2010-2014 when there is not enough data) for station ST-18 (known as Attenuation Pond from January to October 2014).

xii. The initial concentration of all parameters in the Third Portage Lake is assumed to be the average concentration obtained in 2014.

xiii. 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.

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 only 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 AEM:

   – Water quality data provided for ST-21 is taken from samples collected at the surface of the North Cell TSF Reclaim Pond. Therefore the concentrations provided by AEM for ST-21 may not be representative of the entire TSF Reclaim Pond water quality.

   – There is limited water quality data available for the Mill Effluent, in terms of contaminants analyzed: the Mill Effluent is only analyzed on a regular basis for a total of four (4) parameters: gold, iron, copper, cyanide (CN-WAD).

iii. The model does not make allowances for the impact that changes in the TSF (surface area, volume, tailings characteristics, etc.) will have on the TSF Reclaim Pond water quality over time.

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 limited 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 concentrations of different flows in the Portage Area become available. Refer to section 5.3 for recommendations on improving the mass balance.

3.4 INPUT PARAMETERS

The mass balance model for the Portage area of Meadowbank was developed to forecast the long-term concentration of cyanide, copper, ammonia, nitrate and chloride in the North and South Cell TSF Reclaim Pond and in the pits. As of this year, the report will also evaluate 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, and Third Portage Lake.

3.4.1 Mill Effluent Concentration

Table 3-1 presents the Mill Effluent concentrations considered for the input parameters of the mass balance. The additional sample taken in October 2014 was used in the model. The values are also compared to the 2013 and 2012 WMP values used in the previous model.

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

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)		
	For 2014 WMP Forecast	For 2013 WMP Forecast	For 2012 WMP Forecast
Alkalinity	257 (mg CaCO3/L)		
Hardness	4079 (mg CaCO3/L)		
Aluminium (Al)	0.049		
Silver (Ag)	< 0.0001		

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)		
	For 2014 WMP Forecast	For 2013 WMP Forecast	For 2012 WMP Forecast
Arsenic (As)	0.0084		
Barium (Ba)	0.3805		
Cadmium (Cd)	0.00105		
Chromium (VI)	0.0094		
Copper (Cu)	6.795[1]	7.8[1]	28.3[1]
Iron (Fe)	0.14[1]	0.8[1]	11.8[1]
Manganese (Mn)	12.21		
Mercury (Hg)	0.00206		
Molybdenum (Mo)	0.0114		
Nickel (Ni)	3.562		
Lead (Pb)	0.0157		
Selenium (Se)	0.154		
Zinc	0.028		
Ammonia (NH3) (ionized)	+ 41 (mg N/L/month)	+ 45 (mg N/L/month)	17.1 (mg N/L)[2]
Chloride	+ 1500 (mg/L/month)	+ 600 (mg/L/month)	674[3]
Fluoride (F)	0.65		
Nitrate (NO3)	27.9 (mg N/L)	31.6 (mg N/L)	9.9 (mg N/L) [3]
Total Cyanide (CNt)	111	15	16.7 [4]
Sulphate (SO4)	2400 (mg SO4/L)		
Total dissolved solids	-		

[1] The dissolved copper and iron concentration were used instead of the total concentrations, since the solids will tend to decant in the TMF.
[2] Average January to December 2012 ST-21 concentrations.
[3] Average April to December 2012 Mill Effluent concentrations.
[4] The internal CN-WAD criterion for the Mill Effluent is a CN-WAD concentration of 15 mg/L. Assuming that CN-WAD represents 90% of total CN (refer to section 3.2), then this CN-WAD internal criterion translates to a CN total criterion of 16.7 mg/L.

A couple of items to note on the parameters used for the 2014 updated water quality forecast model:

- For copper and iron, the dissolved concentration values were used instead of the total concentrations since the copper and iron precipitates will settle in the TSF.
- 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 2014, on average, 76 mg/L of CN-WAD was removed and converted to cyanate (CNO^-). Assuming that 100% of the cyanate is 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 41 mg N/L of ammonia is added to the Mill Effluent every month. This additional ammonia load is added to the load already present in the Reclaim Water.
- Based on the measured data, the chloride concentration continues to increase in the Mill Effluent. To account for this trend, it is assumed that 1500 mg/L of chloride is added to the Mill Effluent every month of 2014, compared to 600 mg/L assumed in 2013. This additional chloride load is added to the load already present in the Reclaim Water. This value was evaluated by adjusting the model to fit with the measured chloride values in the Reclaim Pond in 2014.

3.4.2 Initial Concentrations in the TSF Reclaim Ponds and Pits

As noted previously, the mass balance model arbitrarily begins in June 2013 to fit the previous model. Therefore, the initial concentrations selected for the North Cell TSF Reclaim Pond correspond to the June 2013 chemical analysis results from station ST-21. These initial concentrations are presented in Table 3-2.

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 not any or little data available, the average values from 2010 to 2014 was used. Note that in general, the concentrations observed in the Attenuation Pond had little variation from one month to the other. These initial concentrations are also presented in Table 3-2.

Input parameters for Goose and Portage Pit, and Third Portage Lake, are also shown in table 3-2. For Goose Pit, the average value of 2013 and 2014 was used. The average of 2013 was used for Portage Pit and the average value of 2014 was used for Third Portage Lake.

Table 3-2: Initial Concentration in the North and South Cells TSF Reclaim Pond

PARAMETER	UNITS	INITIAL CONCENTRATION				
		RECLAIM POND ST-21 (June 2013)	ATTENUATION POND ST-18 (Avg 2014)	PORTAGE PIT ST-19 (Avg 2013)	GOOSE PIT ST-20 (Avg 2013-2014)	THIRD PORTAGE LAKE (Avg. 2014)
Alkalinity	mg CaCO3/L	77	106.4	72.2	115.4	17.370
Hardness	mg CaCO3/L	891	362	0.000	0.000	10.478
Aluminium (Al)	mg/L	0.14[1]	0.76[2]	0.000	0.031	0.007
Silver (Ag)	mg/L	0.004[1]	0.0004[2]	0.000	0.000	0.000
Arsenic (As)	mg/L	0.008[1]	0.007	0.020	0.009	0.000
Barium (Ba)	mg/L	0.06[1]	0.10[2]	0.000	0.028	0.003
Cadmium (Cd)	mg/L	0.001[1]	0.0001[2]	0.000	0.000	0.000
Chromium (VI)	mg/L	0.000	0.007[2]	0.000	0.000	0.000
Copper (Cu)	mg/L	0.6[3]	0.007	0.004	0.004	0.000
Iron (Fe)	mg/L	0.6[2]	1.26[2]	0.000	0.010	0.010
Manganese (Mn)	mg/L	0.07[1]	1.71[2]	0.000	0.059	0.002
Mercury (Hg)	mg/L	0.000[1]	0.0005[2]	0.000	0.000	0.000
Molybdenum (Mo)	mg/L	0.25[1]	0.02[2]	0.000	0.018	0.000
Nickel (Ni)	mg/L	0.09[1]	0.06	0.004	0.058	0.000
Lead (Pb)	mg/L	0.000[1]	0.001	0.001	0.002	0.000
Selenium (Se)	mg/L	0.008[1]	0.002[2]	0.000	0.001	0.000
Zinc	mg/L	0.001[1]	0.02	0.016	0.010	0.002
Ammonia (NH3)(ionized)	mg N/L	46.2	0.17	0.200	0.213	0.007
Chloride	mg/L	683	98.2	0.000	52.450	0.703
Fluoride (F)	mg/L	0.07	0.57	0.000	0.935	0.068
Nitrate (NO3)	mg N/L	13.7	1.25	0.000	10.850	0.034
Total Cyanide (CNt)	mg/L	16.77	0.35	0.000	0.000	0.003
Sulphate (SO4)	mg SO4/L	1276	541.5	0.000	60.8	4.441
Total dissolved solids	mg/L	2954	1437	126.6	397.3	17.370

[1] Dissolved concentration was used since no data was available
[2] Average concentration of 2010-2014 data was used since no data was available
[3] Initial copper concentration was not available, so the values taken in July were used instead.

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. First, metal-cyanide complexes dissociate to free cyanide (HCN and CN^-)[1] based on a first-order decay constant[2] (k_1); followed by HCN volatilization based on a first-order decay constant[2] (k_v). 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.

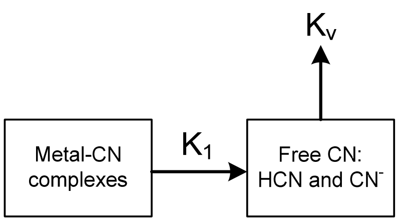


Figure 3-1: Cyanide Volatilization Process

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

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[1] Equilibrium between HCN and CN^- is based on pH.
[2] A first order decay constant signifies that the final concentration (C_f) can be estimated as, $C_f=C_i e^{-kt}$, where k is the first order decay constant.

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.

4.0 MASS BALANCE RESULTS

4.1 RESULTS

The results of the mass balance model are presented in the Figures 4-1 to 4-14, for total cyanide, copper, iron, ammonia, nitrate, and chloride. Selenium, which will be discussed in section 4.2.3, was also identified as a parameter of concern. The graphs show the forecasted monthly concentration of the parameter from 2013 to 2025. A total of two (2) graphs are presented per parameter: the first shows the forecasted concentration in the North and South Cells TSF Reclaim Pond 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 CCME limits (refer to Table 2-1) were also included in the figures, where applicable.

Again, it is important to remember that the results presented in Figures 4-1 to 4-14 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 DISCUSSION

4.2.1 Key Dates

The mass balance model presented in this Technical Note is based on the updated water management plan. The following key dates are important to keep in mind while reviewing the forecasted concentration data presented in Figures 4-1 to 4-14:

1. November 2014: The former Attenuation Pond becomes the South Cell and TSF Reclaim Pond.
2. August 2017: start of water transfer from South Cell TSF Reclaim Pond to Portage Pit
3. July 2018: South Cell TSF Reclaim Pond is completely empty.
4. June 2016 to July 2020: Pumping water from Third Portage Lake to Goose Pit and allow runoff water and ground water to accumulate in the pit.
5. June 2018 to August 2024: Pumping water from Third Portage Lake to Portage Pit and allow runoff water, ground water and East Dike Seepage to accumulate in the pit.

4.2.2 Forecasted Concentrations in the North and South Cells TSF Reclaim Pond

Table 4-1 summarizes the observations noted in Figures 4-1 to 4-14, 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 Reclaim Pond

PARAMETER	FORECASTED CONCENTRATION (mg/L)				WATER LICENSE PART F (CCME) (mg/L)
	NORTH CELL TSF RECLAIM POND		SOUTH CELL TSF RECLAIM POND		
	June 2013 (initial)	2013 to 2016	Nov 2014[1] (initial)	2014 to 2018	
Total Cyanide (CN)	16.8	Fluctuate from 0.14 to 6.9	0.35	Fluctuate from 0.12 to 7.6	0.5 (free CN 0.005)
Copper (Cu)	0.6	Fluctuate from 1.4 to 6.6	0.007	Fluctuate from 1.1 to 5.6	0.1 (0.004)
Iron (Fe)	0.6	Fluctuate from 0.1 to 0.5	1.26	Fluctuate from 0.1 to 1	n/a (0.3)
Ammonia (NH_3)	46.2 (mg N/L)	Fluctuate from 42 to 76	0.17 (mg N/L)	Fluctuate from 7 to 97	16 (0.86) (mg N/L)
Nitrate (NO_3)	13.7 (mg N/L)	Fluctuate from 14.1 to 27.3	1.25 (mg N/L)	Fluctuate from 5.6 to 23	20 (2.9) (mg N/L)
Chloride (Cl)	683	Fluctuate from 683 to 2553	98.2	Fluctuate from 329 to 3562	1000 (120)
Selenium (Se)	0.008	Fluctuate from 0.056 to 0.150	0.0017	Fluctuate from 0.017 to 0.127	n/a (0.001)

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 2013 to 2018 are primarily due on 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 concentration of cyanide in the TSF Reclaim Ponds.

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

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.

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.

v. Guidelines:

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

b. For comparison purposes, almost all forecasted concentrations 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 2013 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.

4.2.3 Forecasted Concentrations in Portage and Goose Pits

Table 4-2 presents the forecasted concentration of all parameters for Portage and Goose Pits in 2025 at mine closure.

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

			FORECASTED CONCENTRATIONS		
PARAMETERS	**UNITS**	**CCME GUIDELINES**	**PORTAGE PIT**	**GOOSE PIT**	**ASSUME COMPLETE MIXING OF BOTH PITS**
Alkalinity	mg $CaCO_3$/L	n/a	19	17	
Hardness	mg $CaCO_3$/L	n/a	31	10	
Total dissolved solids	mg/L	n/a	0.4	0.0	
Aluminium (Al)	mg/L	0.1	0.007	0.007	
Silver (Ag)	mg/L	0.0001	0.000	0.000	
Arsenic (As)	mg/L	0.005	0.001	0.000	
Barium (Ba)	mg/L	n/a	0.005	0.003	
Cadmium (Cd)	mg/L	0.00004	0.00001	0.00001	
Chromium (VI)	mg/L	0.001	0.00015	0.00010	
Copper (Cu)	mg/L	0.002	0.035	0.0004	0.028
Iron (Fe)	mg/L	0.3	0.011	0.010	
Manganese (Mn)	mg/L	n/a	0.065	0.002	
Mercury (Hg)	mg/L	0.000026	0.000016	0.000005	
Molybdenum (Mo)	mg/L	0.073	0.0003	0.0002	
Nickel (Ni)	mg/L	0.025	0.0187	0.0004	
Lead (Pb)	mg/L	0.001	0.0002	0.0001	
Selenium (Se)	mg/L	0.001	0.0008	0.00005	
Zinc	mg/L	0.03	0.002	0.002	
Ammonia (NH_3) (ionized)	mg N/L	0.86	0.582	0.000	
Chloride	mg/L	120	21.26	0.120	
Fluoride (F)	mg/L	0.12	0.07	0.07	
Nitrate (NO_3)	mg N/L	2.94	0.18	0.03	
Sulphate (SO4)	mg SO4/L	n/a	16.74	4.44	
Total Cyanide (CNt)	mg/L	0.005	0.000	0.000	

Legend: XXX: Concentration higher than the CCME guidelines.

Based on the model for forecasting of the concentrations in Portage and Goose Pits, the following notes and observations can be made:

i. All forecasted concentrations meets the CCME guidelines in 2025 except for copper in Portage Pit.

ii. There are no longer any issues in Goose Pit since no Reclaim Water is transferred to this pit.

iii. It is important to note that the water quality in the pits will be subject to CCME guidelines once the water level in the Goose and Portage Pits are equal to the water level in Second 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 131 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 the 4th column of Table 4-2, when assuming complete mixing of both pits, the concentration of copper reduces, but not sufficiently to meet the CCME guidelines.

v. When using the USGS geochemical modelling tool PHREEQC (USGS 2014) to evaluate the equilibrium concentration of dissolved copper in the water column, the forecasted concentration is evaluated approximately at 0.0001 mg/L, much lower than the CCME guidelines. Thus, at equilibrium, most of the copper could precipitate out as an oxide, hydroxide or co-precipitate and adsorb to amorphous ferrihydrite.

vi. Selenium was identified as a possible parameter of concern since its forecasted concentration in Portage Pit for 2025 is close to the CCME guidelines.

Consequently, copper remains a parameter of concern and should be closely monitored. However, overall the forecasted water quality in the pits in 2025 does not raise any major concerns at the moment.

4.2.4 Treatment Requirements

Based on the results of the water quality mass balance presented in section 4.2.3, treatment may be required for copper. Treatment could be undertaken at the South Cell TSF Reclaim Pond, or in the Portage Pit.

If high copper concentrations persist, this metal may 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 copper are listed below:

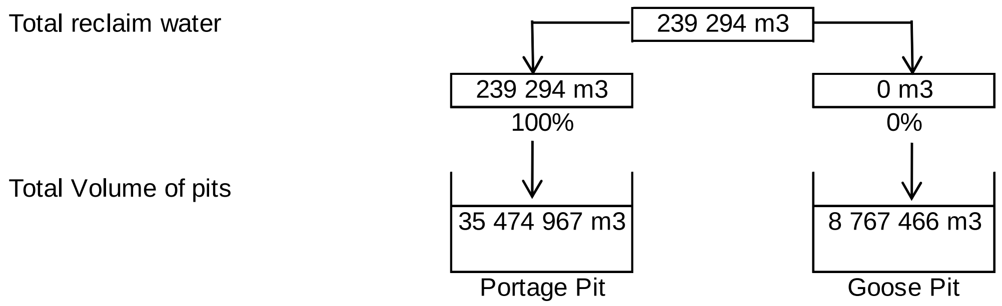
a) The existing Attenuation Pond water treatment plant (WTP) can be modified for copper precipitation with the addition of lime or caustic dosing system. The water from the South Cell TSF pond can be pumped to the WTP for treatment, with the treated water recycled back to the pond. Note that the average pH in 2014 in the Attenuation Pond was 7.5.

b) Treatment in situ at South Cell TSF Reclaim Pond or at Portage pit. Note that the average pHs in the Reclaim Pond in 2014 and in Portage pit in 2013 were respectively of 7.8, and 7.5.

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 selected.

4.2.5 Summary of volume of Reclaim Water sent to the Pits

In the 2014 Water Management Plan, the Reclaim Water is sent to Portage Pit beginning in August 2017. As shown in the figure below, 100% of the South Cell TSF Reclaim Water is sent to Portage Pit.



This illustrates that all Reclaim Water is sent to Portage Pit.

Figure 4-1: Total Cyanide Concentration in the North and South Cells TSF Reclaim Pond

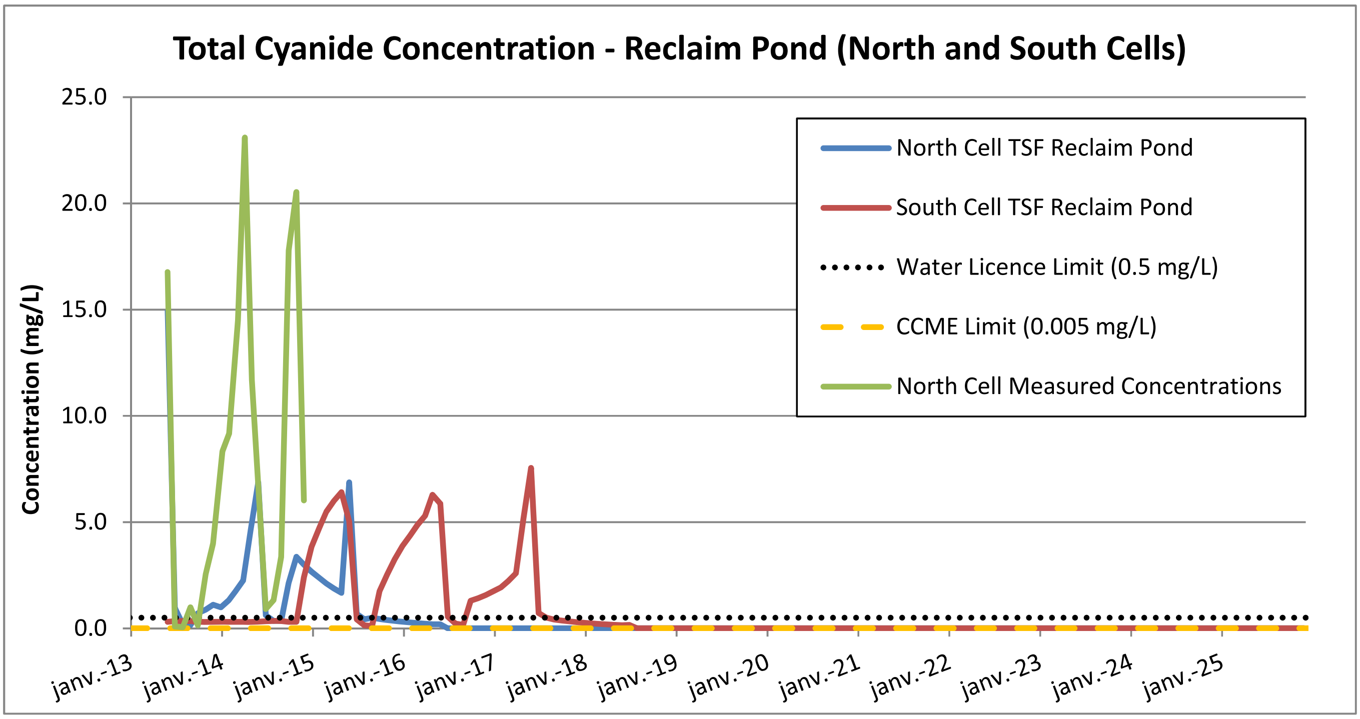


Figure 4-2: Total Cyanide Concentration in the Portage and Goose Pits

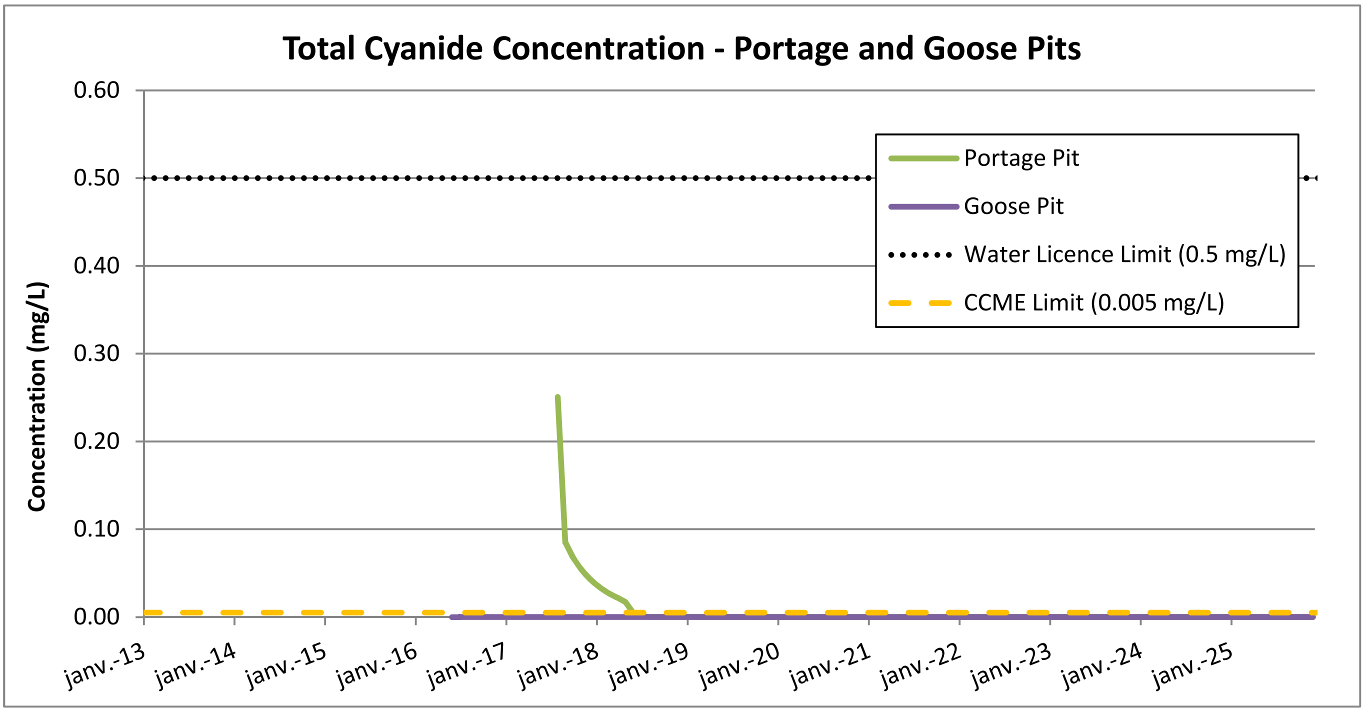


Figure 4-3: Total Copper Concentration in the North and South Cells TSF Reclaim Pond

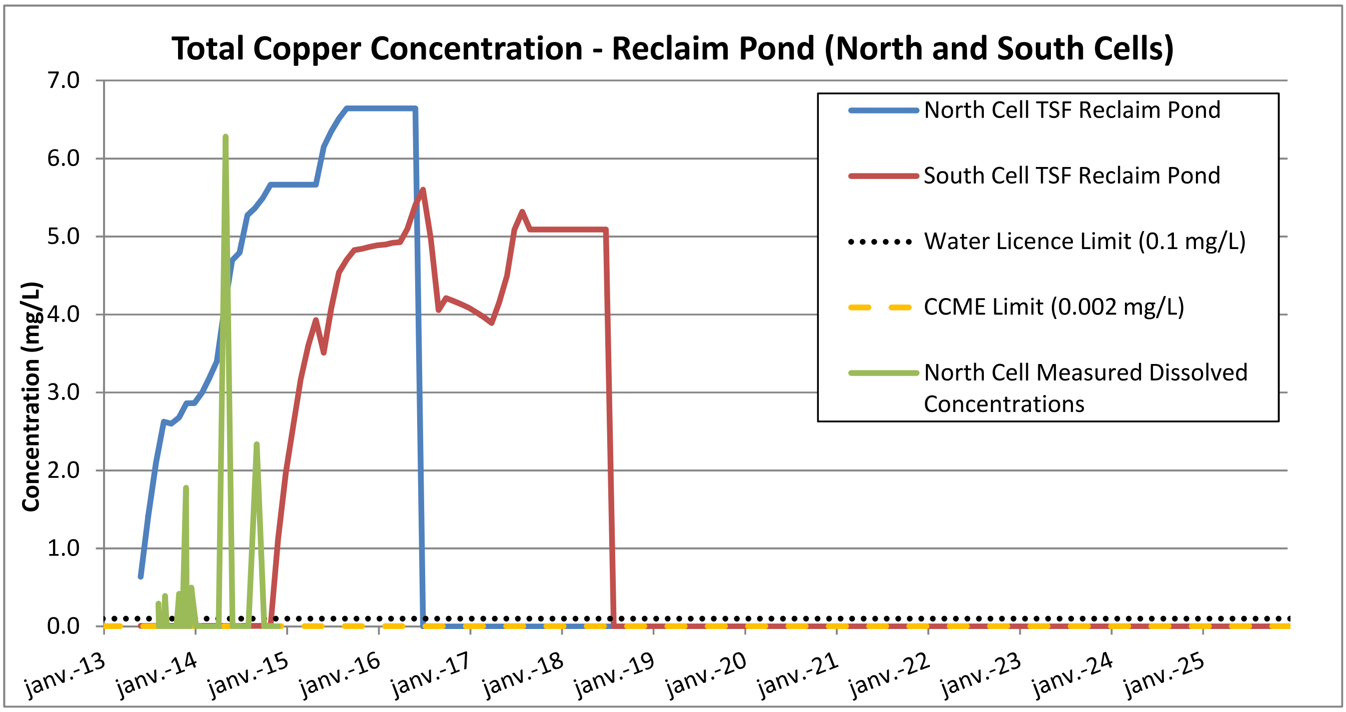


Figure 4-4: Total Copper Concentration in the Portage and Goose Pits

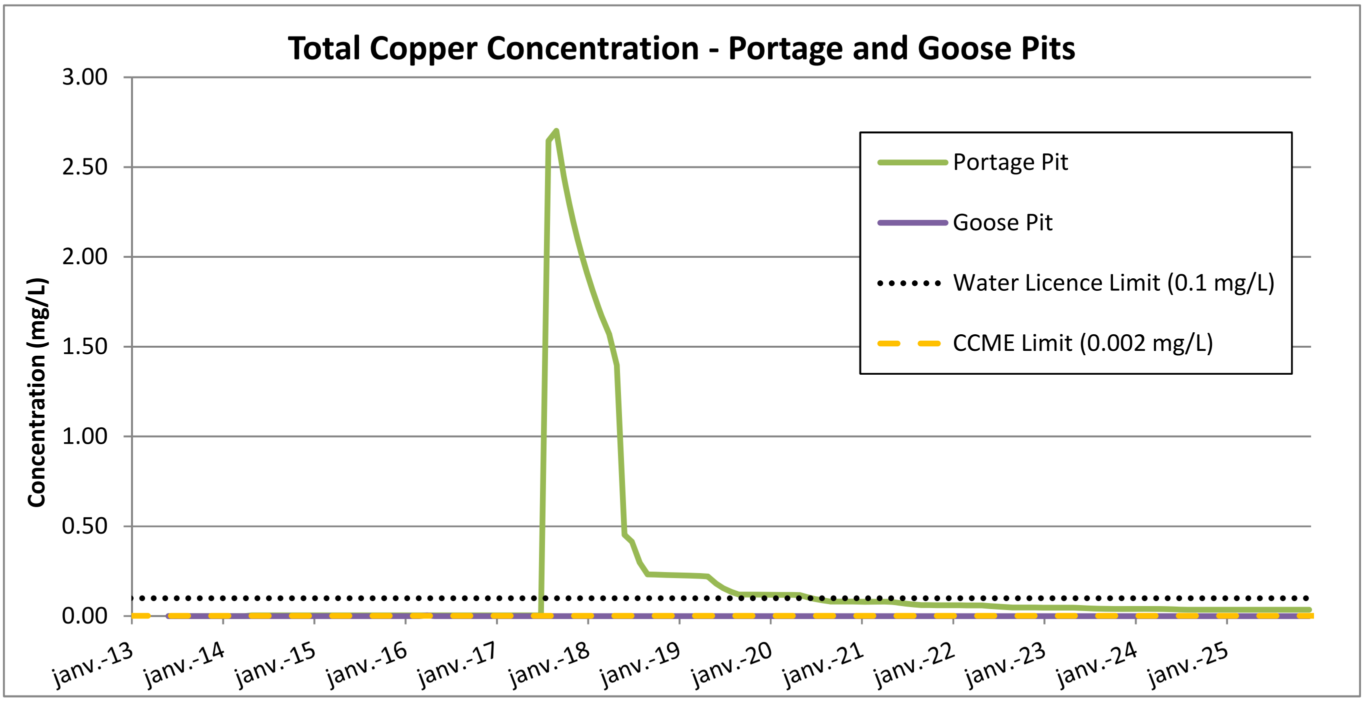


Figure 4-5: Total Iron Concentration in the North and South Cells TSF Reclaim Pond

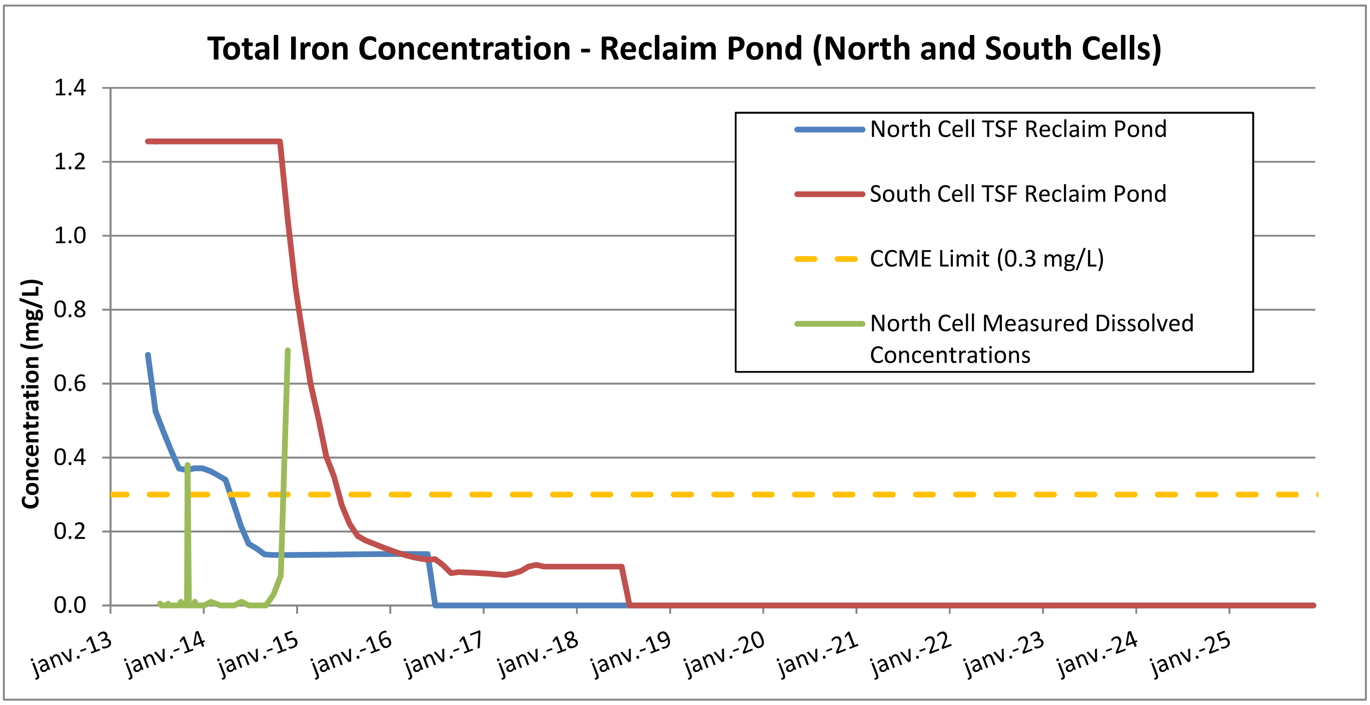


Figure 4-6: Total Iron Concentration in the Portage and Goose Pits

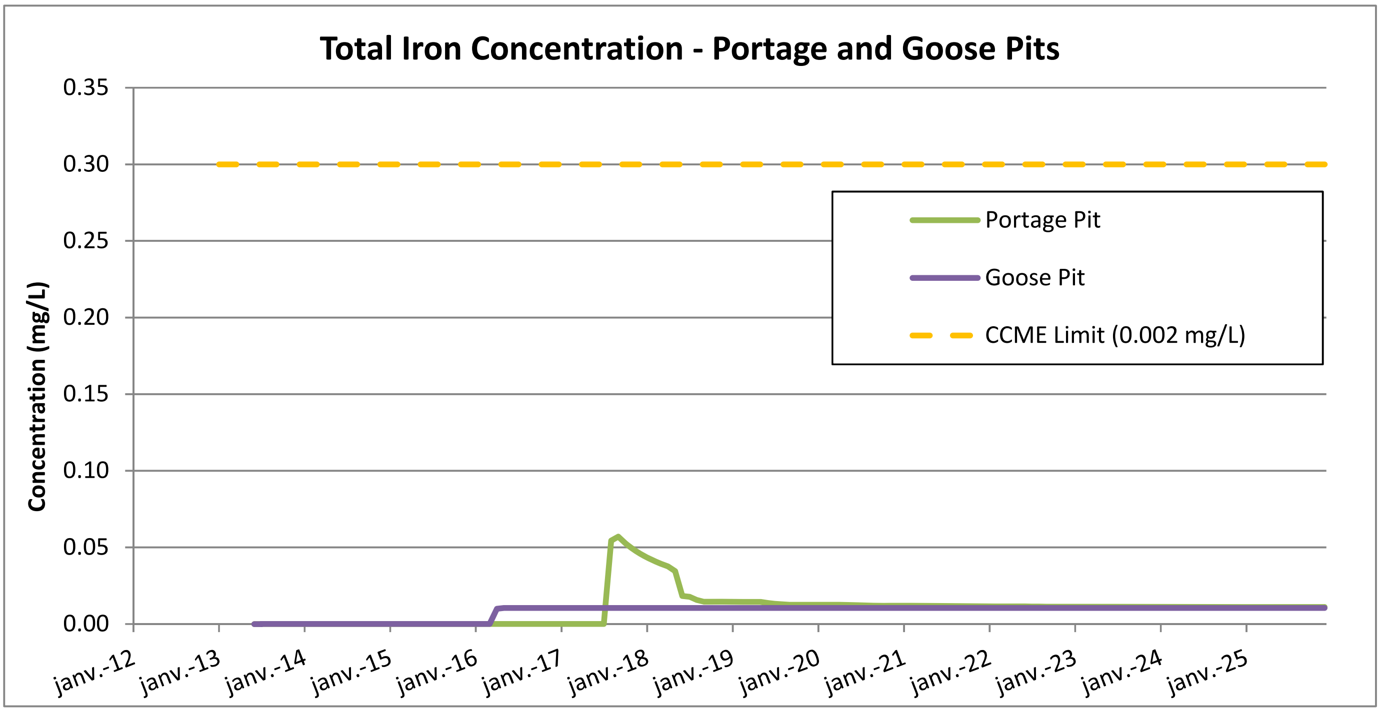


Figure 4-7: Ammonia Concentration in the North and South Cells TSF Reclaim Pond

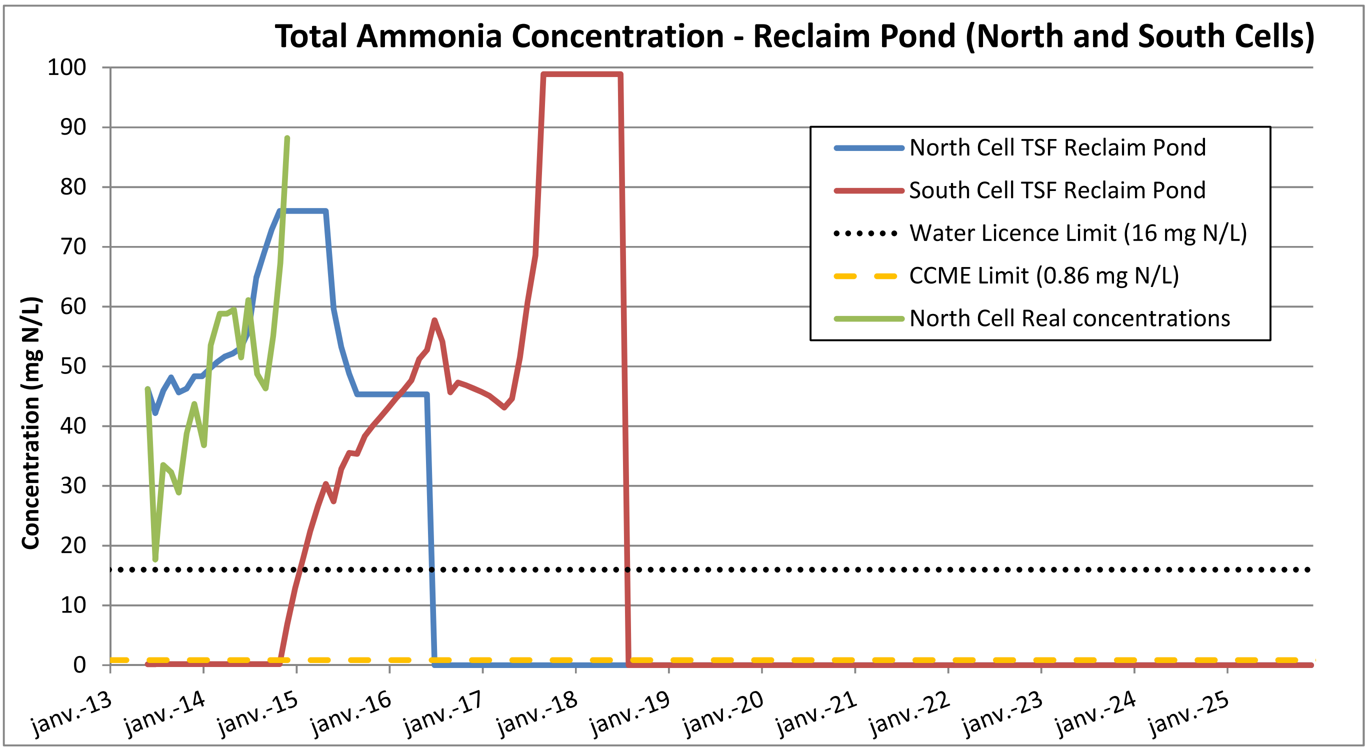


Figure 4-8: Ammonia Concentration in the Portage and Goose Pits

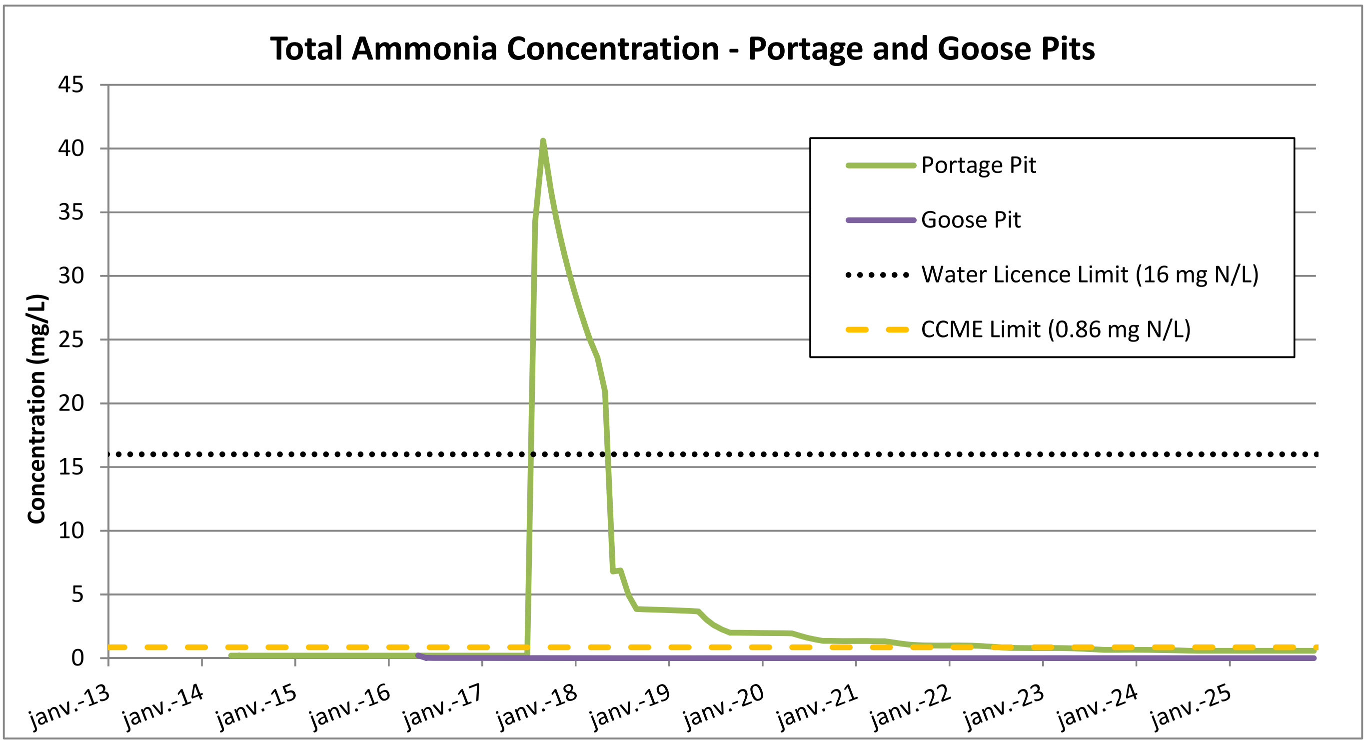


Figure 4-9: Nitrate Concentration in the North and South Cells TSF Reclaim Pond

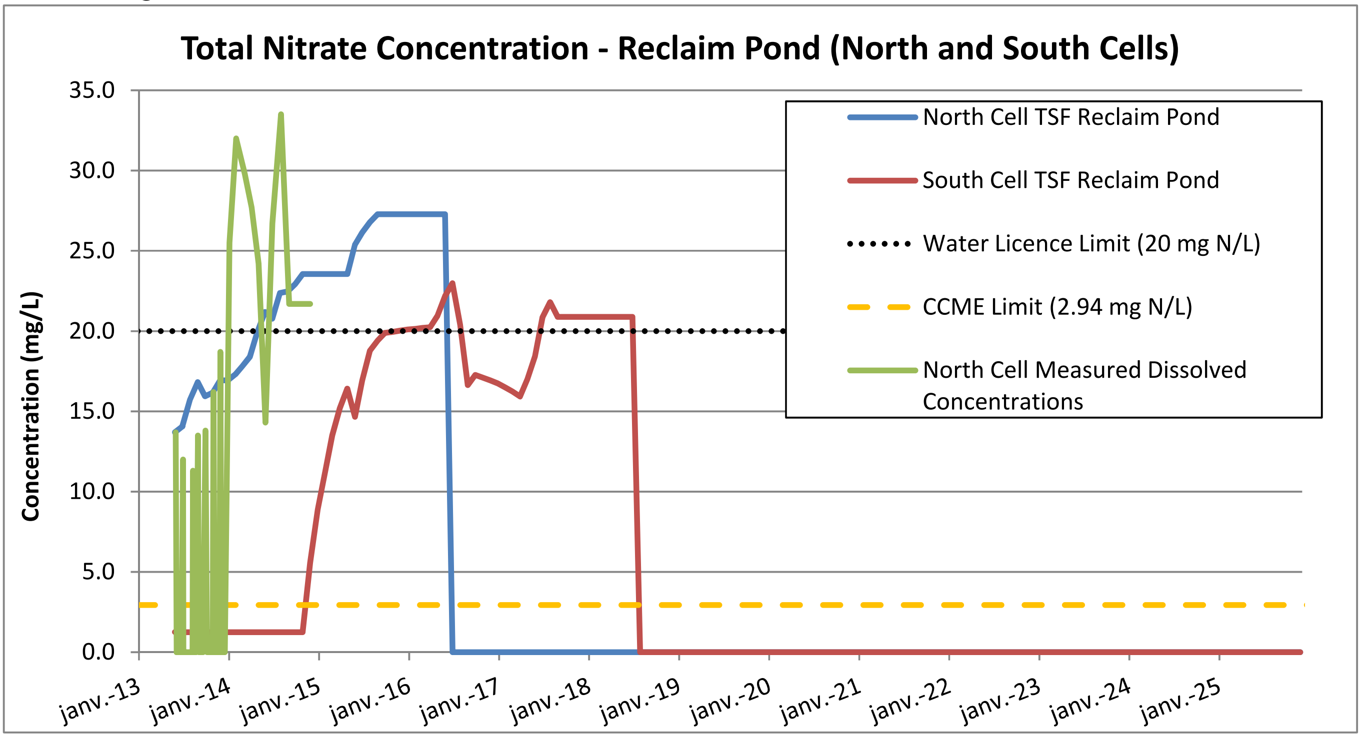


Figure 4-10: Nitrate Concentration in the Portage and Goose Pits

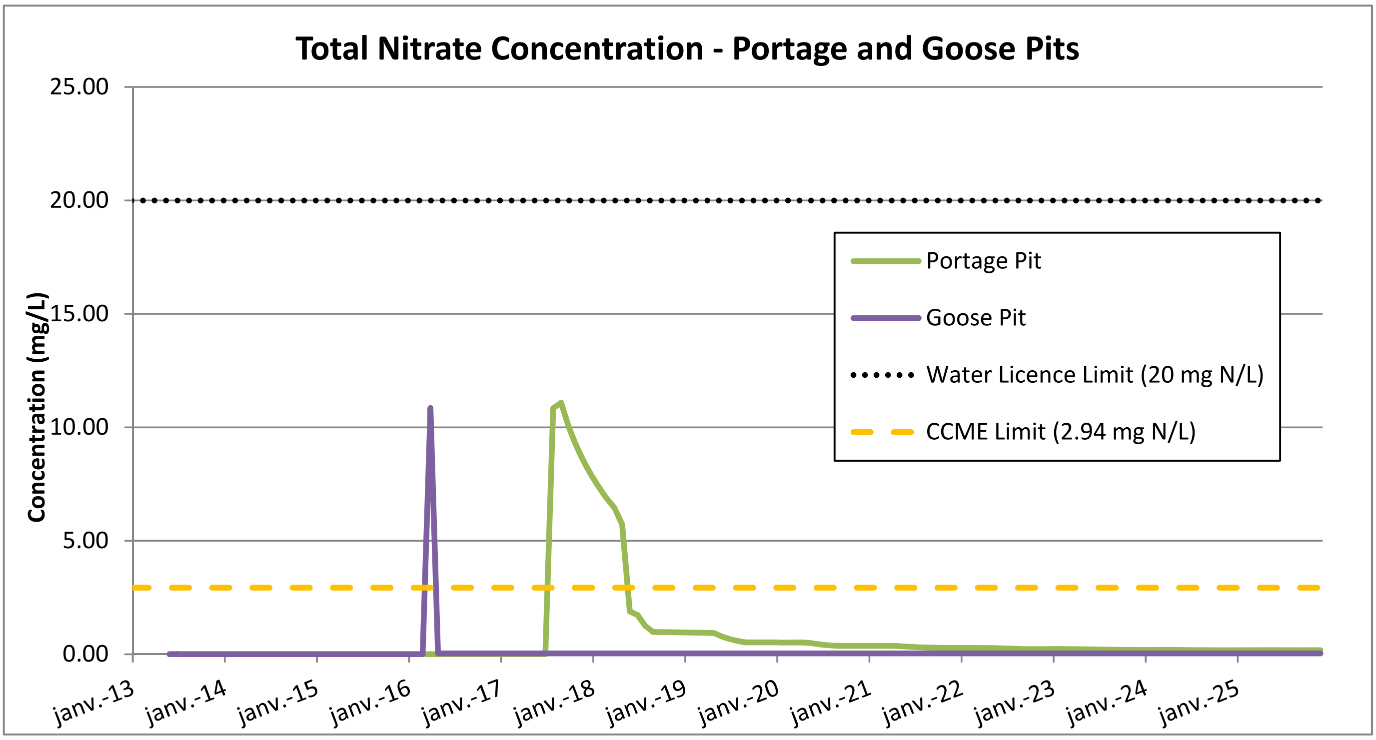


Figure 4-11: Chloride Concentration in the North and South Cells TSF Reclaim Pond

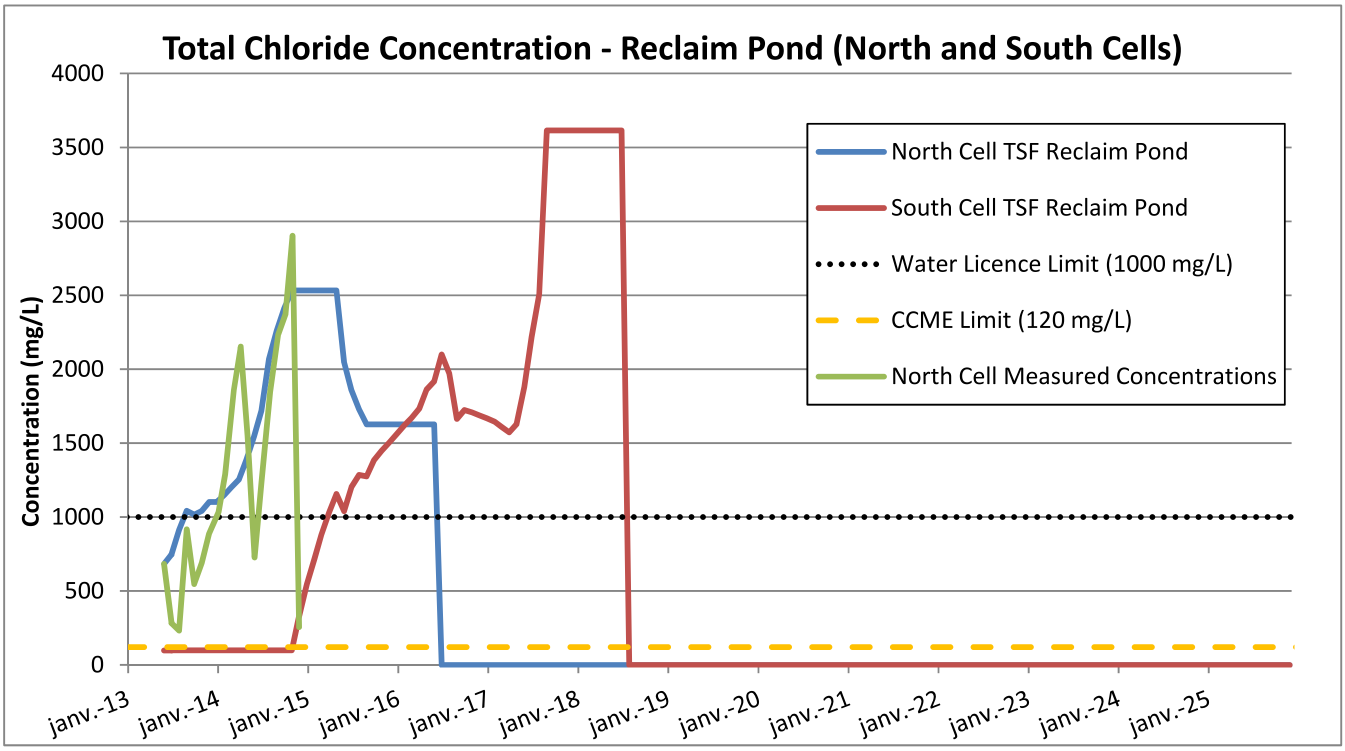


Figure 4-12: Chloride Concentration in the Portage and Goose Pits

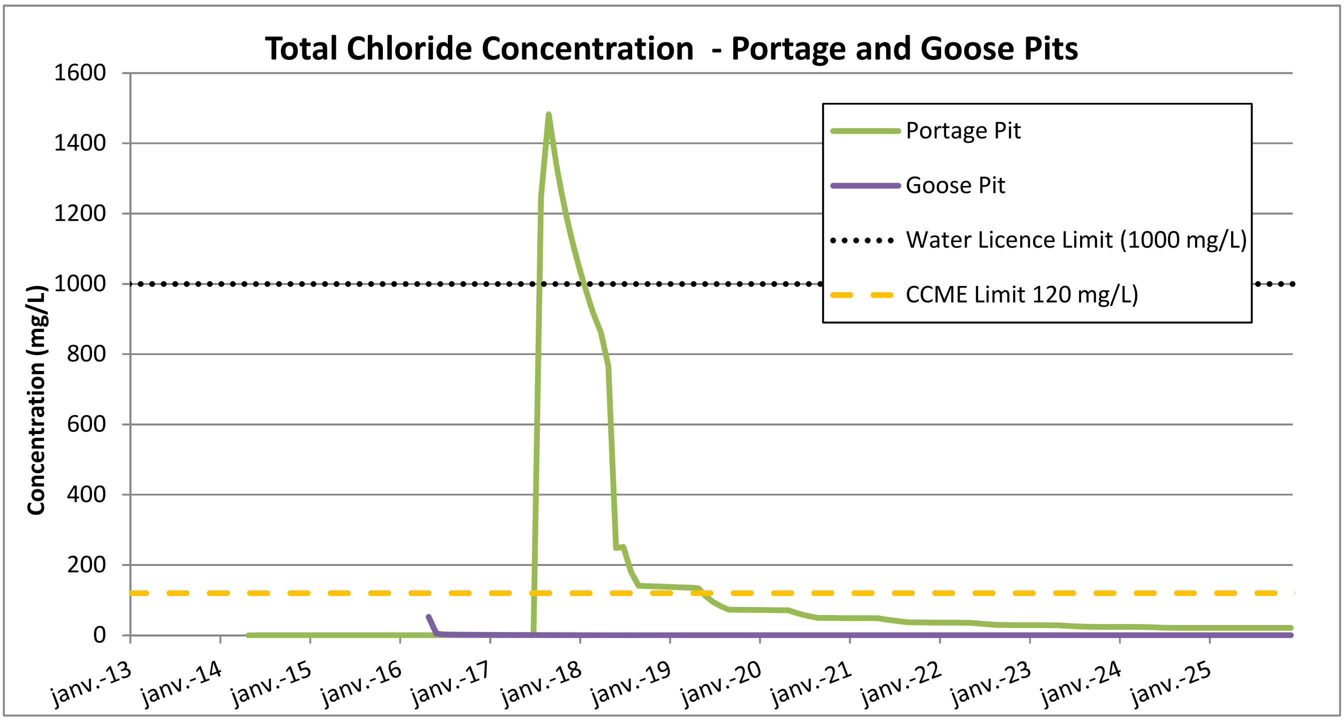


Figure 4-13: Selenium Concentration in the North and South Cells TSF Reclaim Pond

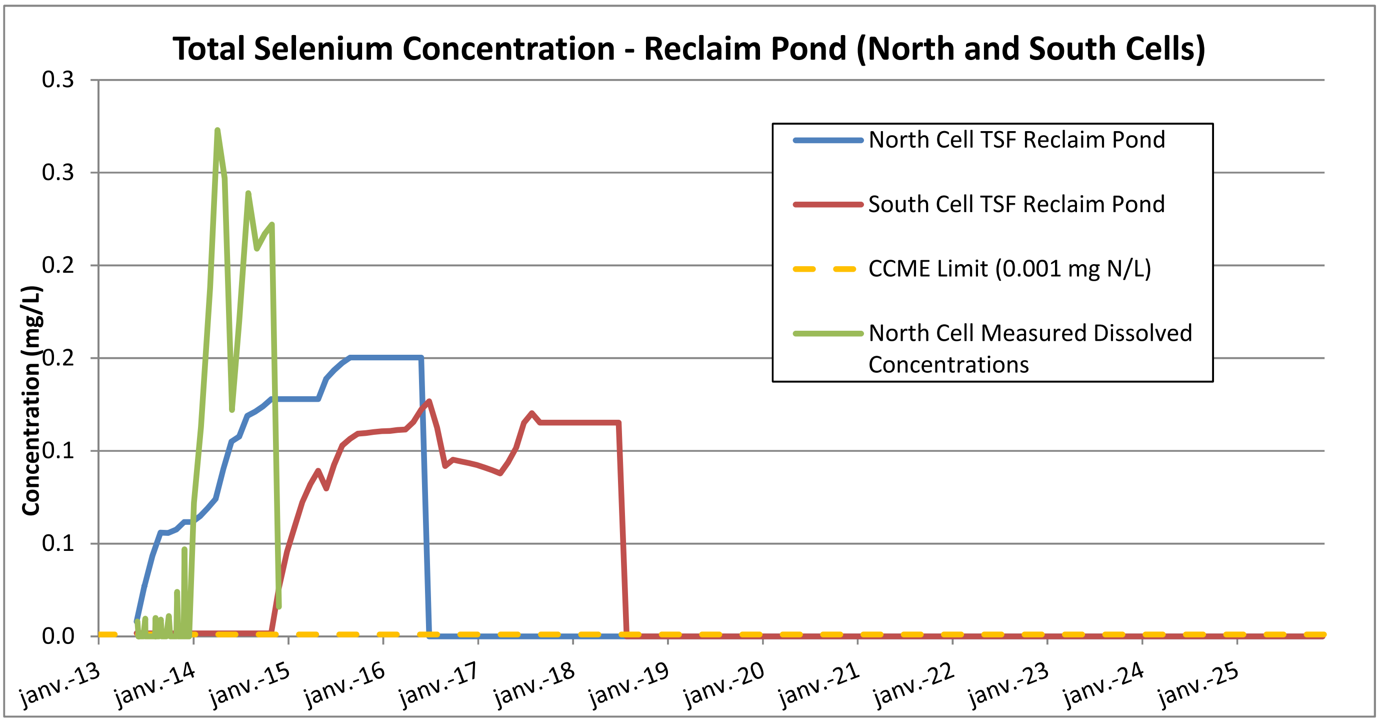
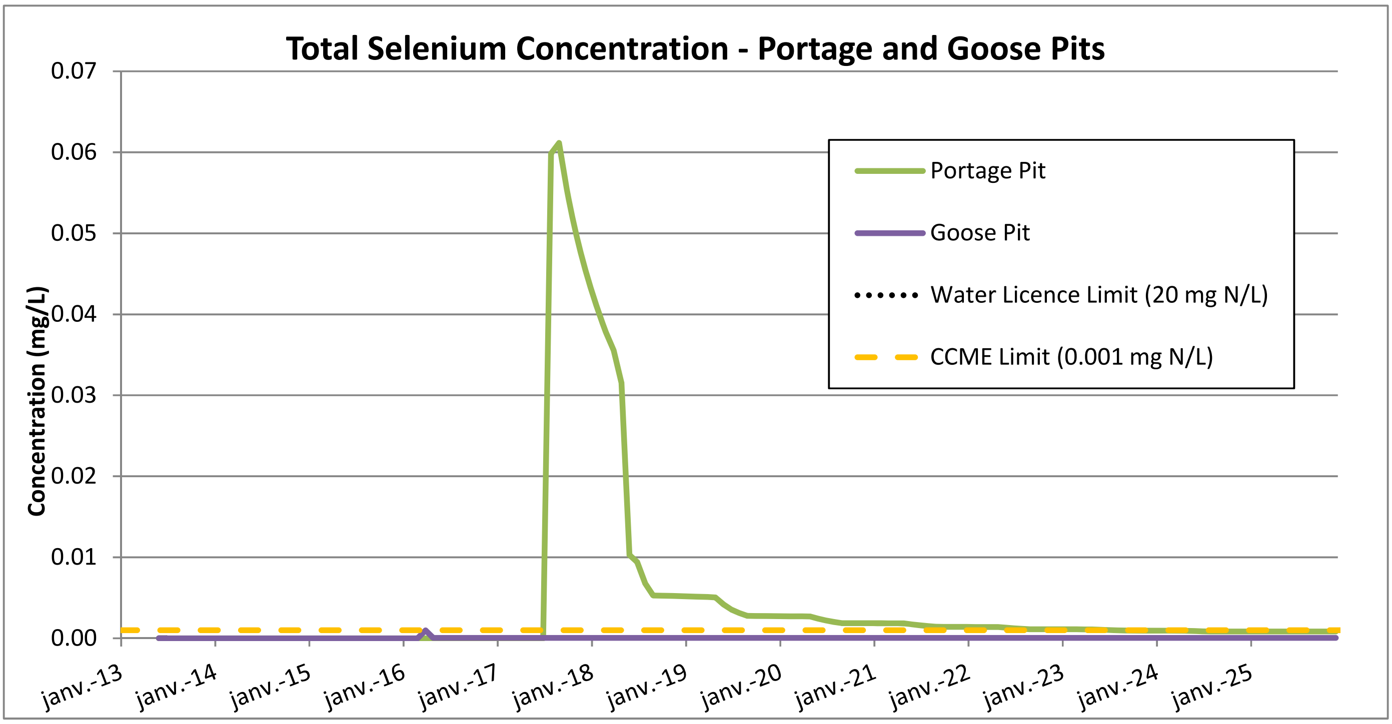


Figure 4-14: Selenium Concentration in the Portage and Goose Pits



5.0 CONCLUSION

Based on the water management plan 2014 developed by AEM, 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 2025. The water quality mass balance model was updated to forecast these long-term concentrations.

5.1 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 here:

- 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 limited set of water quality analysis results provided by AEM:
  - Water quality data provided for ST-21 is taken from samples collected at the surface of the North Cell TSF Reclaim Pond;
  - Limited water quality data available for the Mill Effluent;
  - Limited water quality data for some of the inflows and outflows of the Reclaim Pond.

5.2 RESULTS SUMMARY AND TREATMENT

Based on the results of the water quality mass balance presented in section 4.2, treatment may be required for copper as the pit water quality may exceed CCME limits if the water is not treated. 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 copper prior to discharge in Portage Pit is caustic or lime precipitation.

However, the forecasted equilibrium concentration for copper in Portage Pit meets the CCME guidelines. Consequently, treatment may not be required if it can be demonstrated in the field that these forecasted equilibrium concentration can be attained.

It is important to note that the water quality in the pits will be subject to CCME guidelines once the water level in the Goose and Portage Pits are equal to the water level in Second

Portage Lake. The dikes will only be breached once the water quality in the pits meets CCME guidelines.

5.3 RECOMMENDATIONS

The water quality 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. In addition to the current set of chemical analyses, regular (at least monthly) monitoring of all inflows and outflows of the North and South Cells TSF Reclaim Pond for cyanide, total and dissolved copper, total and dissolved iron, ammonia, nitrate, chloride and selenium should be undertaken.
2. Implement a water sampling and analysis program once reclamation of the North Cell TSF commences to confirm copper equilibrium concentrations, as well as other parameters, once no Mill Effluent is added into the TSF Reclaim Pond. This could be carried out between the months of December 2014 to May 2015 while no tailings are being deposited in the North Cell TSF.
3. Regular analysis are also required of the Mill Effluent water discharged to the TSF in order to better monitor the changes in cyanide, copper, iron, ammonia, nitrate, chloride and selenium concentrations. Samples should be taken at least once a quarter.
4. Once transfer of South Cell Reclaim Water begins to the Portage Pit (August 2017), regular (at least monthly) monitoring of all outflows of the TSF Reclaim Pond for all parameters should be undertaken.
5. Sample and analyze the North and South Cell TSF Reclaim Pond at different depths and locations to determine if there is a concentration gradient in the Reclaim Pond.
6. Continued monitoring of the water in the South Cell TSF Reclaim Pond in 2015 on a regular basis to monitor the evolution of the parameters of concern listed in section 2.2.1. It is understood that this recommendation is required as per the water license.
7. 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 pit is filled with water from South Cell TSF and/or Third Portage Lake. 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.
8. 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.

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APPENDIX A
WATER QUALITY ANALYSES

1. **North Cell TSF Reclaim Pond (ST-21)**
2. **Attenuation Pond (future South Cell TSF Reclaim Pond) (ST-18)**
3. **Portage pit (ST-19)**
4. **Goose Pit (ST-20)**
5. **Additional tests requested for the Mill Effluent**

RECLAIM WATER ST-21 WATER ANALYSIS

DATE	pH	Alkalinity	Turbidity	Hardness	Ammonia nitrogen (NH_3)	Nitrate (NO_3)	Nitrite (NO_2)	Chloride	Fluoride	Sulphate	TDS	Total Cyanide	CN-WAD	Dissolved Aluminum	Dissolved Arsenic	Dissolved Barium	Dissolved Cadmium	Dissolved Copper	Dissolved Iron	Dissolved Lead
Units		mg $CaCO_3$/L	NTU	mg CaCO3/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
2014-01-02													6.52							
2014-01-08	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
2014-02-04	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
2014-03-11	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
2014-04-08	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
2014-05-06	8.19	73	10.57	949	59.5	24.2	0.24	1549	2.2	2015	3878	11.69	15.6	0.139	0.0162	0.0826	0.00267	0.7796	0.29	0.0003
2014-06-03	7.05	67	13.88	674	51.5	14.3	0.16	727	0.41	1251	2142	6.21	9.23	0.046	0.0085	0.0512	0.00065	8.398	0.02	0.0003
2014-07-01	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
2014-08-05	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
2014-09-07	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
2014-10-07		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
2014-11-04	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
2014-12-01	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

DATE	Dissolved Manganese	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel	Dissolved Selenium	Dissolved Silver	Dissolved Titanium	Dissolved Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Lead	Lithium	Manganese	Chromium	Copper	Iron
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	mg/L	mg/L	mg/L
2014-01-02																				
2014-01-08	0.0595	0.0002	0.5826	0.2525	0.072	0.0001	0.005	0.001							0.0003				9.135	
2014-02-04	0.0141	0.0004	0.7348	0.0754	0.113	0.0107	0.005	0.001							0.0011				10.9	
2014-03-11	0.0035	0.0004	0.6747	0.0871	0.188	0.0036	0.005	0.002							0.0009				5.466	
2014-04-08	0.0005	0.0003	0.1866	0.0578	0.273	0.0041	0.005	0.001							0.0003				0.37	
2014-05-06	0.003	0.0005	0.3037	0.0756	0.247	0.0016	0.005	0.007											0.9237	
2014-06-03	0.0447	0.0002	0.2232	0.2941	0.122	0.0042	0.005	0.001												
2014-07-01	0.0615	0.0003	0.359	0.6107	0.17	0.0001	0.005	0.001	0.163	0.0036	0.0107	0.0774	0.0005	0.00101	0.0003	0.005	0.0674	0.0006	3.538	0.42
2014-08-05	0.0212	0.0006	0.5202	0.2237	0.239	0.0001	0.005	0.001							0.0003				0.015	
2014-09-07	0.0269	0.0004	0.5631	0.5444	0.209	0.0222	0.005	0.001											0.5292	
2014-10-07	0.0285	0.0006	0.65	1.399	0.217	0.0333	0.005	0.001												
2014-11-04	0.0261	0.0009	0.721	1.518	0.222	0.1837	0.005	0.011												
2014-12-01	1.355	<0.0001	0.0641	0.2428	0.016	0.0032	0.005	0.001												

DATE	Mercury	Molybdenum	Nickel	Selenium	Strontium	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2014-01-02											
2014-01-08											
2014-02-04											
2014-03-11											
2014-04-08											
2014-05-06											
2014-06-03											
2014-07-01	0.00035	0.3672	0.6694	0.177	0.743	0.005	0.002	0.71	0.01	0.0005	0.01
2014-08-05											
2014-09-07											
2014-10-07											
2014-11-04											
2014-12-01											

ATTENUATION POND, SOUTH CELL (ST-18)

DATE	pH	Alkalinity	Turbidity	Ammonia	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	Dissolved Selenium
Units		mg $CaCO_3$/L	NTU	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
2014-06-03	6.86	113	38.9	0.12	8.5	0.0041		0.0076												
2014-07-01	7.78	96	26.3	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	0.001
2014-08-05	7.83	103	8.11		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	0.004
2014-09-07		114		0.18		0.0111		0.0054												
2014-10-13		106		0.19	11.8	0.0084		0.0065												

DATE	Dissolved Silver	Dissolved Thallium	Dissolved Zinc	Fluoride	Hardness	Lead	Nickel	Nitrate	Nitrite	Sulphate	TDS	Zinc	Conductivity	Total Cyanide
Units	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
2014-06-03						0.0003	0.0427				754	0.002	1830	0.247
2014-07-01	0.0001	0.005	0.001	0.57	318	0.0003	0.0398	1.2	0.27	471	2628	0.04	1021	0.34
2014-08-05	0.0001	0.005	0.001	0.56	406			1.3	0.21	612	1155		1497	0.462
2014-09-07						0.0003	0.0659				1283	0.006		0.346
2014-10-13						0.0017	0.0727				1363	0.012		0.336

Portage Pit (ST-19)

Date	pH	Alkalinity	Turbidity	Ammonia	Ammonia-Nitrogen (NH3-NH4)	Arsenic	Copper	Lead	Nickel	TDS	Zinc
Units	**Units**	**mg $CaCO_3$/L**	**NTU**	**mg N/L**	**mg N/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
2013-01-16	7.61	112	61.6	0.41	7.1	0.0179	0.0059	0.00015	0.0043	252	0.0005
2013-02-06	7.68	95	21.5	0.29	12.6	0.0367	0.0143	0.00015	0.0032	238	0.116
2013-03-06	7.22	111	25.3	0.99	10.7	0.0107	0.0044	0.0097	0.0045	253	0.008
2013-04-03	7.02	55	2.1	0.025	0.19	0.0011	0.0073	0.00015	0.004	57	0.001
2013-05-07	7.17	73	5.48	0.025	0.35	0.0191	0.0026	0.00015	0.0024	116	0.011
2013-07-08	8.16	53	5.74	0.025	0.71	0.0245	0.0012	0.0006	0.0063	103	0.0005
2013-08-14	7.54	50	5.76	0.025	0.25	0.0493	0.0015	0.0006	0.0094	2	0.0005
2013-09-09	7	52	1.42	0.005	0.13	0.0083	0.00025	0.00015	0.0011	54	0.004
2013-10-07	8	49	1.75	0.005	0.11	0.0139	0.00025	0.00015	0.00025	64	0.001

Goose Pit (ST-20)

Date	pH	Alkalinity	Turbidity	Ammonia	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		**mg $CaCO_3$/L**	**NTU**	**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**
2014-03-11	8.38	93	2.82	0.01	0.017	0.017		0.0005											
2014-06-03	6.82	90	30.86	0.05	2.4	0.0061		0.0022											
2014-07-01	8.21	94	79.2	0.22	5.6	0.0045	73.6	0.0005	0.016	0.0013	0.0163	0.00002	0.0005	0.01	0.0003	0.0115	0.0001	0.0191	0.0043
2014-08-10	8.22	83	7.4	0.03	0.4	0.0075		0.0022											
2014-09-08	8.24	88	16.42	0.01	0.61	0.0059	31.3	0.002	0.046	0.0059	0.0387	0.00002	0.0013	0.01	0.0003	0.1072	0.0001	0.0166	0.0253

Date	Dissolved Selenium	Dissolved Silver	Dissolved Zinc	Fluoride	Hardness	Lead	Nickel	Nitrate	Nitrite	Sulphate	TDS	Zinc	Conductivity	Dissolved Titanium
Units	**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**
2014-03-11						0.0006	0.0018				175	0.001	310	
2014-06-03						<0.0003	0.0137				288	0.001	463	
2014-07-01	0.001	0.0001	0.001	0.91	111	<0.0003	0.0109	16.4	0.39	50.9	1544	<0.001	517	0.005
2014-08-10						0.0009	0.036				319	0.003	473	
2014-09-08	0.001	0.0001	0.001	0.96	151	0.0003	0.0277	5.3	0.13	70.6	322	0.009	477	0.005

MILL EFFLUENT (ADDITIONAL TESTS)

DATE	Alkalinity	Aluminium (Al)	Dissolved Aluminium (Al)	Antimony (Sb)	Dissolved Antimony (Sb)	Silver (Ag)	Dissolved Silver (Ag)	Arsenic (As)	Dissolved Arsenic (As)	Barium (Ba)	Dissolved Barium (Ba)	Beryllium (Be)	Dissolved Beryllium (Be)	Boron (B)	Dissolved Boron (B)	Cadmium (Cd)	Dissolved Cadmium (Cd)
	mg $CaCO_3$/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
2014-01-29	91	0.22	0.16	0.01	0.003	0.005	0.002	0.025	0.022	0.17	0.14	0.001	0.001	0.39	0.37	0.005	0.0005
2014-10-26	257	0.049	0.386	0.001	0.0086	< 0.0001	< 0.0001	0.0084	0.073	0.3805	0.1018	< 0.0005	< 0.0005	0.65	0.29	0.00105	0.02071

	Chloride	Chrome (Cr)	Dissolved Chromium (Cr)	Copper (Cu)	Dissolved Copper (Cu)	Cynanide WAD	Total Cyanide (CNt)	Hardness	Tin (Sn)	Dissolved Tin (Sn)	Iron (Fe)	Dissolved Iron (Fe)	Fluoride (F)	Lithium (Li)	Dissolved Lithium (Li)	Manganese (Mn)	Dissolved Manganese (Mn)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg $CaCO_3$/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2014-01-29	2129	0.005	0.0025	25	7.8	0.898	18.80	1500	0.025	0.025	6.7	0.8	0.41	0.05	0.05	0.005	0.0015
2014-10-26	2199	0.0094	0.0046	7.942	6.795	72.96	111	4079	< 0.001	< 0.001	55.8	0.14	0.65	0.013	< 0.005	12.21	0.0013

	Mercury (Hg)	Dissolved Mercury (Hg)	Molybdenum (Mo)	Dissolved Molybdenum (Mo)	Ammonia (NH_3) (ionized)	Ammonia (NH3-NH4)	Nickel (Ni)	Dissolved Nickel (Ni)	Nitrate (NO_3)	Nitrite (NO2)	Lead (Pb)	Dissolved Lead (Pb)	Selenium (Se)	Dissolved Selenium (Se)	Strontium (Sr)	Dissolved Strontium (Sr)	Sulfate (SO_4)
	mg/L	mg/L	mg/L	mg/L	mg N/L		mg/L	mg/L	mg N/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg SO_4/L
2014-01-29	0.00005	0.00005	0.81	0.75	11.8	71.5	0.06	0.005	31.6	0.69	0.005	0.0005	0.19	0.17	2.5	2.3	2565
2014-10-26	0.00206	0.0023	0.0114	0.6517	11.3	16.7	3.56	0.8618	27.9	0.23	0.0157	< 0.0003	0.154	0.158	6.06	2.1	2400

	Thallium (Tl)	Dissolved thallium (Tl)	Titanium (Ti)	Dissolved titanium (Ti)	Uranium (U)	Dissolved Uranium (U)	Vanadium (V)	Dissolved Vanadium	Zinc (Zn)	Dissolved Zinc		
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
2014-01-29	0.005	0.005	0.025	0.025	0.01	0.003	0.005	0.005	0.01	0.0025	Certificat V-32370	Final Tailings
2014-10-26	< 0.005	< 0.005	1	0.5	0.014	< 0.001	0.0006	< 0.0005	0.028	0.03	Certificat V-39451	Final Tailings

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APPENDIX D – 2015 FRESHET ACTION PLAN

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Meadowbank Gold Mine

Freshet Action And Incident Response Plan

October 2015

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 have and will be taken by AEM 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 sample location ST-16 (2013) and seepage from the mill (inside) containment structures through the Assay Road southwest of the mill (Mill Seepage - 2013). 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 extending 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, Vault Waste Rock Storage Facility, Northwest corner of the North Cell TSF, Saddle Dam 1 corner, Saddle Dam 2 sump, AWAR culverts near the site and along the road to Baker Lake, RSF – ST-16 Seepage, Assay Road (Mill) Seepage and the Vault Pit area.

It is important that all dewatering and associated infrastructure be in good working order and adequate to receive the expected water flows associated with the freshet period; this includes but is not limited to pumps, ditch 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 2015 preparation works and roles and responsibilities is presented in the attached Appendix 1 (2015 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 respose 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

Prepared By: ____________________________

Engineering and Environmental Department

Approved by:

____

Engineering and Environmental Department

TABLE OF CONTENTS

LIST OF FIGURES

List of Appendix

List of Schedule

Schedule 1 – ST-16 Seepage monitoring program

Schedule 2 – Mill Seepage monitoring program

1 INTRODUCTION

The purpose of this Freshet Action and Incident Response Plan is to ensure that AEM can address and manage excess water associated with the freshet season at the Meadowbank site and to ensure AEM 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 AEM 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 AEM 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 2015 procedures, the roles and responsibilities and associated timelines. AEM'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 the mining pits and pit walls, the East and West diversion ditches, Vault Road culverts, the area around the Portage Waste Rock Storage Facility (RSF) including the northern portions of the NPAG waste rock extension, Vault Waste Rock Storage Facility, Northwest corner of the North Cell TSF, Saddle Dam 1 corner, Saddle Dam 2 sump, AWAR culverts near the site and along the road to Baker Lake, RSF – ST-16 Seepage, Assay Road (Mill) Seepage and the Vault Pit area.

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 the month of 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 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 April 2015. 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 reflooding process.

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-3, GP-4, GP-8 and Pond 8 will be pumped into Goose pit;
- A pumping station located in pit B (not shown) 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 in 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.

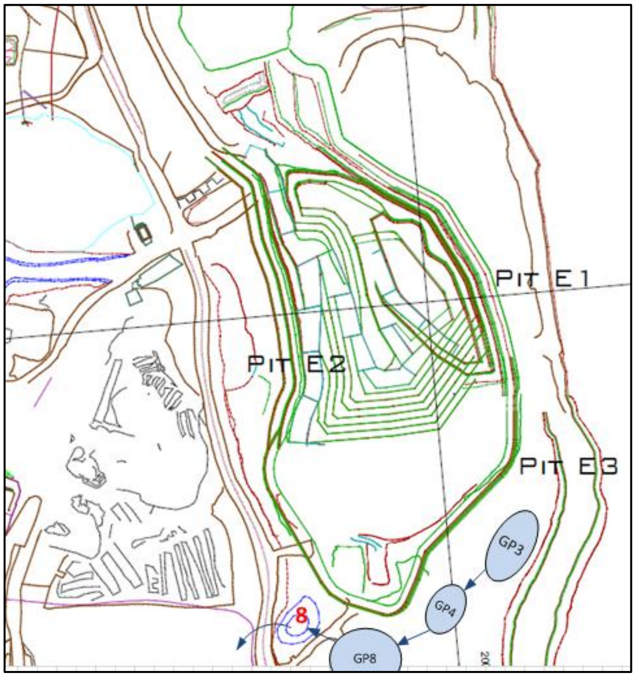

Figure 2-1: View of Portage Pit E area with the associated sumps and trenches

2.1.3 Vault Pit

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.

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. The Actiflo treatment plant is designed to remove TSS. A diffuser was installed in Wally Lake to meet the Type A Water License requirement. The Environmental department must be notified 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 inspected and commissioned to be ready for the pumping season.

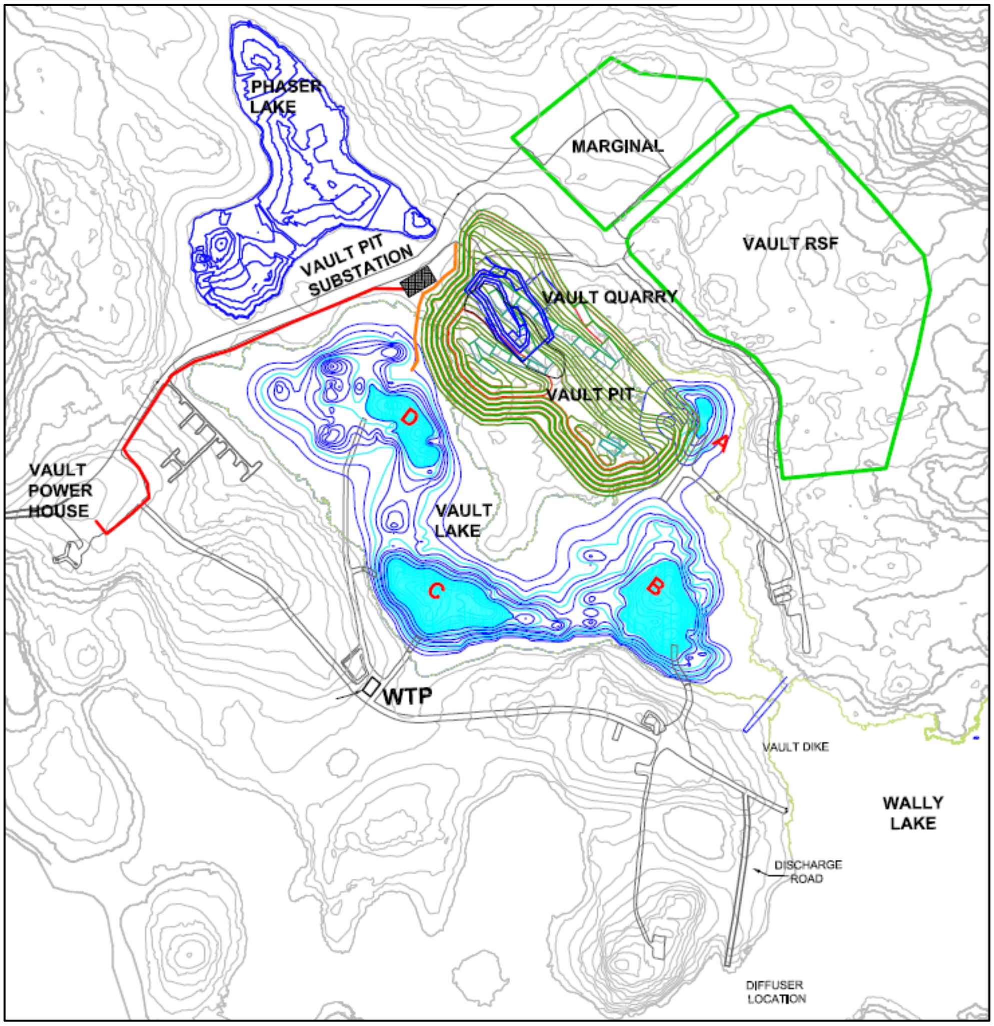

Figure 2-2: View of Vault Attenuation pond its associated ponds

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 in mid-May 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. 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 dversion 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. East Diversion Ditch low point;

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.

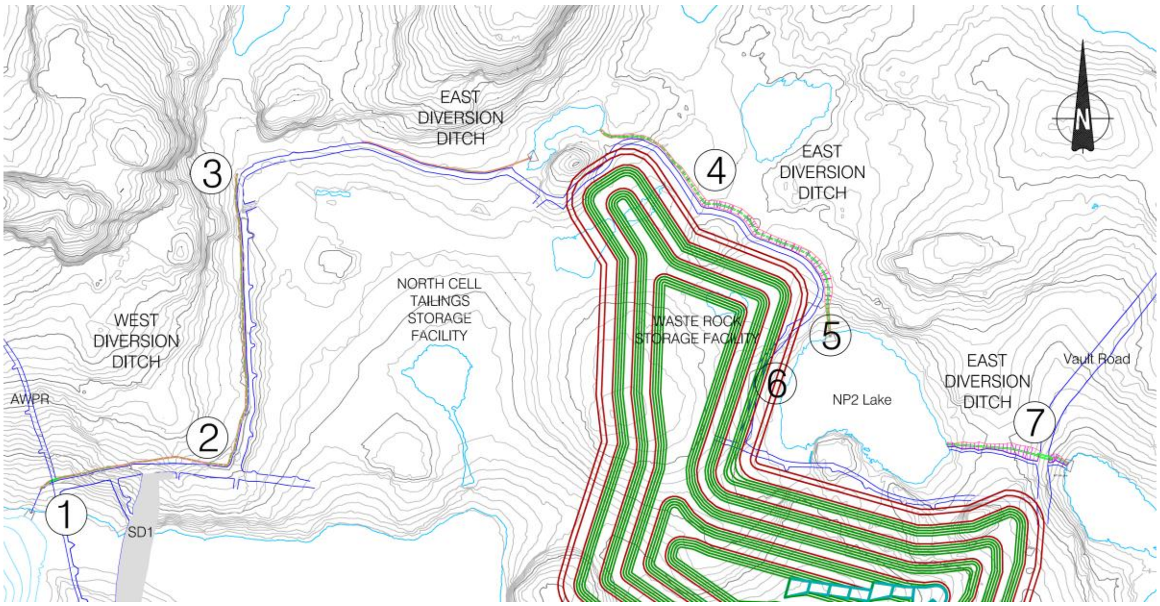

Figure 2-3: Location of the areas of interest for the 2015 diversion ditches freshet Action plan

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 in early May to prevent any back up in the West Diversion ditch. This could increase water levels upstream in the ditch causing problems discussed in Section 2.3.1.2. If necessary silt curtains will be installed at the discharge area to Third Portage Lake to control elevated TSS during the freshet period.

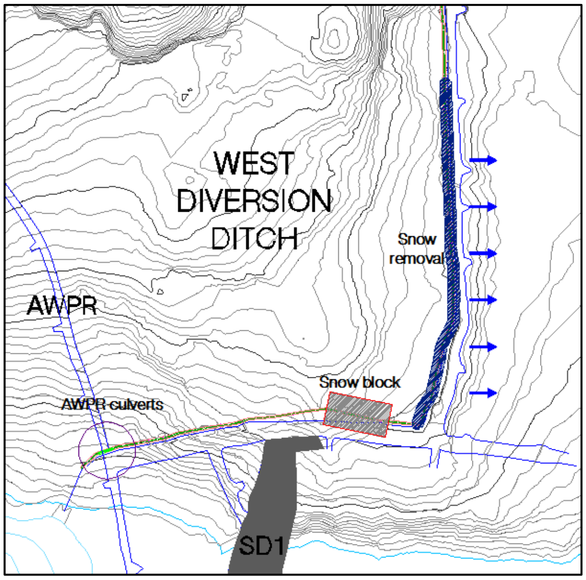

Figure 2-4: West diversion ditches area of interest

A turbidity barrier installed in 2014 has been left in place over the winter. Additional barriers can be installed after ice melt as a contingency. Daily inspections will be conducted starting in mid-May. 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), or visually elevated. If a discharge of TSS occurs, the Environment Department will notify DFO.

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 2013 a large accumulation of snow blocked the flow through this ditch at a location denoted by the red square. Water accumulated behind the blockage and raised upstream creating channels through the rockfill and into the North Cell TSF. In early May of each year, AEM 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, AEM constructed an interception sump located at the west diversion ditch elbow location in 2014. The sump has a capacity of 3000 m³. The sump is designed to intercept water coming from the most critical parts of the West Ditch. Sample monitoring will determine if there is any seepage from the TSF or elevated TSS from the ditch. If water does not meet discharge criteria it will be pumped back to the North Cell TSF. These measures will prevent any contaminated water from reaching Third Portage Lake. 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 during the freshet. Sample monitoring will also be conducted if necessary. Figure 2-5 shows the North Cell interception/settling sump after the completion of the construction.

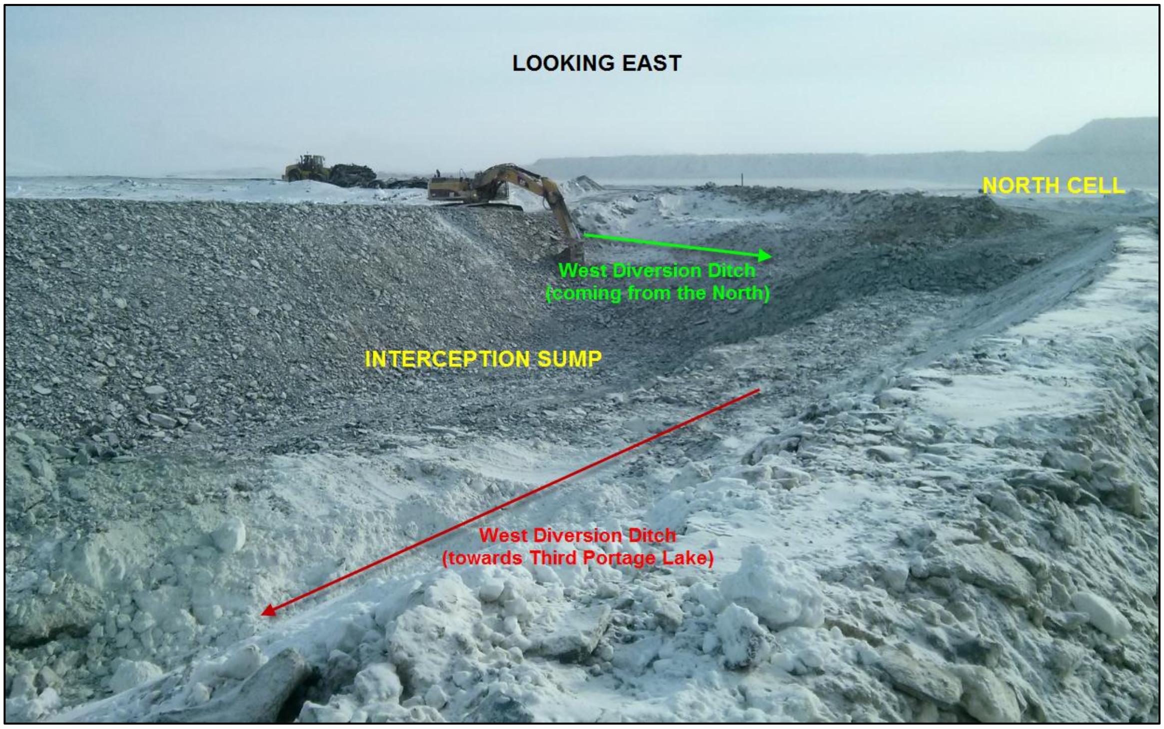

Figure 2-5: North Cell West Diversion ditch interception sump

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) is vulnerable to damage from the freshet water flow from the northern watershed (see watercourse flow in Figure 2-6 denoted by light blue dotted line). The start of the West Diversion ditch is also located in this area and is designed to collect most of the freshet flow – note arrows in Figure 2-6. In order to prevent the water from accumulating against the access construction road and possible overflow to the tailings pond, the snow and ice must be removed in early May from the areas indicated by the red circle in Figure 2-6. This is very important as the start of the West ditch is shallow, must manage a high initial flow rate and can plug easily (with snow). Also, note in the Figure 2-6 two areas where water ponded during the 2013 and 2014 freshet. As a contingency, a pump can be utilized to transfer this water to the North Cell TSF or the West Diversion ditch (non-contact water only). In addition, to prevent any contamination of Third Portage Lake, daily inspections will be completed and samples will be taken if AEM suspects that any seepage contamination is migrating out of the TSF (analysis for CN and metals). If water is contaminated with tailings, the water will pumped back to the TSF.

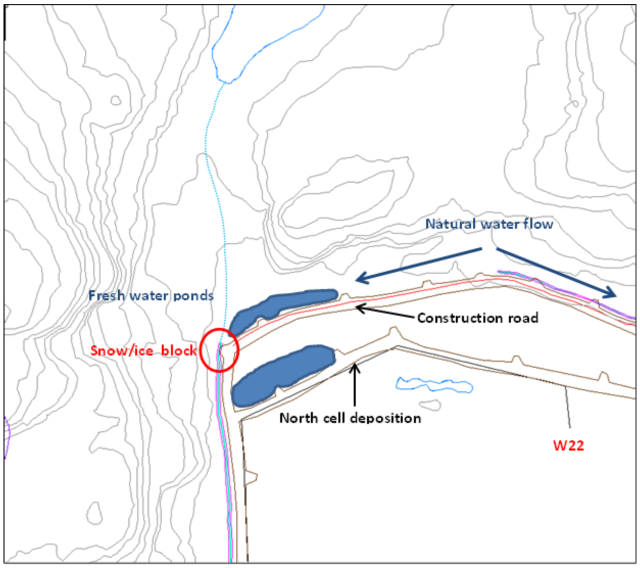

Figure 2-6: View of the northwest corner of the ditches

2.3.1.4 East Diversion Ditch Low Point

There is a low point located on the northernmost portion of the East Diversion ditch – see Figure 2-7 below and Figure 2-3 #4. Snow needs to be removed from this area, denoted by the blue arrow, to prevent watershed flow from following the historical watercourse (dotted line) and reaching the toe of the NPAG Waste Rock extension (RSF). Removing the accumulated snow in early May at a downstream location referenced by the blue arrow will allow the runoff to flow freely through the East Diversion ditch to NP-2 Lake. Daily inspections will be undertaken to ensure the watershed non-contact water flows freely in this section of the East Diversion Ditch.

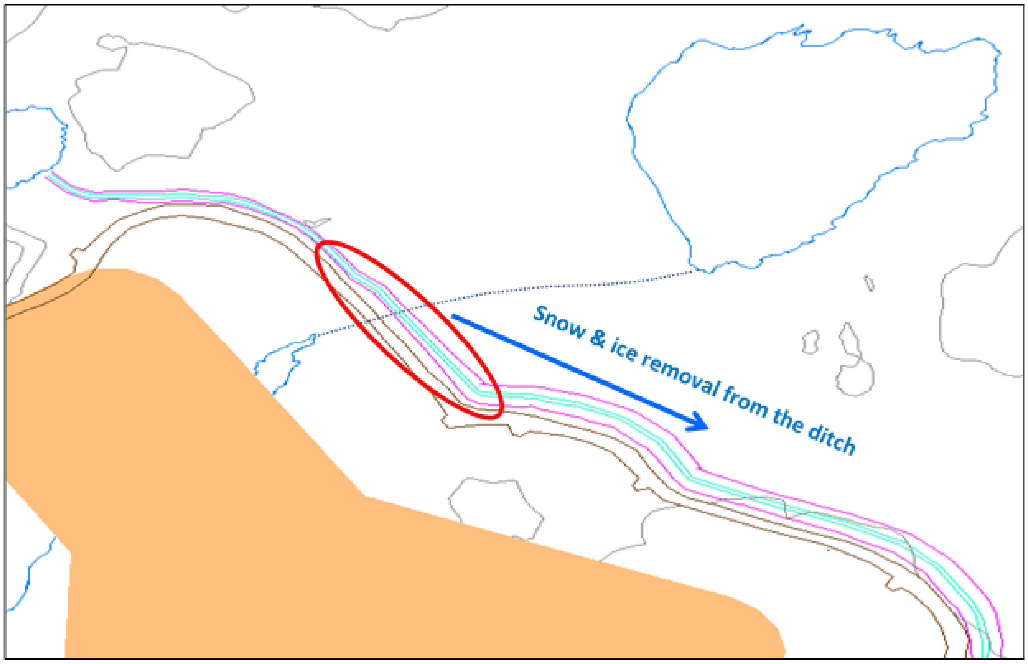

Figure 2-7: View of the north low area where a snow build up retained water in spring 2013

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 commence in early May and 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. If a discharge of TSS occurs, the Environmental Department will notify DFO.

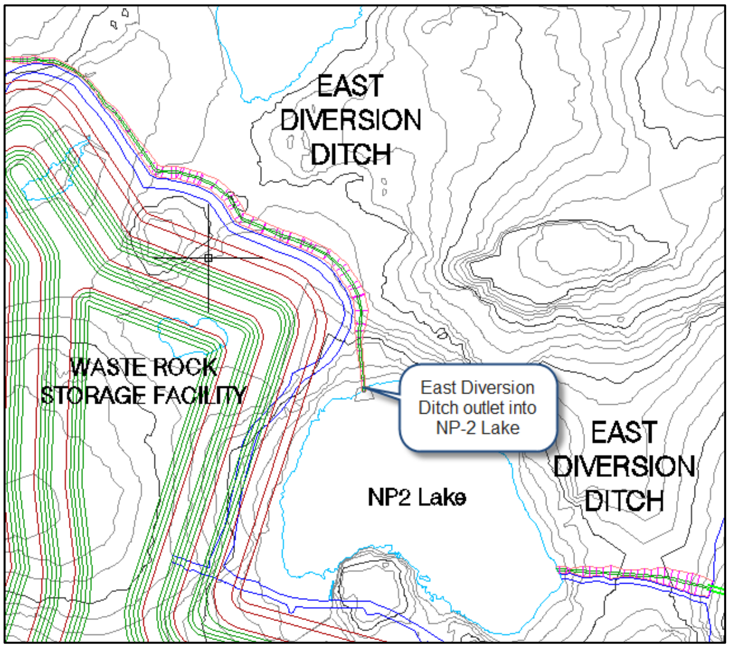

Figure 2-8: View of the East Diversion ditch outlet into NP-2 Lake

2.3.1.6 NP-2 Outlet and Vault Road Culvert

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 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 at ST-16. First, snow from the ditch between NP1 and the road (1) would be removed in early May. Next, any obstruction between the road and NP2 Lake (2) would be removed. If needed, the steam machine would be used to remove the ice and snow from inside the culvert (3) and ensure that any other ice obstructions were removed from the outlet of NP2 Lake (4) to allow free flow of melt water. Daily inspections will commence in early May and TSS sample monitoring will be conducted monthly. Sampling frequency may be increased if TSS results are near 30 mg/L (grab) and 15 mg/L (monthly average), or visually elevated. 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). If a discharge of TSS occurs, the Environmental Department will notify DFO.

In June 2015, while conducting regular inspections as per the Freshet Action Plan, AEM staff observed elevated TSS in the water running under Vault Road (culvert) toward Lake NP-1. The flow was largely localized due to a large accumulation of snow in this area, significant snowmelt occurring due to spring freshet and recent heavy rain. After some additional melting of ice and snow it was clear that water with elevated TSS was flowing past the turbidity and silt barrier that was in place from last year, onto the lake ice. A second turbidity barrier (yellow barrier #2) was installed just outside of the first barrier. Two additional barriers were also installed as a precautionary measure at the outlet of NP-1 (barrier #3) and at the inlet of Dogleg Lake (barrier #4) (Figure 2-11). The incident was of short duration and the turbidity barriers prevented migration of TSS to Dogleg Lake which is fish bearing. AEM also proceeded to raise the Vault road near NP-1 culverts (Figure 2-12). A different source of aggregate – NPAG from Vault was used (harder material) which will prevent an accumulation of fine material and will allow for water to runoff instead of accumulating or percolating through the road. For the next winter season there will be no additional snow from ploughing placed in this area.

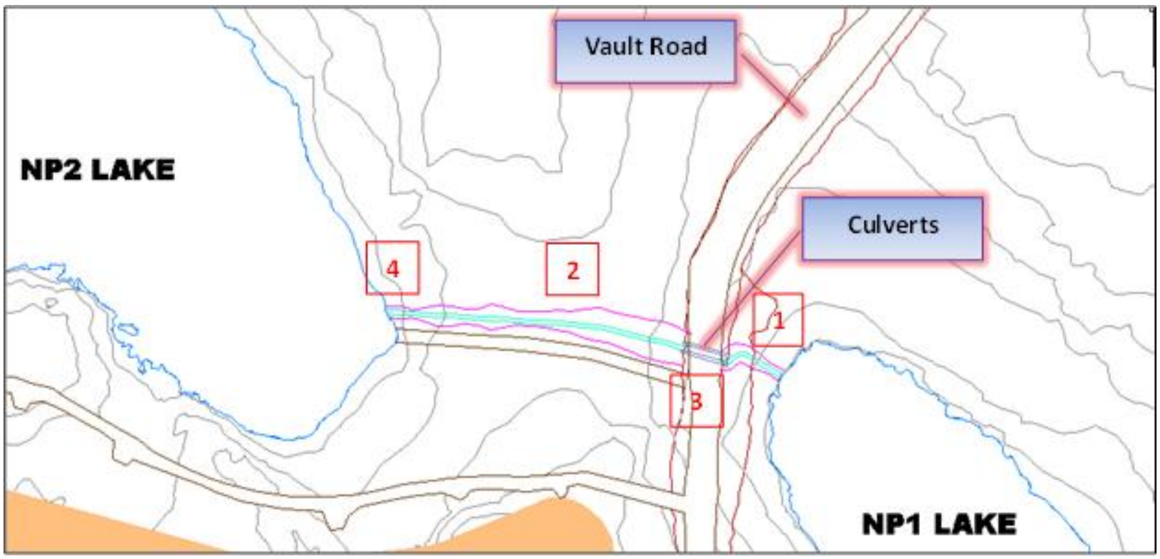

Figure 2-9: View of the diversion ditches at the Vault road area

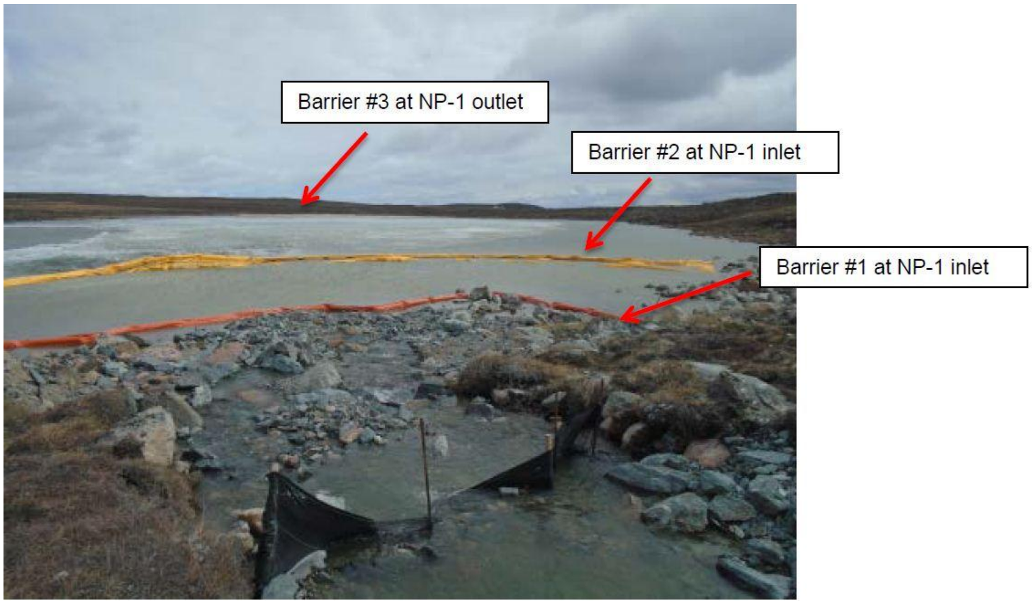

Figure 2-10:Turbidity barriers at inlet of NP1

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

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Figure 2-12: Vault Road repair

2.3.1.7 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. A natural depression should capture most of the NPAG runoff. Daily inspections will be conducted by the Environmental Department. 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. Ditching can be undertaken as a mitigation measure if required.

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 mid-May will be required for Saddle Dam 1 (SD1) to ensure that water does not pool against the toe of the dike. A pumping station located along the toe of the dike was installed previously to mitigate 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 must 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 mid-May 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 Geotechnical department.

2.4 VAULT ROAD CULVERT

The Vault road crosses over a connection between two water bodies, Turn Lake and Drill Trail Lake, at approximately km 2. A system of culverts was installed to allow flow to occur between the two waterbodies. Beginning in mid-May 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, a report will be made to the DFO. Turbidity barriers will be installed as a mitigation measure if needed.

2.5 STORMWATER MANAGEMENT POND

The Stormwater Management Pond 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 will be undertaken to determine the commencement of pumping.

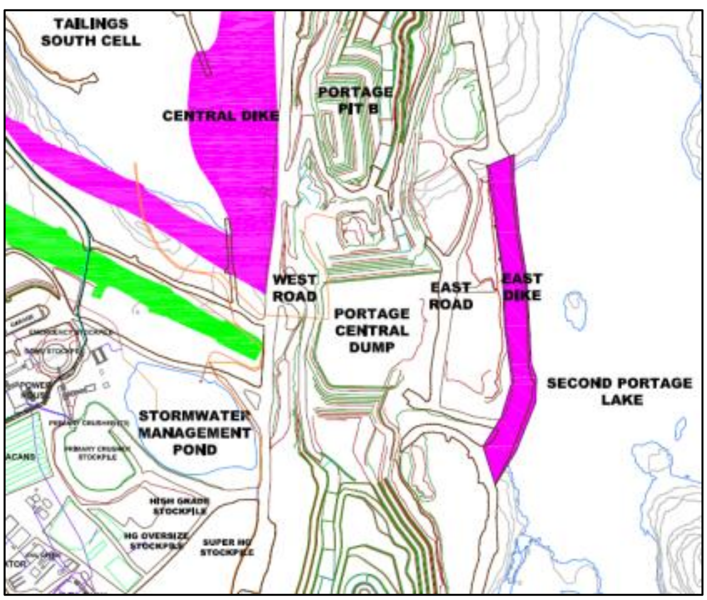


Figure 2-13: Portage Pit area with the Stormwater Management Pond

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 handing systems. The Site Service 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 Site Service 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 can 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 Site Service 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 Site Service Department if pumping can begin. If sample results permit, the pumping may begin; to direct water 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.**

2.7 AWAR CULVERTS ON THE BAKER LAKE PORTION

Weekly inspections will be undertaken at all culverts along the AWAR to ensure that water during freshet is flowing freely and no erosion is occurring. If elevated TSS levels are observed sampling will occur and the results assessed. In addition snow and ice removal may be required to allow the water to flow as per design specifications.

2.8 MEADOWBANK ASSAY LAB

The Assay Lab needs to be advised of the extra sampling that will occur during the freshet period, well in advance. Consideration should be given to reducing the initial sampling after one month period if sample results are consistent or results indicate no elevated contaminant levels. The onsite laboratory, although not accredited, can provide indicative results quickly so that mitigation measures can be implemented in a timely manner.

3 INCIDENT RESPONSE

3.1 ST-16 SEEPAGE

In July 2013, it was noted that seepage from the Waste 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). AEM 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 is continuous as it is part of AEM's Tailings Deposition Plan). A permanent pumping system was installed in 2014 in order to direct seepage back to the North Cell TSF. In addition, as mentioned previously (Section 2.3.1.6), 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. Please note that 2014 pump volumes are reportred in the AEM 2014 Annual Report within the Water Management Report and Plan (Section 3.1.9) and in Table 1 below.

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

	Volume (m^3)	
	2013	**2014**
January	0	0
February	0	0
March	0	0
April	0	0
May	0	14,591
June	0	9,294
July	2,091	3,810

August	2,900	3,386
September	1,364	1,088
October	227	0
November	0	0
December	0	0
Total	**6,582**	**32,169**

During the renewal process for the Meadowbank Type A Water License (2014 – 2015) the KIA requested additional monitoring related to this incident. The revised monitoring plan in NP-2 Lake as well as downstream lakes (NP-1, Dogleg and Second Portage Lakes) is attached in Schedule 1. A discussion and analysis of the 2014 monitoring results can be found in the AEM 2014 Annual Report (Section 8.1.4.2, pg 41 and Appendix G2). The water quality in NP-2 Lake has improved significantly and no impacts have been observed in the aforementioned downstream lakes.

As soon as the Lake and seep area are ice free the sample monitoring program will commence.

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

Also, in 2014, in accordance with the overall mitigation plan for this incident, tailings beaches were built along RF-1 and RF-2 before tailings deposition switched to the South Cell TSF on November 19 2014. Filters barriers were installed along RF-1 and RF-2 to prevent water egress from the North Cell (suspected source area). Coverplacement was installed in late 2014 and early 2015 along RF-2. Thermistors installed in 2013 indicate that freezeback is occurring along the seepage path. All the information collected in 2014 from the inspections, pumping, thermistors, and sampling results were compiled and submitted as progress reports to regulators. This report "Follow up AEM Report – Seepage Water From Waste Rock Storage Facility – Sample Location ST-16" can be found in Appendix G2 of the 2014 Annual report.

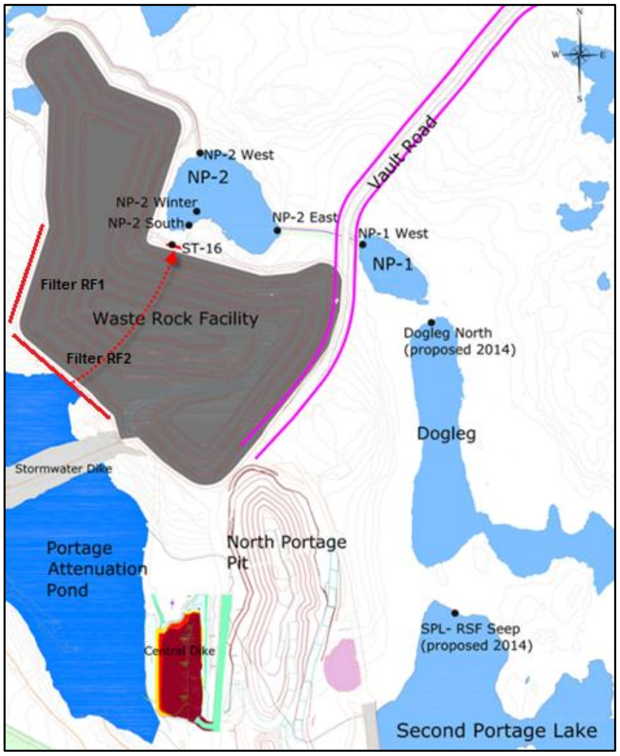


Figure 3-3-1: View of the RSF seepage observed at the ST-16 station with a red arrow representing the flow of the seepage. Red Lines represent installed filters and areas where tailings beaches were built up to minimize flow through.

3.2 MILL SEEPAGE

In November 2013, AEM 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. AEM hired 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 3-3 for the seep location. AEM completed the drilling program and based on the results constructed an interception/collection trench prior to the 2014 freshet (completed early May 2014).

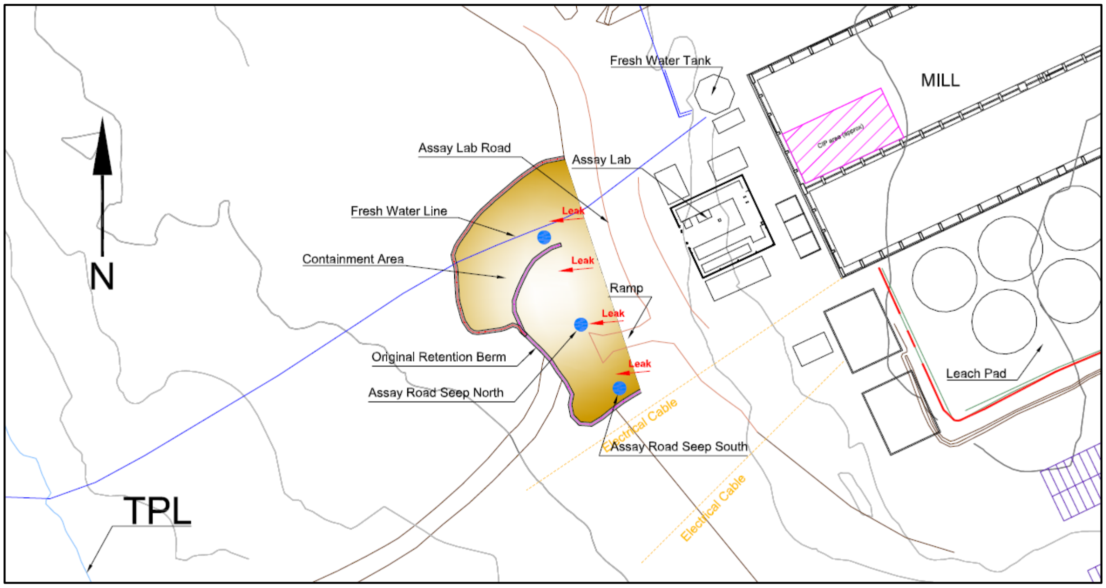


Figure 3-3-2: View of the mill seepage area and initial retention berm construction

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
January	0	0
February	0	0
March	0	0
April	0	0
May	0	2,450
June	0	1,935
July	0	1,158
August	0	3,979

September	0	2,420
October	0	1,043
November	Ice	842
December	0	871
Total	**0**	**14,698**

In addition, a recovery/monitoring well, MW-203, located beside the Assay Lab upstream of the trench is continuously pumped back to the mill to intercept the seepage. 2014 pump volumes are reported in the AEM 2014 Annual Report within the Water Management Report and Plan and included in Table 2 above.

CN WAD (on site uncertified lab) levels in MW-203 have diminished significantly over the winter of 2015 as have the flow rates. This well will remain in operation.

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. A complete discussion of the monitoring results for 2014 is included in AEM's 2014 Annual Report (Section 7, pgs 32-34). 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.

Daily inspections will be conducted of the pumping, collection systems and perimeter area and the pumped volumes will be recorded in 2015.

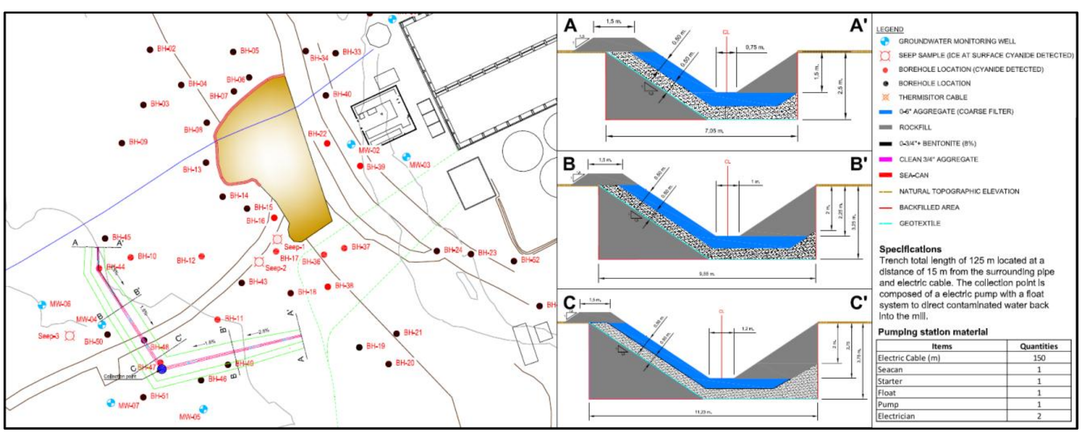


Figure 3-3: View of the mill seepage area and interception trench design

APPENDIX 1

2015 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.	Dike/Dewatering 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.	Dike/Dewatering	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-3, GP-4, GP-8 and Pond 8 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).	Geotech tech and Engineering	Before June
2.1.3 Vault Pit			
2.1.3 Vault Pit	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 (former Pond D).	Mine Operations	May to Sept
	2) Set-up pumping from pond A & D to Vault Attenuation Pond (former Pond B & C) to prevent water from flowing into the Vault pit area.	Mine Operations	
	3) Notify Environmental Department before discharging any water to Wally Lake. **NOTE: Any discharge of contact water must be through the Diffuser.**	Water engineers and Engineering	Freshet/Summer 2015
	4) Inspect all piping and discharge diffuser	Dike/Dewatering	May
	5) Inspect and commission the WTP	Dike/Dewatering	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 Department AND sample for Cn and Water License Parameters.	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 Department AND sample for Water License Parameters – ST-24.	Env. Department	May - as soon as 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 Site Service, Mine and Dikes/Dewatering	Before May 20
	2) If needed, steam to free any ice blockage.	Engineering to coordinate with Site Service, 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 Site Service, Mine and Dikes/Dewatering	Before May 20
	4) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
	5) ST-6 sampling as per Water License and monthly inspection.	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, can use onsite assay lab for this (provide notice). Extra sample to Multilab if needed.	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 DFO/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 Site Service, Mine and Dikes/Dewatering	Early May
		2) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
		3) Sample for TSS monthly (Multi Lab) and as needed for Turbidity - can use on site lab for TSS if necessary. Increase frequency of sampling if TSS near 30 mg/L (grab) and 15 mg/L (monthly average).	Env. Department	May - until Freshet complete and after rain events
		4) If water exceeds Water License criteria (TSS - 30 mg/L (grab) and 15 mg/L (monthly average), contact Engineering to pump water to TSF and temporarily stop (dam) flow through ditch to prevent impact to TPL.	Env Dept/ Eng Dept if limits exceeded, Dikes/Dewatering if pumping needed	May - as soon as freshet start and until water freeze up
2.3.1.3	Northwest corner of North Cell TSF (West Diversion ditch)	1) Snow and/or ice must be removed with an excavator to allow water flow to enter West Diversion Ditch.	Engineering to coordinate with Site Service, Mine and Dikes/Dewatering	Early May

		2) Daily inspection - keep record.	Env. Department	May - until Freshet complete and after rain events
		3) Sample if suspect Tailings water - analyse for Cn, Copper, Iron - can use onsite lab for CN WAD as indicator.	Env. Department	May - until Freshet complete and after rain events
		4) If tailings water present - water to be pumped back to TSF, contact engineering and dikes/dewatering.	Env. Dept Eng. Dept if limits exceeded, Dikes/Dewatering if pumping needed	May - as soon as freshet start and until water freeze up
		5) Tailings beach to be maintained in North TSF.	Water engineers to ensure tailings deposition	All year
2.3.1.4	East Diversion Ditch low point (E 638418, N7216815). **(area where former pipe was through road)**	1) Snow removal to allow free water flow.	Engineering to coordinate with Site Service, Mine and Dikes/Dewatering	Early May
		2) Daily inspection - keep record.	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 Site Service, Mine and Dikes/Dewatering	Early May
		2) If needed, steam to free any ice blockage.	Engineering to coordinate with Site Service, Mine and Dikes/Dewatering	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 monthly 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), or visually elevated, can use on site assay lab for this (provide notice). Extra samples to Multi 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 DFO/NWB (grab > 30 mg/L).	Env. Department	May - as soon as freshet starts and until water freezes up
2.3.1.6 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 Site Service, Mine and Dikes/Dewatering	Early May
	2) If needed, steam culvert to free any ice/snow blockage.	Engineering to coordinate with Site Service, Mine and Dikes/Dewatering	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 - see # 5 below.	Env. Department	May - before freshet starts and until freeze - up
	5) Sample for TSS monthly (Multi Lab) and as needed for Turbidity. Increase frequency of sampling if TSS near 30 mg/L (grab) and 15 mg/L (monthly average) - use on site assay lab as this location is not regulated. Multi Lab to verify levels >30 mg/l - install turbidity barrier for elevated levels	Env. Department	May - until Freshet complete and after rain events

2.3.1.7	North portion of NPAG Waste Rock Expansion	1) Daily inspection - keep record	Env. Department	May until runoff complete
		2) Sample for ST-S-XX and ST-16 metals when 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 + Eng Dept assistance if ditches needed	May until runoff complete
		3) Prevent **contaminated** contact water from reaching NP-2.	Env. Department	May until runoff complete
2.3.2	**Saddle Dams**			
2.3.2.1	Saddle Dam 1	1) Inspect pumping system	Dikes/Dewatering	Early May
		2) Daily inspection - keep record	Eng Dept and Dikes/Dewatering	May and until water freezes
		3) Start pumping to TSF when water observed. Keep volume pumped out.	Eng Dept and Dikes/Dewatering	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) Monthly Inspection - keep record.	Geotech engineer and 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, and maintain	Env. Department	May - until freshet complete and after rain events
		3) Sample monitoring for TSS, if excess turbidity observed - use onsite assay lab and Multi Lab to verify levels >30 mg/l.	Env. Department	May - until freshet complete and after rain events
		4) Report any discharge of TSS to Drill Tail to DFO (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.	Site Services and Dike/Dewatering	When required in Spring and/or Fall

2.6 FUEL TANK FARMS			
2.6.1 Meadowbank Tank Farm	1) Site Service to advise Env Dept in advance of intent to pump once ice melts in containment area	Sites Servies 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 Site Services 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 requi:re 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.**	Site Services	Probably mid-June and September
2.6.2 Baker Lake Tank Farms	1) Site Service to advise Env Dept in advance of intent to pump once ice melts in containment area.	Sites Servies 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 Site Services if pumping can begin based on sample results.	Env. Department	Probably mid-June and September
		5) Once approval given by Env Dept, Site Services can pump to tundra but must avoid erosion during pumping, ie., low flow, the volume must also be determined by Site Services personnel **NOTE: The water cannot be pumped out to the tundra if it does not meet the Water License criteria.**	Site Services	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 2015

		1) Sample for TSS and Turbidity if elevated TSS observed.	Env. Department	May - until freeze up
		2) Notify Site Services 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
2.8	**ASSAY LAB**			
2.8	Meadowbank Assay Lab	1) The Assay Lab needs to be advised of the extra sampling that will occur well in advance of the freshet.	Env. Department	May 2015
		2) Consideration should be given to reducing the initial sampling after an initial one month period. If we are managing the water as planned (i.e. on site) there is no need to require extra sampling.	Env. Department	May 2015
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 Dikes/Dewatering	Early May

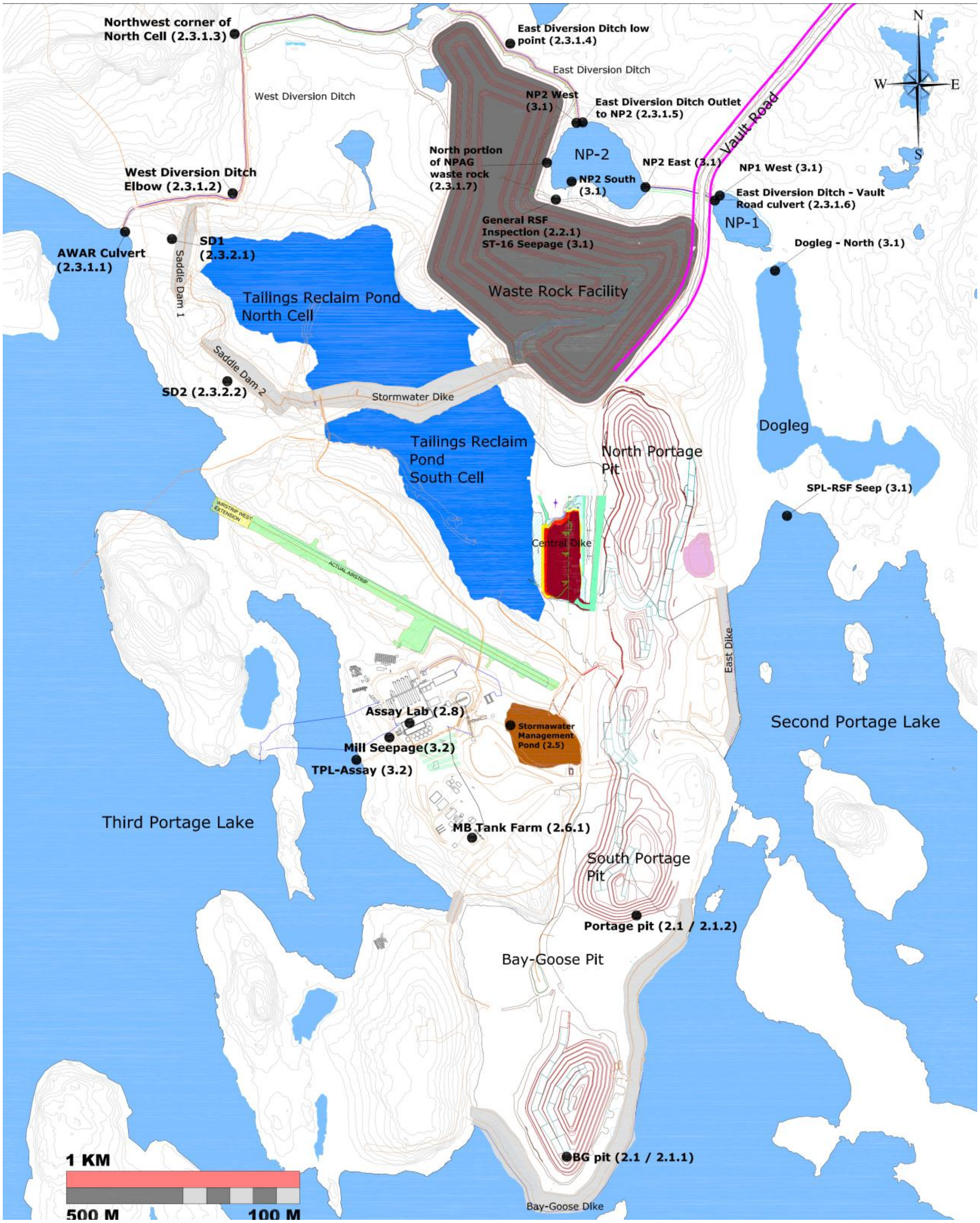
	2) If the snow accumulation is judged to be too great, then snow must be removed.	Engineering to coordinate with Site Service, Mine and Dikes/Dewatering	Early May
	3) Daily inspection - keep record.	Env. Dept, Eng Dept and Dikes/Dewatering	May - as soon as freshet starts until freeze up
	4) Notify Eng. Dept and Dikes/Dewatering 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 be reported to Env Dept and authorities.	Env. Dept, Eng Dept and Dikes/Dewatering	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 Report2015
3.2 **Mill Seepage**			
3.2 Mill Seepage	1) Pump water from the trench to the mill - volumes documented.	Env. Dept with assistance from Site Services	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 emegencies 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

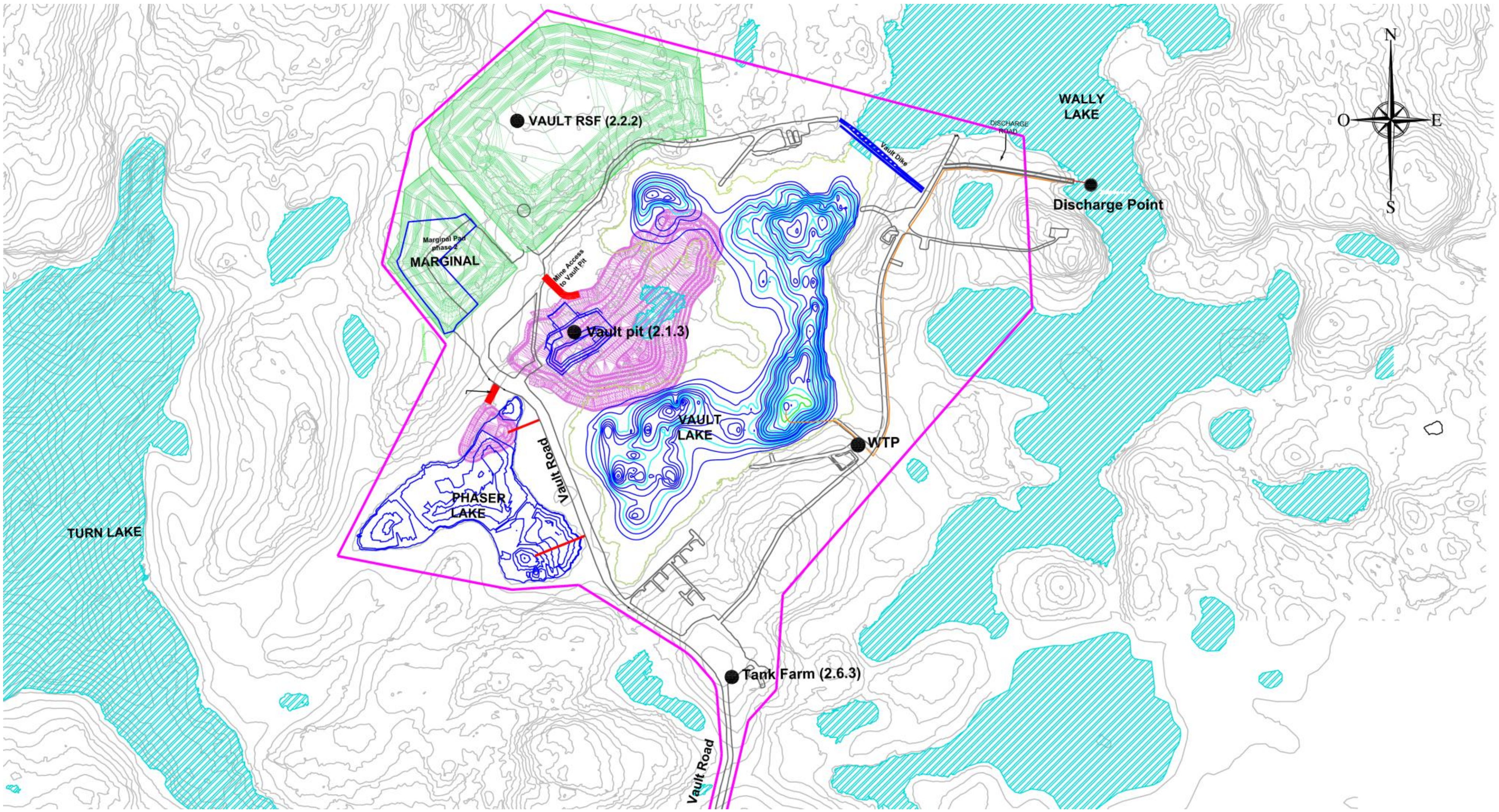
APPENDIX 2

2014 Monitoring Locations and Areas of Concern for the Freshet Action and Incident Response Plan

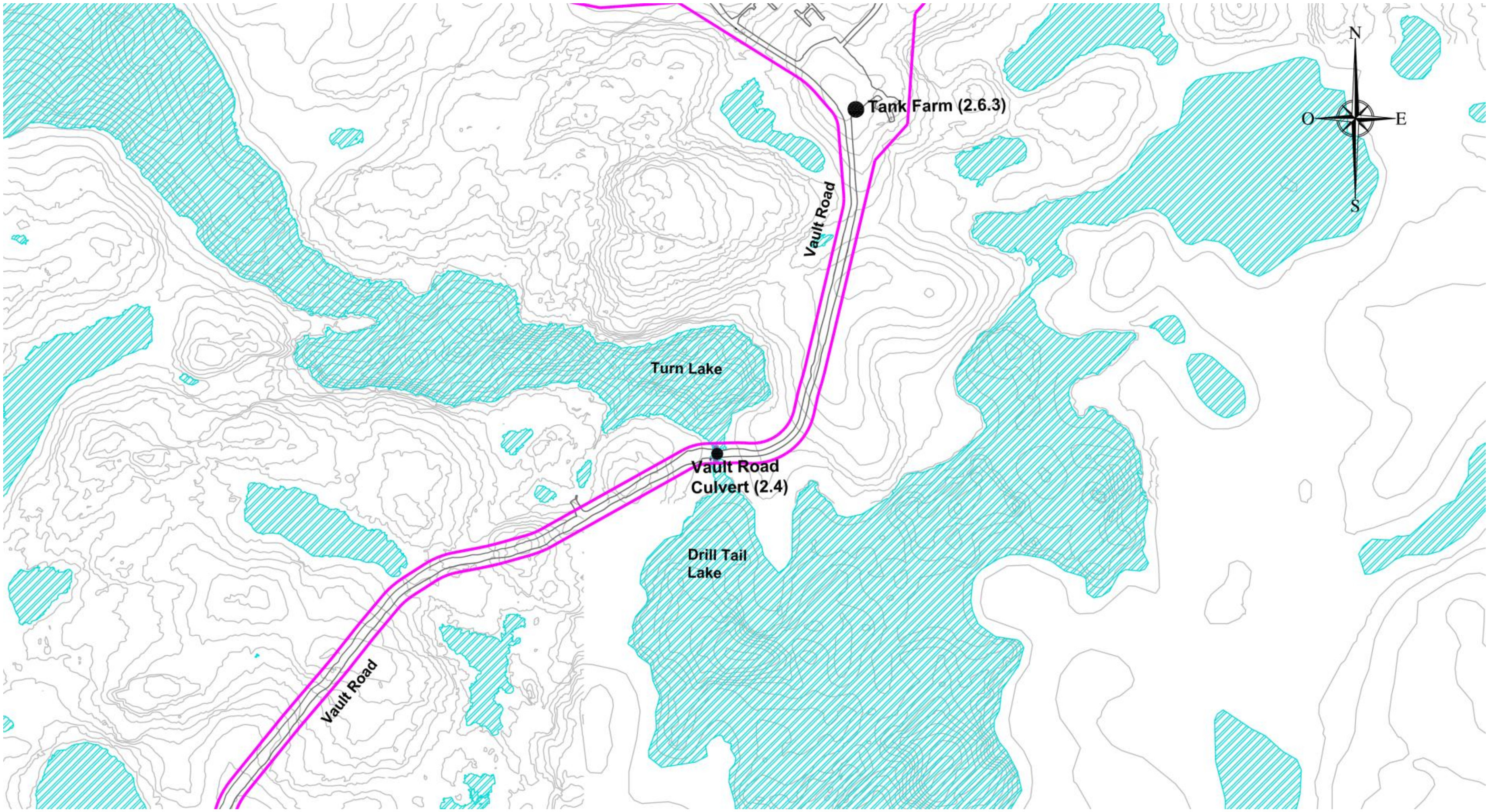
Meadowbank Areas of Concern and Monitoring Locations


Northwest corner of North Cell (2.3.1.3)
East Diversion Ditch low point (2.3.1.4)
East Diversion Ditch
West Diversion Ditch
NP2 West (3.1)
East Diversion Ditch Outlet to NP2 (2.3.1.5)
Vault Road
North portion of NPAG waste rock (2.3.1.7)
NP-2
NP2 East (3.1)
NP1 West (3.1)
West Diversion Ditch Elbow (2.3.1.2)
NP2 South (3.1)
East Diversion Ditch - Vault Road culvert (2.3.1.6)
NP-1
General RSF Inspection (2.2.1)
ST-16 Seepage (3.1)
Dogleg - North (3.1)
AWAR Culvert (2.3.1.1)
SD1 (2.3.2.1)
Saddle Dam 1
Tailings Reclaim Pond North Cell
Waste Rock Facility
Saddle Dam 2
SD2 (2.3.2.2)
Stormwater Dike
Tailings Reclaim Pond South Cell
North Portage Pit
Dogleg
SPL-RSF Seep (3.1)
Central Dike
East Dike
Assay Lab (2.8)
Stormawater Management Pond (2.5)
Mill Seepage(3.2)
TPL-Assay (3.2)
Second Portage Lake
Third Portage Lake
MB Tank Farm (2.6.1)
South Portage Pit
Portage pit (2.1 / 2.1.2)
Bay-Goose Pit
BG pit (2.1 / 2.1.1)
Bay-Goose Dike
1 KM
500 M
100 M
N
S
E
W

Vault areas of concern


VAULT RSF (2.2.2)
Marginal Pad phase 2
MARGINAL
Mine Access to Vault Pit
Vault pit (2.1.3)
Vault Dike
DISCHARGE ROAD
WALLY LAKE
Discharge Point
VAULT LAKE
WTP
PHASER LAKE
Vault Road
TURN LAKE
Tank Farm (2.6.3)
Vault Road
N
O
E
S

Vault Road areas of concern


Tank Farm (2.6.3)
N
O
E
S
Vault Road
Turn Lake
Vault Road
Culvert (2.4)
Drill Tail
Lake
Vault Road

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, Turbidity, Colour, Hardness, Bromide, Thiosulfate, Fluoride, Thiocyanate, Alcalinity, Ammonia-nitrogen, Total Ammonia, Nitrite, Nitrate, TDS, Chloride, Sulfate, Ortho-Phosphate, TOC, TSS, Dissolved Oxygen (DO), Total Kjeldahl Nitrogen (TKN), Mg, K, Dissolved and total metal: Al, Ag, As, Sb, Ba, Be, B, Cd, Cu, Cr, Co, Fe, Pb, Li, Mn, Hg, Mo, Ni,Se, Sr, Tl, Sn, Ti, U, V, Zn, and Chlorophyll A (Lake site), CN tot / CN Wad, Total P	Multilab	ST-16 NP-2 South NP-2 West NP-2 East NP-1 Dogleg SPL	Monthly
CN Free	SGS	ST-16 NP-2 South NP-2 West NP-2 East NP-1 Dogleg SPL	Monthly
CN Wad	Assay Lab	ST-16 NP-2 South	2x/week initially and 1x/week after 1 month

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 Cu Fe	Multilab	Trench Original Sump MW 4-5-6-7-8	Monthly
CN Free	SGS	Trench Original Sump MW 4-5-6-7-8 TPL-Assay	Monthly
pH, Conductivity, Turbidity, Colour, Hardness, Bromide, Thiosulfate, Fluoride, Thiocyanate, Alcalinity, Ammonia-nitrogen, Total Ammonia, Nitrite, Nitrate, TDS, Chloride, Sulfate, Ortho-Phosphate, TOC, TSS, Dissolved Oxygen (DO), Total Kjeldahl Nitrogen (TKN), Mg, K, Dissolved and total metal: Al, Ag, As, Sb, Ba, Be, B, Cd, Cu, Cr, Co, Fe, Pb, Li, Mn, Hg, Mo, Ni,Se, Sr, Tl, Sn, Ti, U, V, Zn, and Chlorophyll A (Lake site), CN tot / CN Wad, Total P	Multilab	TPL-Assay	Monthly
CN WAD	Assay Lab	Trench Original sump MW 2-3-8-201-202-203	2x/week initially and 1x/week after 1 month

APPENDIX E – 2014 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

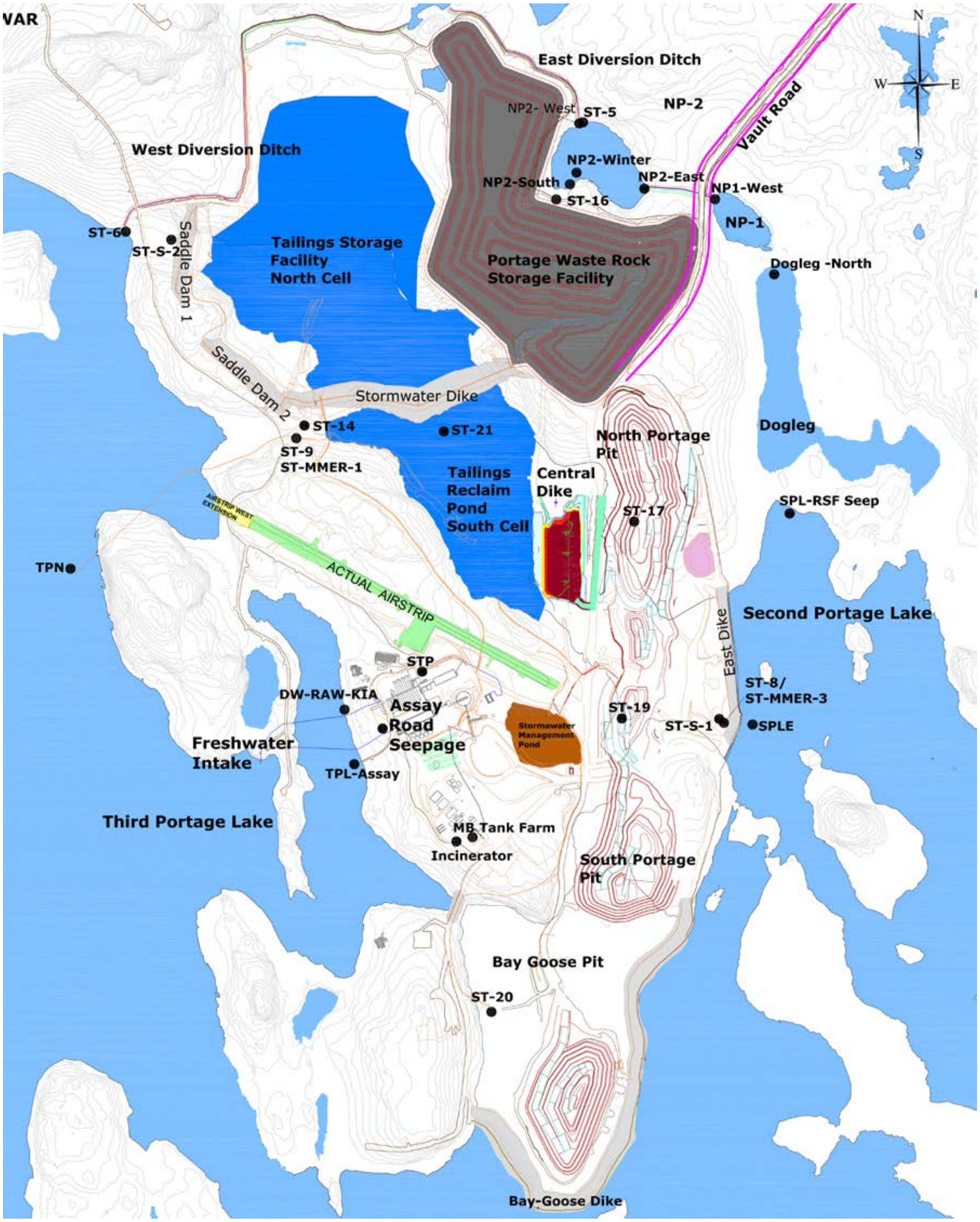
NWB (Nunavut Water Board License) (2008). Water License No: 2AM-MEA0815. Agnico- Eagle Mines Ltd. June 2008.

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
Dogleg
ST-9
ST-MMER-1
North Portage Pit
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-8/ ST-MMER-3
ST-19
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

DYNO
Dyno Nobel
Groundbreaking
Performance

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:

<u>DNCI Corporate contact :</u> A DNCI corporate employee who is assigned to receive Emergency Calls at all times from the answering service.

<u>ER Advisor:</u> Emergency Response Advisor (ERA), who will normally be the applicable General Manager, Area Manager, or Technical Advisor who will liaise with First Responders.

<u>OSC:</u> (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

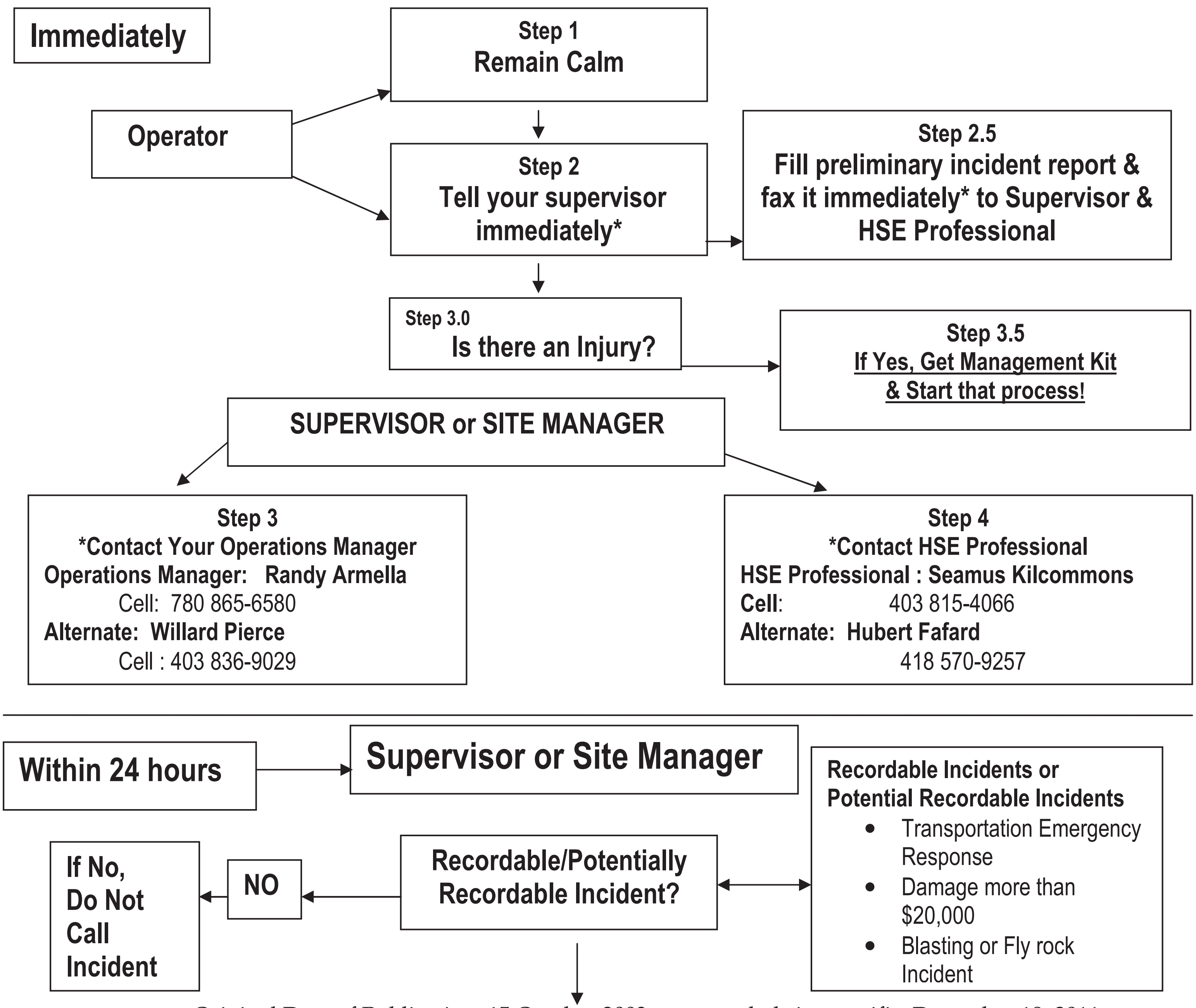
6.1 GENERAL

Reporting Incidents Flow Chart (continued on next page)

Table 6-1
Emergency Response Flow Chart

Reporting Incidents

Property Loss/Fly Rock/Environmental Spill/Injury



Yes, Not Sure?

↓

Contact Incident Report Line
1- 888-547-3966
(1-888-KIS-DYNO)
Press: "1 " and report: Actual or Potential MTIs, RWIs, LTIs, Transportation Emergency, Blasting or Fly Rock Incidents, Environmental Spills, Property Damage over $20,000

Within 72 hours → **Supervisor or Manager**

Complete ICARUS Report & Submit to HSE Professional & Operations Manager

Complete Investigation and RCA with Help of HSE Professional

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:	**Type of Facility:**
Agnico-Eagle Mines Ltd. - Meadowbank	Bulk Explosives Site

PO BOX 540
Baker Lake, Nunavut
X0C 0A0

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: **NRC License:**

Agnico-Eagle Meadowbank Mine

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

[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: